

## Education for Digitalization of Energy

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### *Deliverable 4.1*

# *Identification and assessment of VET systems for delivery of skills and professional knowledge to address digitalization*

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#### **Abstract:**

This report systemically reviews the legal framework (governance, laws and policies, incentives) and organizational aspects (admission, qualification, teaching and learning, career development) behind the delivery of vocational education and training across Europe, both in general and specifically in connection with the digital roadmap established for the European energy sector. The review regards Europe at broad level and five focus countries (Germany, Romania, Spain, Greece and Sweden) in particular. The outcomes of the review will be used with a two-fold aim: a) drawing some considerations about the existing challenges that could hinder the process of digitalization in energy-related industry sectors and occupations, and b) identifying initial directions for improvement. The document is the first deliverable of WP4, and presents the results of the first year of activity carried out in task T4.1. These results will be used - together with the findings of WP2 - for the development of best practices that will be focus of tasks T4.2-T4.4.

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#### **Keywords:**

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## Table of Contents

<b>Definitions, Acronyms and Abbreviations</b> .....	<b>6</b>
<b>List of Figures</b> .....	<b>7</b>
<b>List of Tables</b> .....	<b>8</b>
<b>Executive Summary</b> .....	<b>9</b>
<b>1. Introduction</b> .....	<b>12</b>
<b>2. Legal framework of vocational education and training</b> .....	<b>15</b>
2.1. Generalities for Europe .....	15
2.2. Country review: Germany .....	16
2.2.1. VET within the German education system .....	16
2.2.2. VET governance .....	19
2.2.3. Support measures and financing in VET .....	20
2.2.4. Incentives for VET learners .....	21
2.2.5. Incentives for companies that offer VET .....	27
2.3. Country review: Spain.....	28
2.3.1. VET within the Spanish education system .....	28
2.3.2. VET governance .....	30
2.3.3. Support measures and financing in VET .....	31
2.3.4. Incentives for VET learners .....	33
2.3.5. Incentives for companies that offer VET .....	34
2.4. Country review: Greece .....	35
2.4.1. VET within the Greek education system .....	35
2.4.2. VET governance .....	37
2.4.3. Support measures and financing in VET .....	37
2.4.4. Incentives for VET learners .....	37
2.4.5. Incentives for companies that offer VET .....	38
2.5. Country review: Romania .....	38
2.5.1. VET within the Romanian education system .....	39
2.5.2. VET governance .....	42
2.5.3. Support measures and financing in VET .....	43
2.5.4. Incentives for VET learners .....	44
2.5.5. Incentives for companies that offer VET .....	45
2.6. Country review: Sweden .....	45
2.6.1. VET within the Swedish education system .....	45
2.6.2. Governance and responsibilities .....	48
2.6.3. Support measures and financing in VET .....	49
2.6.4. Incentives for learners .....	49
2.6.5. Incentives for companies that offer VET .....	51
<b>3. Organization and delivery of vocational education and training</b> .....	<b>52</b>
3.1. Generalities for Europe .....	52
3.2. Country review: Germany .....	53
3.2.1. Procedures for admission, training and awarding of qualifications .....	53
3.2.2. Organization of the dual apprenticeship scheme .....	59
3.2.3. Organization of the teaching .....	61
3.3. Country review: Spain.....	64
3.3.1. Educational procedures for admission, training and awarding of qualifications .....	64

3.3.2.	Organization of the dual apprenticeship scheme .....	68
3.3.3.	Organization of the teaching .....	68
3.4.	Country review: Greece .....	70
3.4.1.	Procedures for admission, training and awarding of qualifications .....	70
3.4.2.	VET types and the apprenticeship scheme .....	71
3.4.3.	Organization of the teaching .....	71
3.5.	Country review: Romania .....	73
3.5.1.	Procedures for admission, training and awarding of qualifications .....	73
3.5.2.	Organization of the teaching .....	75
3.5.3.	Romania's professional and technical education for the year 2020-2021 .....	76
3.6.	Country review: Sweden .....	76
3.6.1.	Procedures for admission, training and awarding of qualifications .....	76
3.6.2.	Organization of the apprenticeship scheme .....	79
3.6.3.	Organization of the teaching .....	80
<b>4.</b>	<b>Policy on VET digitalization with echoes in the Energy sector .....</b>	<b>81</b>
4.1.	Generalities for Europe .....	81
4.2.	Germany .....	84
4.3.	Spain .....	87
4.4.	Greece .....	92
4.5.	Romania .....	93
4.6.	Sweden .....	94
<b>5.</b>	<b>Conclusions .....</b>	<b>96</b>
5.1.	Evaluation of VET systems across Europe .....	96
5.1.1.	Germany .....	96
5.1.2.	Spain .....	98
5.1.3.	Greece .....	98
5.1.4.	Romania .....	99
5.1.5.	Sweden .....	100
5.2.	Final considerations .....	100
<b>6.</b>	<b>References .....</b>	<b>103</b>

## Definitions, Acronyms and Abbreviations

BA	German Federal Employment Agency ( <i>Bundesagentur für Arbeit</i> )
BBIG	German Vocational Training Act ( <i>Berufsbildungsgesetz</i> )
BIBB	German Federal Institute for Vocational Education and Training ( <i>Bundesinstitut für Berufsbildung</i> )
BMBF	German Federal Ministry of Education and Research ( <i>Bundesministerium für Bildung und Forschung</i> )
CEDEFOP	European Center for the Development of Vocational Training
CPD	Continuing Professional Development
CVET	Continuing Vocational Education and Training
DGB	German Federation of Trade Unions
EC	European Commission
EQF	European Qualification Framework
ESCO	European Skills, Competences, Qualifications and Occupations
ESF	European Social Fund
EU	European Union
ICT	Information and Communication Technology
IT	Information Technology
IVET	Initial Vocational Education and Training
NGO	Non-Governmental Organization
SBL	School Based Learning
SME	Small Medium Enterprise
SSA	Sector Skill Alliance
VET	Vocational Education and Training
WBL	Work Based Learning

## List of Figures

Figure 1 Methodology to assess legal framework and organization of vocational education and training .....	10
Figure 2 Simplified structure of German education system.....	17
Figure 3 VET in the German education system .....	18
Figure 4 VET in the Spanish education system .....	29
Figure 5 Public expenditure on education by activity in 2018 .....	31
Figure 6 Formal and non-formal VET in Greece .....	36
Figure 7 VET in the Romanian education system .....	41
Figure 8 VET in the Swedish education system.....	47
Figure 9 Governance and responsibilities in upper secondary education.....	48
Figure 10 Funding sources and financial flows for Swedish VET .....	52
Figure 11 Density rates of apprentices around Germany (2019) .....	60
Figure 12 Work based learning and apprenticeship in Swedish VET .....	79
Figure 13 Job openings in renewables by field of industry in 2015.....	85
Figure 14 Job openings in renewables by field of activity in 2015 .....	85
Figure 15 Percentage of VET students between 15 and 19 years old.....	88
Figure 16 Budget allocated for training actions related to digital skills for workers.....	91

## List of Tables

Table 1 Upgrading Training Assistance scheme .....	23
Table 2 Continuing training grant .....	23
Table 3 Upgrading scholarship .....	24
Table 4 Continuing education bonus .....	24
Table 5 Continuing VET scheme for unemployed people .....	25
Table 6 Bodies involved in Spanish VET .....	31
Table 7 Organization of VET system in Greece .....	35
Table 8 Overview of upper secondary VET in Germany .....	54
Table 9 overview of post-secondary VET in Germany .....	55
Table 10 Overview of tertiary VET in Germany .....	55
Table 11 Overview of advanced/specialistic VET program in Germany .....	56
Table 12 Overview of advanced/master VET program in Germany .....	57
Table 13 Specific categories of teachers and trainers in German IVET .....	62
Table 14 Specific categories of teachers and trainers in German CVET .....	62
Table 15 Overview of Lower secondary basic VET in Spain.....	65
Table 16 Overview of upper secondary intermediate VET in Spain.....	66
Table 17 Overview of Higher VET in Spain .....	67
Table 18 Summary of admission requirements and qualification for VET in Sweden.....	77
Table 19 Actions for the digitalization of the analog economy in the Spanish VET .....	89
Table 20 Actions for the implementation of the digital economy in the Spanish VET .....	89

## Executive Summary

The EDDIE project has the overall objective of setting a Sector Skills Alliance (SSA) between education providers, policy makers and industry, for the production of a Blueprint Strategy for education and professional training in the European Energy sector of the digital era. The aim of the Blueprint is to focus and meet the industry's skills demand following the Energy Transition and the Digitalization of the economy and society. In order to successfully address any technological, economic and social barrier or change, it is essential to anticipate and identify the skills demand of the industry, as well as to implement sustainable strategies and solutions for adequate education and professional training. In this regard, the Blueprint can constitute a sustainable design plan to develop and update education and training programs in response to the future requirements and changes of the Energy industry.

Taking into account multidisciplinary, as well as interdisciplinary technical, green and soft skills, the EDDIE Blueprint can prepare the ground for a new generation of engineers, researchers and technicians who have a sound knowledge of energy and IT subjects, and also the skills necessary to develop, use and improve them. Similarly, the Blueprint can establish the references that education and research providers of the European energy sector need, not only to advance their knowledge and expertise, but also to play a key role in building networks and partnerships with industry, policy makers and societal actors.

The present deliverable, **D4.1 - Identification and assessment of VET systems for delivery of skills and professional knowledge to address digitalization - concludes the work initiated in WP2, and presented in the report D2.2 (Current and future skills need in the Energy sector)**. D2.2, in fact, reports the results of an analysis devoted to identifying discrepancies between the skills demand from the modern - and highly digital - Energy industry and the skills offer from the education and training providers, with a specific

- Categorisation of technical, soft and green skills (demanded by the industry and offered by education and training providers)
- Focus of current skill gaps and future skill requirements.

Deliverable **D4.1 follows and complements the reviews and assessments in D2.2, focusing on certain aspects of vocational education and training (VET) that are not covered in the assessment presented in D2.2. Particularly, D4.1 (which is the outcome of the first year of activity of task T4.1) addresses the legal framework and the structuring/organization behind which – at present - European VET providers deliver skills and knowledge to learners and the professional world. The VET systems and programs are subject to territoriality, local regulations and local promotion more than university education.**

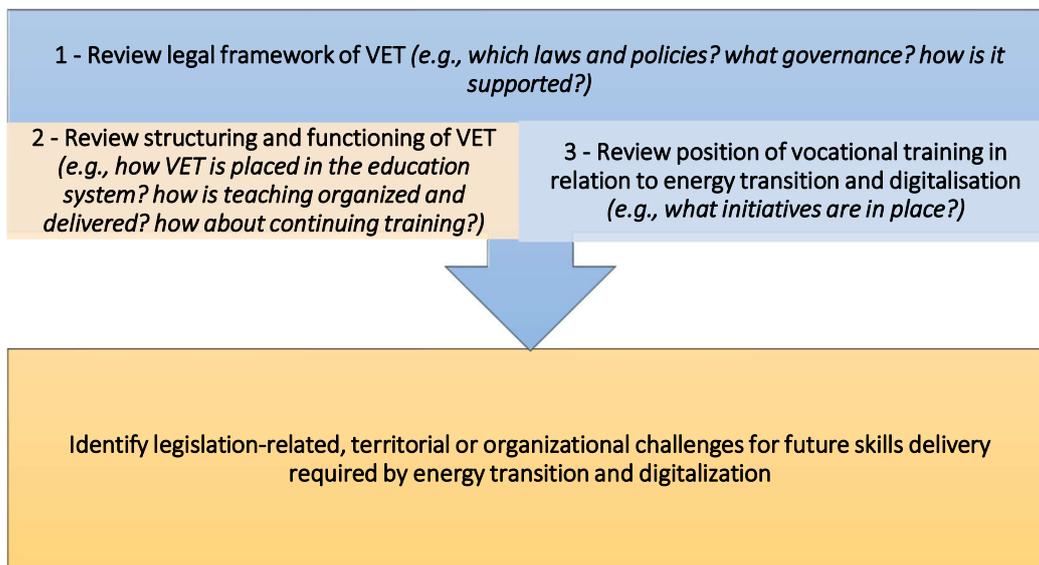
**Starting from an overview of the general scenario at European level, and taking five of the EDDIE focus countries (i.e., Spain, Germany, Romania, Greece and Sweden) as illustrative samples of the entire European VET sector, the analysis presented in this deliverable develops into four stages:**

- 1. Review of the legal framework (competent institutions, standard legislation, policy, regulations, contracts and incentive schemes) that currently characterises vocational education and training.**
- 2. Review of the current structuring and organization of learning and teaching activities in vocational education and training.**
- 3. Review of the current status and advancements in the policy and strategic actions for vocational education and training, in the view of energy transition and digitalization.**
- 4. Assessment of the main findings of the review, and derivation of key conclusions on any existing gaps and barriers - related to policy, organization or territory - that could hinder the effective operation of the VET sector at European level in response to Energy digitalization.**

All this work is crucial to identify initial directions for improvements or changes that could be necessary in legal standards, (re)structuring and (re)organization of VET to match the requirements of the future Energy sector.

The outcomes of this work, together with those of the activity of WP2, represent the basis which the Blueprint strategy will build upon.

A schematic view of the four-steps "Review & Assessment approach" that is followed in this deliverable, is given in **Figure 1 Methodology to assess legal framework and organization of vocational education and training.**



**Figure 1 Methodology to assess legal framework and organization of vocational education and training**

Currently, the European VET system still fails to provide effective and equitable employability to learners in relation to the knowledge and skills demanded by the ongoing digital transformation of the Energy sector. Alignment of the VET system with the technological advancement, economy, labor market and the society is needed to prepare the learners both theoretically and practically, and to deliver technical, green and soft skills that could be directly used in the new occupations associated with the energy transition and digitalization. In this direction, exemplary efforts are ongoing already in some European countries and vocational training systems, New digital technologies, subjects and equipment appear to be more and more present in several vocational training programs. However, the progress is not harmonic across Europe, and this is mainly due to the wide diversity in national systems of education and VET. VET systems in particular are caught in their national contexts of legislation, culture, regulation, society and economy, and in some EU member states there is even variation within the state, (such as in Germany - with its sixteen *Bundesländer* -, the United Kingdom - with England, Wales, Scotland and Northern-Ireland -, and Belgium - with its three language communities).

In an economy where the quality of the workforce is essential - for the success of an organization - as much as the alignment with technological progress and market changes, now more than ever adapting the development of training and competences with the business needs has become a challenge not only for education centers but also for in-company training providers. This is true especially for small and medium sized enterprises (SMEs) that often do not have the instruments to offer specialized education and training to their workers. Thus, in some European countries (e.g., Germany) special schemes (such as *inter-company vocational training*) were introduced by the government to guarantee full coverage of all VET elements, and with the threefold aim of creating competitiveness for the SMEs, increasing the attractiveness and accessibility of vocational training, and – as a consequence – improving the employability of people.

The introduction of digital equipment and online learning & training into the VET programs is another action supported quite extensively by the EU member States, and we can expect this to increase dramatically in the near future, as a consequence of the Covid-19 crisis. The pandemic, in fact, has revealed that digitalization is essential not only in a number of occupations (also beyond the digital and energy sectors) but also to provide seamless education and training. At the same time, the pandemic is increasingly revealing the flaws that need to be resolved in order to bring digitalization into the education and training system.

From the reviews and assessment conducted in depth on five focus countries and on the overview of the situation at European level, we can identify significant discrepancies among the vocational education and training systems, also for what concerns the general offer of programs and specific offer of training related to occupations in the energy and digital sectors. The review and assessment are carried out considering different training levels and

options (e.g., initial, continuing, advanced) as well as different competences, and including several aspects such as territoriality, local society, local policies and local economy.

Overall, the work performed through this review and assessment indicate that the most significant challenges to digitalization in education and training are related to

- The lack of European standardization (at regulatory and organization level) on specialized education and training for occupations in areas that demand highly advanced competences (such as data analytics and management, resource management, machine learning and artificial intelligence, cybersecurity, software development).
- The heterogeneity of national situations (at political, economic and societal level), and the discrepancies among the national targets and corresponding development paths.

Although the European Commission has set a clear Action Plan for the digitalization of education, and although several energy transition-related initiatives set by the EU member States call for a coherent integration of the VET curricula in order to include specialized training and education also in these areas, meaningful results are yet to be seen. However, the different territorial situations could represent a major barrier for an harmonic and homogeneous progress in this direction all around Europe.

# 1. Introduction

The digital transformation has started to transform, since the past decade, many aspects of work and daily life, reshaping dramatically the society, the labor market and the future of the economy. For this reason, the need of unlocking the potential of digital technologies also for learning and teaching, and of developing digital skills, is a clear statement in the most recent political guidelines of the European Commission (EC). Education and training not only are key aspects of personal development, social cohesion, economic progress and innovation, but also are critical building blocks for a fairer and more sustainable Europe. Increasing quality and inclusiveness of education and training systems and making digital skills accessible to everyone during the current transition to a green economy, are of strategic importance for the European Union (EU). However, employers find it hard to recruit highly skilled workers across a number of economic sectors, including in the Information Technology (IT) and Energy ones. Very few people, in fact, are up- and re-skilling to work in this sector, often because training is not available at the right time or in the right place.

The use of digital technologies is also crucial to fulfil the European Green Deal objectives and to achieve climate neutrality by 2050. Digital technologies are powerful enablers for moving to a circular economy and decarbonizing different sectors and industries (energy, transport, construction, agriculture and many others), and in this respect it is paramount to reduce the climate and environmental footprint of digital products and facilitate a move towards sustainable behavior in both their development and use.

The education and training system is becoming more and more a relevant part of the digital transformation. In fact, if - on one hand - it can control and deploy the benefits and opportunities of digital technologies, - on the other hand - it must effectively manage the risk of an urban/rural digital divide where certain people can benefit more than others. The digital transformation in education is being driven by advances in connectivity; the widespread use of devices and digital applications; the need for individual flexibility and the ever-increasing demand for digital skills. The COVID-19 crisis, which has heavily impacted education and training, is accelerating the change and facilitating the move to a new (digital) learning experience.

Digital technology, when harnessed skillfully, effectively and without discrimination, can fully support the agenda of high quality and inclusive education and training. Two are the interrelated key aspects that should be addressed before the education and training system can be redesigned in order to incorporate all the facets that are required by the digital transformation of the society, the economy and the world of world:

1. *the potential associated to deploying a broad and growing array of digital technologies* (apps, platforms, software) to enhance and extend education and training. Online, distance and blended learning are specific examples of how technology can be used to support teaching and learning processes
2. *the need to provide all learners with digital competences* (knowledge, skills and aptitudes) to live, work, learn and grow in a world increasingly mediated by digital technologies.

Addressing these two aspects requires policies and actions on several fronts, including infrastructure, strategy and leadership, teacher skills, learner skills, content, curricula, assessment and national legal frameworks. While the EU member States are individually responsible for the content of teaching and the organization of their education and training systems, actions at EU level can contribute to the development of quality and inclusive education and training by supporting cooperation, the exchange of good practices, frameworks, research, recommendations and other tools. In this respect, it is important to analyze and understand the current status of the education and training in Europe also from the perspective or legal framework and organization of activities, with the overall aim of focusing where the member States are now, in terms or disposition to, and readiness for digitalization.

From the review presented in this report, it can be highlighted that across Europe many initiatives and investments have been undertaken over the past decade in educational technology and development of knowledge and skills for the energy and digital sectors. Also, it can be highlighted that in recent years the EC have defined a clear guideline and roadmap for Digitalization and Digital Education. However, despite some progress and good examples of innovation, the national and multi-national initiatives across Europe are still limited in scale and very territory-dependent, and still have marginal impact at global European level. This could be, in part, due to the fact that the potential of digitalizing education was not widely visible and understood until some short time ago. Now, the Covid-19 crisis has put us for the first time in a situation where digital technologies, digital knowledge and digital skills have become essential not only in a number of occupations (also beyond the digital and energy sectors) but

also in the way education and training is provided. The pandemic has also revealed the shortcomings that need to be resolved in order to bring digitalization into the education and training system.

Both the digital transformation and the Covid-19 crisis open new opportunities for creation of value, technological progress and innovation that could be dramatically beneficial for the society and the economy. The Sector Skills Alliance (SSA) and the Blueprint that are central to the EDDIE strategy, represent powerful instruments to foster and facilitate the reformation of the education and training system in Europe in the direction demanded by the digitalization of the Energy sector and its workforce. The innovative industry-driven approach of the EDDIE Blueprint will be based on an innovative inter- and multidisciplinary approach that can foster technical, green and soft skills at once, as well as societal aspects, economy and gender dimension. The direct involvement of professionals and stakeholders interested in education and training will be crucial to boost the attractiveness of the energy sector. In this regard, the Blueprint will be demonstrated and validated in selected *focus countries*, launching new approaches and tools based on digital technologies and subjects.

Effective collaboration and coordination between the EDDIE partners and other relevant stakeholders from the professional and education world, will be crucial to develop a Blueprint strategy that can capture technical, economic and societal trends and needs of the present and the future at European level. In fact, the targets of the EU cannot be attained without

- on one hand, the participation and agreement of the stakeholders involved in the digital energy transition;
- on the other hand, (re)developing different skills for different needs in different systems, including the education and training system, in order to incorporate digitalization as a driver of the transformation required in the energy sector globally.

The (re)development of an affective and equitable education and training system must start from the knowledge of the state of the art, and from an understanding of the current policies and practices that are at the basis of the delivery of education and training. In this respect, the present document concludes the analysis (initiated in WP2 of the EDDIE project) of vocational education and training (VET) across Europe, addressing the legal framework and the organizational aspects behind its delivery. Particular attention is given to the EDDIE focus countries (namely, Germany, Spain, Romania, Greece and Sweden), as they well illustrate the variety of VET systems that can be found across the EU member states, both with synergies and with differences at societal, territorial, political and economic level.

Once established that the digital transformation is increasingly becoming vital for the progress of the economy, of all the industry sectors as well as of the society, it is important to understand its consequences and challenges in terms of upgrading the policy and delivery of education and training, in connection with the transitions that are ongoing in the Energy sector (which is of specific reference for the implementation of the EDDIE Blueprint). Therefore, in the present work, the impact of digitalization on VET policy and delivery must be especially referred to – and interpreted for - the occupations of interest for the energy transition. Our analysis, in this case, builds systemically upon a top-down approach that starts from the most comprehensive consideration of the energy transition as the *“pathway toward transformation of the global energy sector from fossil-based to zero-carbon by the second half of this century”*, for which the digitalization is only one – although dominant – facet (together with information technology, smart technology, policy frameworks and market instruments).

It must be considered that the digital transformation itself is strongly influenced by the progressive changes and developments characterizing the sectors it affects, and for this reason, any digitalization process will have to undergo updates over time, based on the requirements of the industry. In the case of the Energy sector, the evolution and developments are continuous and unstoppable, following the qualitative and quantitative requirements associated with the energy supply and offer on one hand, and with the energy consumed and demanded on the other hand. A variety of heterogenous factors come into play in this evolutive process, such as the environmental and climate changes, variations in the demographics, geopolitical conditions, or the human activity. In this context, the digitalization of the education and training of future professionals – which must be supported by specific policy and methods for the delivery of professional knowledge and skills - can represent an incredibly useful resource to reach the EDDIE objective.

## *Structure of the document*

The core of this document consists of the four remaining chapters:

- Chapter 2 presents a review of the legal framework that characterizes European VET: first a broad picture is given at EU-wide level and then we focus in detail on the abovementioned five focus countries, discussing for - each of them – how the VET system is regulated, what authorities and actors are involved, and what incentives are planned to promote professional knowledge and training.
- Chapter 3 addresses the organization of the education and training, covering different aspects related to delivery of teaching, learning process and contents, methods for admission and certification of qualifications. As previously done, we first present a brief overview at general European level, and then we focus our attention on the five focus countries.
- Chapter 4 reviews how much – at present – European VET is disposed towards and ready for the delivery of competences in the sectors of IT and Digitalized Energy, in terms of EU-wide actions and of national strategies at regulatory and organizational level.
- Chapter 5, which represents the Conclusions section, evaluates the main findings of the review at EU-wide level and for each focus country. These findings will be used to extrapolate – at a global European level - some important conclusions on the challenges that should be addressed in future (and in the next steps of the EDDIE project) in terms of VET standardization, regulations, curricula and methods, in order to shape professionals with highly advanced digital knowledge and skills, as it is demanded by the modern Energy industry.

## 2. Legal framework of vocational education and training

In this chapter, we review the general legal framework behind European VET systems, describing the main aspects that characterize their establishment within the education framework, as well as the governance, general policy and forms of promotion around the community (general incentives and financial support).

First, we provide a “broad picture” of these aspects at EU level, taking into account that the systemic assessment of this information comprehensively for the whole continent is very complex due to the diversification of VET models and mechanisms adopted in the various EU member states, in relation to the developments within the national economy, political situation and society. Then, we focus our attention on the legal frameworks and policies that establish the VET systems of five focus countries of the EDDIE project (Germany, Spain, Romania, Greece and Sweden), providing for them a more in-depth analysis.

### 2.1. Generalities for Europe

In Europe, vocational education and training can rely on a well-developed network of providers, which are governed with the involvement of social partners, such as employers and trade unions and in different bodies, for example chambers, committees and councils. The system usually consists of initial and continuing VET:

- *Initial vocational education and training (IVET)* is usually carried out at upper secondary level before students begin working life. It takes place either in a school-based environment (mainly in the classroom) or in a work-based setting, such as training centers and companies. This varies from country to country, depending on national education and training systems, and on economic structures.
- *Continuing VET (CVET)* takes place after initial education and training, or after beginning working life. It aims at upgrading knowledge, helping citizens to acquire new skills, retrain and progress their personal and professional development. CVET is largely work-based with the majority of learning taking place in a workplace.

On average, 50% of young Europeans aged 15-19 participate in IVET at upper secondary level. However, the EU average hides significant geographical differences in participation ranging from 15% to more than 70%.

#### Governance

VET governance regards the structure of VET, how it is operated and financed, as well as the system of quality assurance that underpins it. It can be defined as “*the formal and informal arrangements that determine how decisions relating to provision are made, who makes them and on what basis*”. [REF1] Effective VET systems are based upon governance mechanisms that carefully balance multiple interests that are mainly related to the territorial situation; hence, there is not one right form of governance model for education or for VET that can be implemented across all EU countries.

#### Policy framework

In contrast to general education, where EU member states defend their autonomy, VET has been open to European cooperation from the beginning of the European integration process in 1957. [REF2] While mobility and cooperation projects progressed over the years, only in the 2002’s Copenhagen Process and declaration we can retrieve the foundation for the current EU’s key policy instruments. Since then, the European VET has been strengthened, with particular focus on improving transparency of qualifications and quality of education and training. Nevertheless, despite any attempts, until now there is no EU common VET framework, and all the various mobility activities as well as other instruments - such as EQAVET, ECVET, EQF, ESCO or the EafA<sup>1</sup> - have not yet reached European

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<sup>1</sup> ECVET: European Credit system for Vocational Education and Training – EQAVET: network for European Quality Assurance in Vocational Education and Training. – EQF: European Qualifications Framework. – ESCO: European classification of Skills/Competences, qualifications and Occupations – EafA: European Alliance for Apprenticeships.

citizens (students and employers alike) on a broad scale. On the other hand, the impact of the Copenhagen process is clearly visible in a very specific, territory-dependent way, in all EU member states.

### *Education framework*

In most EU countries, VET is predominantly addressing young people (with initial VET), providing qualifications at the middle level of education (ISCED-11 levels 3-4, EQF levels 3-4), financed from education budgets and coordinated by central governments.

However, the differentiation of VET among the EU member countries is clear from the variety of types and programs, and impressive diversity can be seen even for certain segments and types of VET for which homogeneity could be expected, such as apprenticeship programs. These, for example, differ based on the territory in terms of their position in the overall national skill formation system and the number of apprentices enrolled, in terms of duration (one to four years), in terms of structure (one-phased, two-phased) or target group (youth, adults, unemployed).

### *Financing and other support measures*

In general, European's upper secondary education is mainly funded by the State, whereas some other types of VET - such as the dual system of apprenticeship - require strong financial contributions by employers. State institutions and social groups make considerable use of vocational qualifications as an instrument to actively overcome unemployment and improve business competitiveness. Corresponding activities have been introduced in the form of a virtually indeterminate number and variety of financial support programs and measures, at national, regional, local and sectorial levels for diverse target groups and educational processes. Therefore, it is virtually impossible to present even an approximately complete documentation of their concrete design at common EU-level.

From country to country, it is possible to identify a number of other important differences and territory-specific characteristics of VET, for example:

- Vocational education at upper secondary and post-secondary level is more diversified than general education. Most countries have one or two dozen different upper secondary general education curricula, but several countries offer more than 200 programs for vocational education.
- Although upper secondary general education is standardized in most countries, for VET curricula the principles, scope and expected education outcomes are standardized only in some of them.
- The degree of ownership and business interest in VET differs around the EU countries, and this is also aggravated by the influence that national organizations and trade unions have on the operation of vocational tracks relevant to their industries.

## **2.2. Country review: Germany**

In Germany, the dual system of apprenticeship training has historically been very strong, but its dominant position is being challenged by other training routes that gain increasing significance, particularly tertiary education. The growing attractiveness of school-based programs is linked to the gender impact of the VET system and the gender segmentation of the labor market, while academization reflects better the labor market demands for high skills. With dual study programs and three and a half-year dual training, the dual system seeks to provide popular training options for highly skilled young people. This, however, has made access to fully-qualifying vocational programs very difficult for low-achieving young people, including migrants and refugees, thereby challenging the integration function of the German VET system.

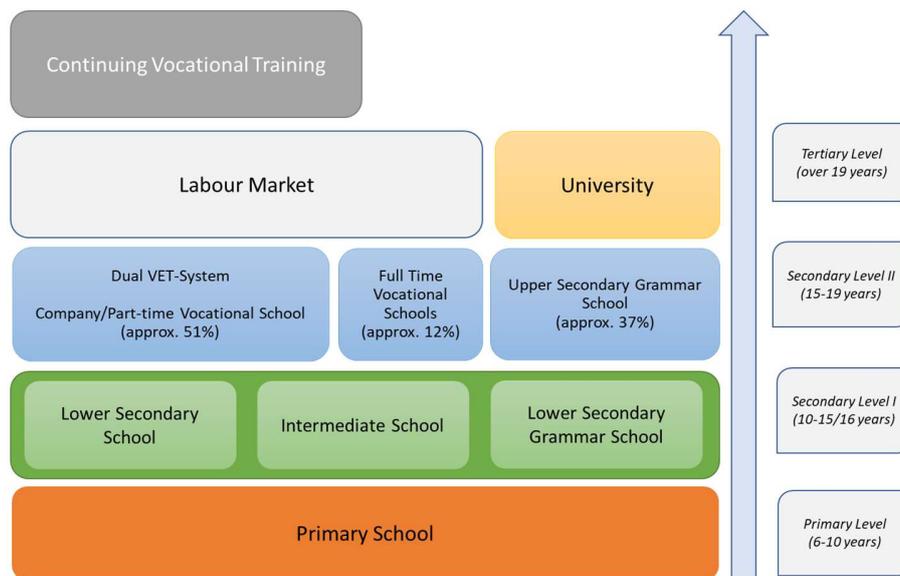
### **2.2.1. VET within the German education system**

Education in Germany starts later than in other European countries (e.g. Italy or UK), with primary school beginning at age six. The grouping of children based on comparable skills or needs (the so-called "streaming") is introduced at very early (from the age of 10) and this is the subject of current controversy in Germany, because many believe

this to be too young. Streaming is based upon discussions between parents and teachers, and it is possible to move between different streams. From 10 to 15 the children will be streamed into one from [DE1], [DE2]:

- Lower secondary school,
- Lower secondary grammar school
- Intermediate school

At the age of 15, children are further streamed into one of three major options (ref. **Figure 2**). Upper secondary grammar schools are focused upon academic learning and cater for 37% of young people, whilst the largest destination is the Dual-VET (*apprenticeship*) system. This is termed “dual” as the learning takes place both in school and in work. The young people will remain within this system until they are 18 years old. [DE3], [DE4]



**Figure 2 Simplified structure of German education system**

(own elaboration)

Germany is one of the European countries where the *dual system of apprenticeship* - with two learning venues: 70% work-based and 30% school-based - is the main pillar of VET. About one in two secondary school graduates chooses a vocational path, mostly apprenticeship. Progression is possible through various regulated VET programs provided at post-secondary and tertiary level.

The German education system entails initial and continuing vocational training (ref. **Figure 2**); alongside school-based activity, work based learning (WBL) is key in most programs offered at secondary and tertiary levels, in the following learning options (ref. **Figure 3**) [DE5]:

- At upper secondary level: general vocational programs with vocational orientation; school-based VET programs; apprenticeship programs (incl. WBL of ca. 75%);
- At post-secondary level: specialised programs
- At tertiary level: advanced vocational qualifications and exams at EQF level 5 (certified advisor in specific professional areas; technician), EQF 6 (master craftsman, specialist) and EQF 7 (management expert; vocational pedagogue, IT-Professional); technician, specialist and similar programs; bachelor programs; master programs.

The apprenticeship scheme at upper secondary level (EQF level 4) is the main pillar of VET and attracts also upper secondary graduates. Parallel to apprenticeships are school-based VET programs at upper secondary level (EQF levels 2 to 4), which differ in terms of access, length, types and levels of qualification they lead to. [DE6]

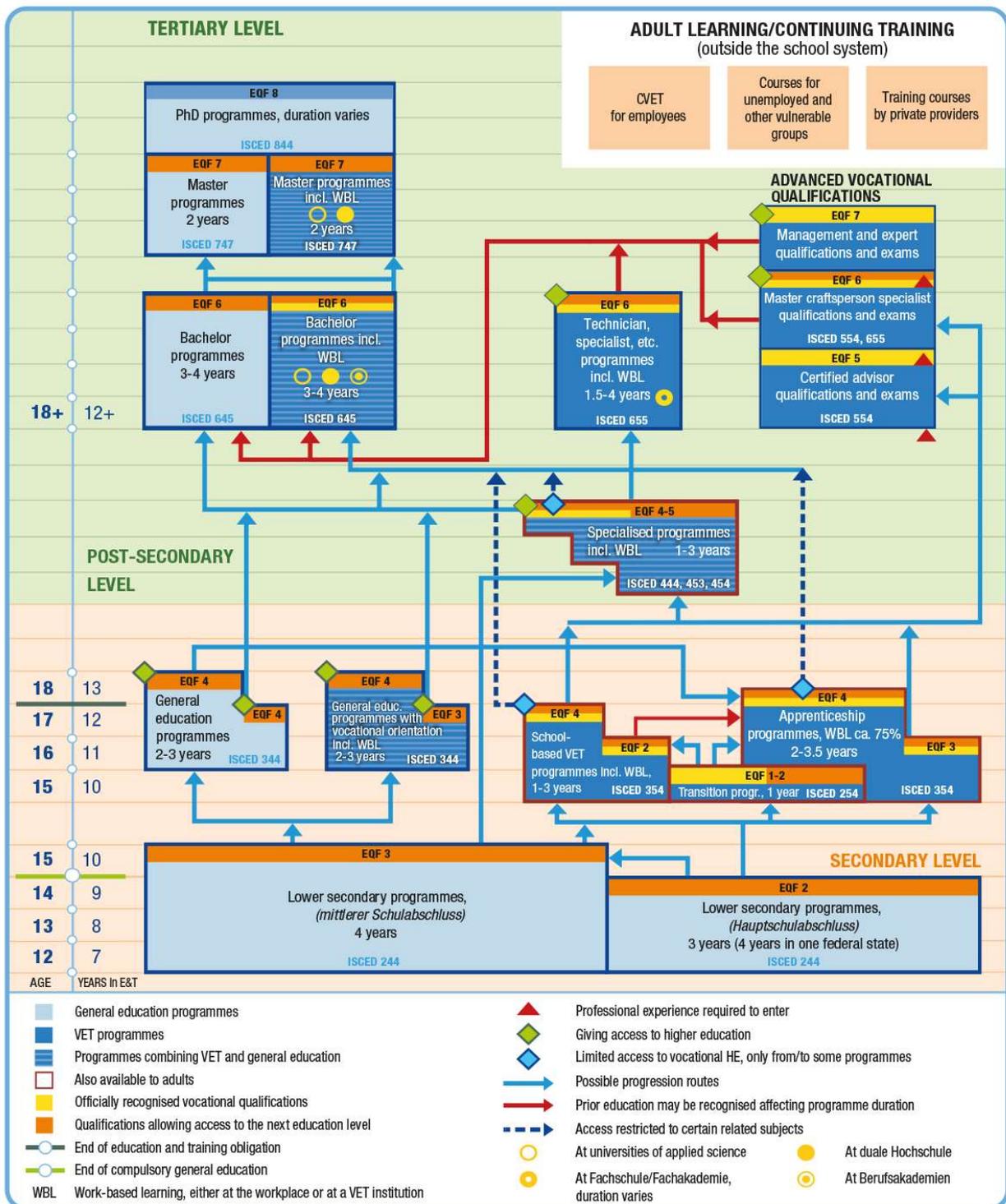


Figure 3 VET in the German education system

(source: Cedefop & ReferNet Germany 2019)

### 2.2.2. VET governance

In Germany, the Vocational Training Act (*Berufsbildungsgesetz, BBiG*) regulates responsibilities and roles for the organization, development and monitoring of VET. In the following, the main roles are presented. [DE7]

#### State government

According to the Constitution, the State Ministries of Education and Cultural Affairs (*Landesministerien für Bildung, Wissenschaft und Kultur*), is the authority responsible for school education. The ministers participate in a standing committee (*Kultusministerkonferenz, KMK*) to ensure a certain degree of uniformity and comparability in school and higher education policies. The KMK's decisions are only recommendations, which can become legally binding when passed by the individual State parliaments.

The States have their own vocational training committees, where employers, employees and the highest State authorities are equally represented. These committees advise the State governments on vocational training issues in schools and contribute to designing schemes that support disadvantaged people and can provide opportunities for additional qualifications that require school-based training.

#### Federal government

Vocational training refers to nationally-recognized occupations and regulations, and this ensures a national standard.

The *Federal government* is the authority responsible for designing the dual VET system's content for the recognized occupations. The national standard for training occupations guarantees the respect of the basic principles agreed with industry and States, and the adhesion of training for a recognized occupation to the regulations. The federal government can also take independent measures to promote dual training, such as permanent support schemes or special funding programs, which, for example, aim to create additional training positions in disadvantaged categories of people or sectors of the economy. Furthermore, the federal government provides funding for special research projects to ensure the continuous development and improvement of VET.

The Federal Ministry of Education and Research (*Bundesministerium für Bildung und Forschung, BMBF*) is in charge of general VET policy issues, such as the aforementioned Vocational Training Act (BBiG), the annual VET report, the application of plans to enhance VET, and the legal supervision and funding of the Federal Institute for VET (*Bundesinstitut für Berufsbildung BIBB*). [DE8], [DE9]

Nationally, the BIBB represents the main institution for consensus building between all parties involved in VET. It carries out research on in-company training and provides services and advice to both the federal government and the VET providers. Its four-party Main Board provides advice to the government on fundamental issues of in-company vocational training and is involved in setting standards and designing training regulations.

It is responsibility of federal ministries representing each occupational field (in most cases, the Federal Ministry of Economic Affairs and Energy - *Bundesministerium für Wirtschaft und Energie, BMWi*) to recognize individual occupations requiring formal training. However, the approval of the Education Ministry is always required.

#### Social partners

Key to the operation of the dual VET system is the close cooperation between employers, trade unions and the government.

The *social partners* – employers and trade unions – have considerable power and control on the content and form of VET, which guarantees that their requirements and interests are always considered. Responsible action by all participants – beyond each group's particular interests – is paramount for the efficiency of the dual mechanism. The representatives of the social partners are members of the Federal Institute for VET's mainboard - together with the federal and State governments - and take part in their vocational training committees and those of the competent bodies (ref. next category).

The organization of dual training requires a clear division and coordination of responsibilities, with employers and unions playing a central role especially in initiatives for change (since the structure of vocational training must meet the demands of the industry). If there is a need for change (e.g., in qualification requirements) representatives of the federal government, State governments, social partners must agree on the basic principles.

### Competent bodies

The so-called “competent bodies” (*Zuständige Stellen*) include professional chambers (enterprises, trainers and apprentices). Their responsibilities include: setting and maintaining lists of training contracts, organizing the examination system and holding final exams.

Each competent body has a tripartite VET committee whose members represent employers, trade unions and teachers. These committees must be informed and consulted on all important VET issues, and have decision power on VET regulations.

Being self-governing bodies, the Chambers of Industry and Commerce, the Chambers of Crafts and the appropriate professional boards for the liberal professions are recognized as ‘competent bodies’ in dual training. Training advisors from the chambers verify the capacity of companies and ability of trainers to train and to provide counselling to both companies and apprentices. They receive training contracts, check, register, and monitor them, and provide consultancy services.

### 2.2.3. Support measures and financing in VET

Vocational education and training, in Germany, is based on a mixed financing mechanisms, with funds provided by various public and private bodies. These include the Federal Ministry of Education and Research (*BMBF*), the Federal Ministry of Economic Affairs and Energy (*BMWi*), the Federal Ministry of Labor and Social Affairs (*BMAS*), the Federal Employment Agency (*BA*), the States and their ministries of employment, economic, education or cultural affairs, the EU, local authorities, companies, unions, chambers, associations, private institutions and individuals themselves.

With respect to the financing, vocational education differs substantially from the schools and universities sector, which benefit from relatively comprehensive public funding.

In the following, the main aspects of the funding for initial vocational training (IVET) and continuing vocational training (CVET) are summarized.

#### Funding of initial VET

In the dual system, in-company training is usually funded by the company: in fact, it is up to the company to decide whether or not to offer training and in which occupations, as well as the number of training places and the total expenditure on training. Companies enter into a contract with apprentices and pay them remuneration. This is regulated by collective agreement and increases with every year of training, averaging about a third of the starting pay for a trained skilled worker minimum wage for apprentices.

As of 1 January 2020, a first-year apprentice is entitled to a remuneration in the amount of at least 515 Euros. In the following years, the monthly minimum wage will be gradually increased up to 620 Euros for first-year apprentices by the year 2023. [DE10]

The school-based component of dual VET is supported by public funds of the States and local authority, with the former covering the costs of internal school affairs (supervision of schools, laying down of curricula, teacher training, teachers’ pay) and the latter bearing the costs of financing external school affairs (construction, maintenance and renovation of school buildings, management, procurement of teaching and learning resources).

Full-time vocational training outside the dual system and special measures to promote VET or to create additional training places for specific target groups or in less popular regions, are financed from the Federal or State budgets (often also partly supported by ESF funds). The federal government also finances special research projects to ensure that VET is constantly updated.

The VET-related expenditure of the federal employment agency applies to both pre-VET and IVET (i.e. grants for young people). The amounts spent on promoting the transition from IVET to the labor market (ref. **Figure 3**) are instead classified and covered as employment policy measures.

### *Funding of continuing VET*

Continuing vocational education and training (CVET) is financed by enterprises, the State, the federal employment agency and private individuals.

Federal employment agency, State and local authorities provide funds primarily for CVET in the public sector. The majority of the funding is related to continuing company- or job-related training. However, some spending also covers general, political, cultural and academic research education and training, since these areas cannot always be clearly separated. The federal government contributes to financing CVET through funding schemes from various ministries. The Federal States participate in financing in a similar way, acting together with local government, and in some case municipal associations, to finance adult education centers, teacher training institutes and other continuing training institutes. Annually, a CVET survey [DE11] provides data on enterprise expenditure on CVET courses for their employees. Results from the survey offer an overview and breakdown of the costs involved, identifying two categories: a) direct training costs (payments to external training providers, personnel costs for internal training staff, travel expenses, costs for rooms and equipment); b) personnel absence costs for participants in training courses.

### **2.2.4. Incentives for VET learners**

In Germany various incentives are offered to learners, which differ for the type of vocational education and program.

#### *Pre-VET measures*

Prevocational education and training measures prepare young people who need extra support for vocational training or, if they cannot yet start training for inherent personal reasons, to enter employment in the mainstream labor market. Pre-VET measures give participants the opportunity to assess their skills and abilities as part of the process of choosing a possible occupation, e.g. through internships. The measures also provide them with the knowledge and skills they need to start IVET. They can support them in their preparation to acquire a secondary general school-leaving certificate or equivalent school leaving qualification; if this is not or not yet possible, it helps place participants in employment and sustainably integrate into the training and/or labor market.

About 5% of apprentices in need of extra support participate in a pre-vocational training measure every year.

#### *Basic vocational training grant*

Financial support is offered during IVET and prevocational training organized by the federal employment agency to help apprentices overcome the economic difficulties that can stand in the way of appropriate vocational qualification. The overall monthly needs of an apprentice not living with parents are estimated, and the amount which cannot be covered by own/parents' income is subsidized. On average, every year, more than 50,000 people undergoing vocational training and over 18000 trainees in pre-vocational training measures receive support through this grant (from 1 Aug 2016 the maximum is EUR 622 per month).

There are also vocational training grants specifically dedicated to the needs of learners with disabilities.

#### *Support during training*

This incentive is destined to young people who need help to start and complete vocational training. Enrolment is voluntary. Mentors help apprentices improve German language and other academic skills through special classes during at least three hours a week. The law establishing this measure came into force in May 2015, with the threefold aim of helping apprentice avoid dropping out training, stabilizing training relationships and completing vocational training. According to 2017 data, through this measure, 81% of participants were in jobs subject to social insurance contributions within six months.

#### *Introductory training for young people*

This form of incentives has the primary goal of giving young people with limited prospects of being placed in training an opportunity to acquire modular qualifications towards a recognized occupation. In reality, there is no actual age limit to apply.

Introductory training offers companies that provide training an opportunity to get to know young people, not just in a brief job application interview, but to observe their skills and abilities over a period of six-twelve months in daily work processes. Companies offering introductory training enter into a contract with the young trainee. Employers receive a subsidy of up to EUR 231 per month to remunerate apprentices, plus a flat-rate contribution towards the average total social security amount payable. On completion of the work placement, participants receive a certificate issued by the competent body (e.g. the chamber of industry and commerce, or the chamber of skilled crafts).

In certain circumstances, up to six months' credit for the work placement can be offset against the qualifying period of a subsequent apprenticeship. Every year, about 70% of those completing introductory training move into training six months after completion, through this measure.

### *Apprentice remuneration*

According to the Vocational Training Act, the training company has to pay apprentices an appropriate allowance: the amount and payment procedure are specified in the training contract. Training allowances are based on collective wage agreements.

There are significant differences in the level of remuneration between the training sectors and occupations. On average, a trainee earns around EUR 908 gross. Depending on occupation and region, the salary may be higher or lower. For example, mechatronics engineering trainees earn EUR 1.088 gross per month on average (data of 2020).

### *Training placements*

Training placements can be offered to all young people through employment agencies and job centers. The agencies approach employers to enquire about training places, and offer them specific consultancy services. In the 2017, around 550.000 training places and 545.000 applicants were registered with the federal employment agency.

### *Measures for integrating refugees into initial VET.*

Germany gives high importance to the integration of young people with migration background and refugees into the education and VET system, as well as into the labor market. Key factors for the integration are learning the German language, validation of formal, non-formal or informally acquired skills, provision of vocational orientation and access to pre-VET and VET programs, apprenticeships, upskilling measures and employment.

As a consequence of the arrival of about one million refugees at the end of 2015, existing programs aiming to integrate disadvantaged groups into the VET system and the labor market, opened up to refugees, too. In addition, new programs - specifically addressed to refugees - were introduced in 2016. Since 2015, a specific ESF-BAMF program, called "*German for professional purposes*", is running under the funding of the Federal Office for Migration and Refugees (BAMF), to help people with migration background learn German and integrate into society and work. In the same year, a new information hub for German language courses, *Handbook Germany*, was also set up by the same federal office. [DE5]

Following an amendment to the Social Code in 2016, young refugees with recognized residence status and who participate in dual VET, are entitled to financial support after 15 months' stay in Germany. Support comes in the form of training loans, pre-vocational training measures, or an assisted training scheme. The 2016 Integration Act intends to facilitate refugee integration into society through a "support and challenge" approach: if refugees with prospects of staying permanently will take integration courses at an early stage, they will have legal certainty while in vocational training. "Legal certainty" means, in practice: up to three-year right of residence for those in apprenticeship until successful completion of training, followed by two-year right to reside, if the person works in the profession s/he was trained in. Asylum seekers will be granted temporary residence permits once they have submitted their asylum application, so as to have legal certainty and early access to the integration courses and labor market.

### *Mobility program for young people interested in vocational training from other European countries*

A special program, the *MobiPro-EU*, offers measures and means to promote international mobility for apprentices across the EU, through: German language tuition, social and vocational training and mentoring, and financial support to enable mobility and to secure living costs. This specifically aims at helping young people interested in apprenticeship and young adults from the EU to complete vocational training in a company in Germany. [DE12]

### *Incentives for trainees of continuing VET*

The State promotes participation in continuing VET with various support and funding means (such as grants, subsidies and loans to cover continuing training and living costs), addressing various target groups. Some of them are regulated by law and others are in the form of programs. In **Table 1- Table 5**, we present the most relevant ones.

**Table 1 Upgrading Training Assistance scheme**

<b>Name</b>	<b>MEISTER-BAFÖG (BERUFSAUSBILDUNGSFÖRDERUNGSGESETZ) - MASTER CRAFTSMEN-BAFÖG</b>
<b>Financial instrument</b>	Grant for individuals Loans
<b>Legal basis</b>	Meister-BAFÖG (Bundesausbildungsförderungsgesetz)
<b>Year of implementation</b>	1996
<b>Objective and targets</b>	To promote professional qualification and advancement in the dual system of vocational training, leading to qualifications as a Master, technician or business administrator. Strengthen the training motivation of young skilled workers, and reward the successful achievement. For entrepreneurs, provide an incentive upon successful completion of the training to take the step to self-employment and to create jobs.
<b>Short description</b>	The support is a combination of grant and loan. The loan is provided by Kreditanstalt für Wiederaufbau (KfW), a non-profit banking institution owned by the German State; Federal government subsidises the loan (financing interest rate during the program/course and grace period).
<b>Operation/management</b>	The scheme is operated and managed by the Federal Ministry of Education and Research.
<b>Eligible group</b>	Craftsmen and other professionals who are preparing for a degree as industrial masters, technicians, skilled merchants, skilled nurses, operating computer scientists, programs, business administration or equivalent qualification and recognized under the Vocational Training Act (Vocational Training Act) or the Crafts Code (HwO). They have to hold a certificate of completed training or an equivalent vocational qualification.
<b>Eligible education/training</b>	Courses preparing for a degree under Vocational Training Act or the HWO, equivalent further education degrees by federal or provincial regulations, equivalent further education degrees at recognized supplementary schools on the basis of State-approved examination regulations
<b>Most relevant webpage</b>	<a href="http://www.meister-bafog.info/">http://www.meister-bafog.info/</a>

**Table 2 Continuing training grant**

<b>Name</b>	<b>WEITERBILDUNGSSTIPENDIUM - CONTINUING TRAINING GRANT</b>
<b>Financial instrument</b>	Grant for individuals
<b>Legal basis</b>	NA
<b>Year of implementation</b>	1991
<b>Objective and targets</b>	To encourage particularly gifted young workers to continue education in VET.
<b>Short description</b>	The grant must serve to cover the expenses related to training (including study/work material), travel and accommodation.

	The recipients of the scholarship can apply for up to EUR 6 000 for an unlimited amount of continuing training courses eligible for funding, within the three-year funding period. However, they must cover 10% of costs themselves, per each course.
<b>Operation/management</b>	The scheme is operated and managed by the Federal Ministry of Education and Research.
<b>Eligible group</b>	All "talented" young workers.
<b>Eligible education/training</b>	VET studies
<b>Most relevant webpage</b>	<a href="https://www.sbb-stipendien.de/weiterbildungsstipendium">https://www.sbb-stipendien.de/weiterbildungsstipendium</a>

**Table 3 Upgrading scholarship**

Name	AUFSTIEGSSTIPENDIUM - SCHOLARSHIP FOR ADVANCEMENT
<b>Financial instrument</b>	Grant for individuals Public funding: Federal budget (50% of public support) European Social Fund (50% of public support)
<b>Legal basis</b>	NA
<b>Year of implementation</b>	2008
<b>Objective and targets</b>	To increase permeability between vocational and academic education and offer the opportunity for further professional development. The program is aimed primarily at those who have gained their higher education entrance qualification without school, but through several years of experience, recognition of prior learning.
<b>Short description</b>	Employees can apply for this State-funded grant to finance their costs for education and training. The eligible education and training activities include all kinds of university studies. A lump-sum allowance is granted up to a maximum amount of EUR 670 per month plus a book allowance of EUR 80.
<b>Operation/management</b>	Stiftung Begabtenförderung berufliche Bildung - Gemeinnützige Gesellschaft mbH (SBB) SBB Foundation has been commissioned and funded by the Federal Ministry of Education and Research for the selection of scholarship recipients and assisting them during their studies.
<b>Eligible group</b>	All "talented" employees - according to a three-step application procedure.
<b>Eligible education/training</b>	University studies
<b>Most relevant webpage</b>	<a href="https://www.sbb-stipendien.de/aufstiegsstipendium.html">https://www.sbb-stipendien.de/aufstiegsstipendium.html</a>

**Table 4 Continuing education bonus**

Name	BILDUNGSPRÄMIE - EDUCATION BONUS
<b>Financial instrument</b>	Grant for individuals Public funding: Federal budget (50% of public support) European Social Fund (50% of public support)
<b>Legal basis</b>	Bundesministerium für Bildung und Forschung: Richtlinie zur Förderung von Prämiegutscheinen und Beratungsleistungen im Rahmen des Bundesprogramms

	<p>„Bildungsprämie“ (Federal Ministry of Education and Research: Directive on the promotion of education vouchers and advisory services under the federal program "education bonus");</p> <p>allgemeine Verwaltungsvorschriften zu §§ 23, 44 Bundeshaushaltsordnung (BHO) (general administrative regulations under §§ 23 and 44 of the Federal Budget Code (BHO))</p> <p>+ for the savings version: Vermögensbildungsgesetz (VermBG) (act on capital accumulation)</p>
<b>Date of implementation</b>	Jan 2008
<b>Objective and targets</b>	Encouraging categories of people that show lower rates of participation in company-based continuing vocational training (such as low-income workers, women, employees in small and medium-sized enterprises (SMEs), part-time workers and healthcare professionals)
<b>Short Description</b>	<p>The financing is given in the form of premium and savings vouchers.</p> <p><i>Premium voucher:</i> it reduces training costs by up to 50% (max EUR 500) for job-related training courses or courses that help improve people’s employability. It is valid for six months. People can receive vouchers every two years.</p> <p><i>Savings voucher:</i> it gives the right to withdraw money from capital formation saving plans without losing the savings grant. This is open to all people who have such saving plans, regardless of their income.</p>
<b>Operation/management</b>	<p>The scheme is governed by the Federal Ministry of Education and Research. The funding is based on the financial resources available in the framework of the ESF-funding period 2014-2020. Contributions to training providers who accept these vouchers are granted through project funding as a proportion of funding for further training or testing. The grant is 50% of the course fees up to a maximum amount of EUR 500 per voucher.</p> <p><u>Responsible body:</u> Federal Employment Agency (Bundesagentur für Arbeit, BA)</p>
<b>Eligible group</b>	Age: 25 or older; employed: 15 hours or more employed per week; with income not above EUR 20 000 EUR per year per individual or EUR 40 000 per household
<b>Eligible education/training</b>	Education and training corresponding to professional interests of the applicant, not necessarily related to the current job.
<b>Most relevant webpage</b>	<a href="https://www.bildungspraemie.info/">https://www.bildungspraemie.info/</a>

**Table 5 Continuing VET scheme for unemployed people**

<b>NAME</b>	<b>BILDUNGSGUTSCHEIN - EDUCATION/TRAINING VOUCHER</b>
<b>Financial instrument</b>	grant for individuals/voucher/individual learning account
<b>Legal basis</b>	Decision of employment agency
<b>Year of implementation</b>	2003
<b>Objective and targets</b>	To prevention unemployment of two categories of people that are at risk of long-term unemployment: the low-skilled and the unemployed, encouraging participation in continuing training
<b>Short description</b>	<p>The scheme is intended to assist in the re-employment of those in temporary employment and, in particular, to increase participation of the unemployed in CVET</p> <p>Employment agencies issue a voucher after providing guidance and counselling services to the applicant</p> <p>Both employees and employers may request reimbursement of the costs of training</p>

	Vouchers specify the training objective and time needed to achieve it, the scope of regional validity, and the duration of validity (three months maximum)  A voucher can be redeemed by the participant with a provider of his choice authorised to finance continuing training
<b>Operation/management</b>	Federal scheme  Responsible body: Federal Employment Agency (Bundesagentur für Arbeit, BA)
<b>Eligible group</b>	Vulnerable employees or employees with expiring contracts, in temporary employment (at risk of unemployment) and  unemployed who have finished professional training (Berufsausbildung) or have done professional work for 3 years
<b>Type of education/training</b>	Secondary (ISCED 2-3), post-secondary (ISCED 4) VET; certified CVET (not related to ISCED classification)
<b>Most relevant webpage</b>	<a href="https://www.arbeitsagentur.de/karriere-und-weiterbildung/foerderung-berufliche-weiterbildung">https://www.arbeitsagentur.de/karriere-und-weiterbildung/foerderung-berufliche-weiterbildung</a>

### 2016's law to reinforce continuing VET and unemployment insurance coverage (AWStG)

In June 2016, a law came into force to strengthen CVET and unemployment insurance coverage (*Weiterbildung und Änderungen bei der Arbeitslosenversicherung, AWStG*). [DE13] This law facilitates access and improves the overall conditions of CVET (such as allowances during training and financial incentives for passing exams) in order to attract more people with few or low-level qualifications, the long-term unemployed and older employees into qualifying continuing vocational training.

The law complements and reinforces standard support means for CVET under the German Social Code, as in the following examples.

- **Förderung beruflicher Weiterbildung (FwB) program** [DE14]: scheme available to both the unemployed and employees under threat of imminent unemployment, or to workers with low levels of qualifications and employees in small-medium enterprises (SMEs). Eligibility for funding also depends on labor market conditions, as with the education and training voucher. Eligible continuing VET courses aiming to obtain, update or upgrade a vocational (also partial) qualification are listed in the KURSNET [DE15] database of the federal employment agency. [DE16]
- **The IFlaS (Initiative zur Flankierung des Strukturwandels) scheme**: initiative that gives people with low-level qualifications and living in structurally weak areas, the opportunity to acquire a recognized vocational qualification or complete modular (or partial) qualifications. Target groups are the unemployed and people at risk of becoming unemployed. Since 2012 the initiative also targets those returning to work who have no VET qualifications (or have not worked in the occupation they trained for over four years), helping them get back into jobs subject to social insurance contributions. [DE17]
- **The WeGebAU scheme** [DE18]: instrument by which employment agencies can provide full or partial funding for qualification courses to employees aged over 45 working in SMEs with fewer than 250 employees. Since April 2012, such employees can also receive funding for continuing VET, regardless of their current qualification level, on the additional provision that their employer meets at least 50% of the course costs. Employees who have no, or no useful, vocational qualifications can also receive funding. Employers who release employees with low-level qualifications to take part in continuing VET to gain qualifications, can receive a subsidy to cover the employee's pay for the period they spend in training.

### 2.2.5. Incentives for companies that offer VET

Traditionally in Germany, many companies provide apprenticeship and cover most of its costs. This tendency has however declined in the last decade, especially among the SMEs, due to a progressively increased difficulty in filling the apprenticeship places on offer. This has pushed the government to put in place new mechanisms of support to companies, especially SMEs.

Various support schemes exist now, to help companies that offer vocational training. These are not only financial, and are summarized in the following. [DE5], [DE19]

#### *Inter-company vocational training centers and training structures*

SMEs, in particular crafts companies, are important training suppliers, but are not able (fully or partly) to provide all the training assets required by law. This is mainly due to the increasing division of labor in production processes, increasing specialization and, in some cases, to financial problems or accelerated technological change. Against this negative pattern, the German Federal Institute for Vocational Education and Training supports the planning, establishment and development of inter-company vocational training centers and training structures of these training centers, as a supplementary external measures to compensate the limited suitability of SMEs as training providers.

Inter-company training centers have an essential position in continuing training in SMEs, especially in the commercial and technical sectors.

Funding is offered not only for the realization of inter-company training structures, but also for their modernizing and restructuring in order to adapt to any changes in education, training policy and economic conditions, as well as to the challenge of digitalization.

#### *Other support mechanisms for SMEs*

Various incentives for SMEs exist:

- *Training placement*: employment agencies offer employers specific consultancy services and approach SMEs to enquire about training places. Employers are free to register any training places they are offering.
- *Alliance training guarantee*: process introduced in 2016 to help find training places and apprentices - every young person who is still looking for an apprenticeship on 30 September of a given year will receive three offers of company-based training from an employment agency.
- *Jobstarter plus*: grant provided by the Federal Ministry of Education to initiatives in line with the improvement of regional training structures or to trial innovative training policy approaches addressing training market problems. The program aims at responding flexibly and actively to current training market developments with a range of variable funding priorities, such as: a) advising and supporting SMEs in the process of (re)starting participation in dual training and increasing their commitment to training; b) counteracting matching problems and the difficulties that companies have in filling training places in certain sectors; c) advising and supporting SMEs in the process of adapting their training to the challenges posed by the increasing automation and digitalization of the economy.
- *Passgenaue Besetzung*: program, financed jointly by the ESF and Federal Ministry For Economic Affairs, aiming at counteracting matching problems in the training market. The program gives funding for consultants who support SMEs in filling the training places they offer with suitable local and foreign young people and young refugees and migrants.
- *Consultancy of federal employment agency (BA) on employers' qualification*: the BA supports personnel development measures in SMEs as a part of its preventive approach to securing a supply of skilled workers. It informs and advises employers, and identifies the possibilities for further development of companies through company-based qualification measures. This consultancy makes employers aware of the advantages of more frequently including groups of employees who are often not considered for participation in measures (e.g. those without formal qualifications and older employees) in further training measures.

### Support to integration of refugees in dual VET and work

The following incentives for SMEs (and skilled trade companies) are specifically devoted to integrating refugees in apprenticeship:

- *Companies integrate refugees*: network funded jointly by the Federal Ministry For Economic Affairs and the Umbrella Organization of the Chambers of Industry and Commerce (*DIHK*), addressing companies that are involved, or want to get involved, with refugees. The aim is to bring refugees to training and employment.
- The chambers' *Welcome Guides (Willkommenslotsen)* are available to companies on all issues relating to the operational integration of refugees. Since the start of the program in 2016, the Welcome Guides have achieved around 11500 placements of refugees in employment, training or internship.
- *JOIN*: online internship platform that - through a matching process – offers companies and refugees opportunities to find and get to know each other through internship placements. This is a joint initiative of the Federal Ministry of the Interior and the Industry, and aims at offering refugees a chance of employment in a timely manner and at providing a first proof of their qualifications, even before they receive a residence permit and a work permit.

## 2.3. Country review: Spain

The education and training system in the country was faced with the challenge of bringing young people's skills closer to labor market needs; consequently, VET qualifications in the education system have been updated with the aid of business.

The Government of Spain, since 2000, has adopted successive plans for the development of the Digital Society, aligned with European strategies, to maximize the impact of public policies on ICT and achieve the transformation and modernization of the Spanish economy and society.

### 2.3.1. VET within the Spanish education system

In formal education, two-year VET programs are offered at all three levels to school-age learners. Programs are also accessible to adults (ref. **Figure 4**).

Some of the distinctive features of VET system in Spain are the following (Cedefop, 2019):

- *Lower secondary basic VET* (ISCED 353) programs target learners over 15; mostly at risk of dropping out; most learners (55.1%) are within the theoretical age, 44.1% are older (up to 24), while the share of people over 25 enrolled in basic VET is insignificant (0.8%);
- *Upper secondary intermediate VET* (ISCED 354) programs are for learners aged 17-18. Almost one third (31.5%) of learners are within the theoretical age, the majority are older (44.1% are up to 24 while 20.2% are over 25).
- *Higher VET* (ISCED 554) programs for learners 18-19. Their age distribution with respect to the theoretical age is 19.3% within the theoretical age, 51.6% are at most 24 and 29.1% are over 25.

These data reflect a trend to re-engage in education and training to upskill for employment.

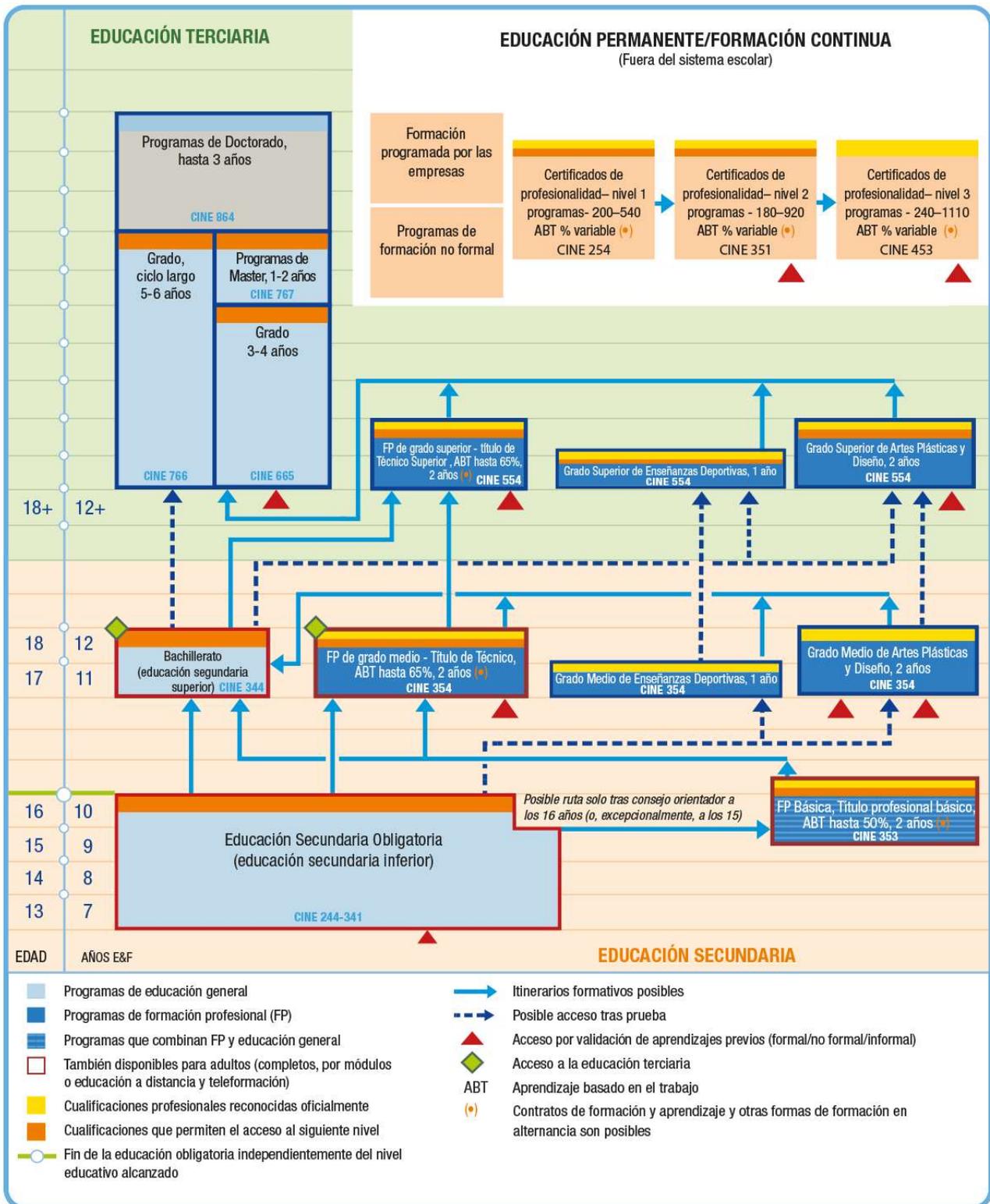


Figure 4 VET in the Spanish education system

(source: Cedefop & ReferNet Spain 2019)

### 2.3.2. VET governance

#### Legislation

Nowadays, the VET system is governed by Act 5/2002 on qualifications and vocational education and training (LOCFP) ([SP1]). This covers the training programs included in initial and continuing VET, to enable skilling, upskilling and reskilling.

Education in Spain, including VET, is still regulated by the 2006 Education Act (LOE) [SP2] and the 2013 Act for the improvement of education quality (LOMCE) [SP3]. However, the Council of Ministers has approved a Draft Organic Law for the Modification of the Education Law (LOMLOE) that aims to position Spain at the levels of countries with better education, according to OECD guidelines, as recommended by the 2030 Agenda. This project repeals the LOMCE, approved in 2013. [SP4]

#### Governance

The Ministry of Education and Vocational Training is responsible for national IVET policies, quality of IVET programs and curricula.

The Ministry of Labor, Migrations and Social Security sets the policies for vocational training under its remit. The aim is to upskill and retrain the unemployed and employees, and to support employability matching skills with the needs of the local economy.

Implementation of VET policies is managed by the regions, which may shape (up to 35-45% of) IVET curricula based on local/territorial needs. [SP6]

#### Main bodies involved in vocational training for employment:

- The *General Council for the national employment system (Consejo General del Sistema Nacional de Empleo)* is the main consultative and participatory body for public authorities and social partners. In particular for VET issues, it carries out its functions through the training for employment State commission (Comisión estatal de formación para el empleo);
- The *sectoral conference on labor affairs (Conferencia Sectorial de Empleo y Asuntos Laborales)* is the general instrument for coordination and cooperation between the central Government and the regions in employment policy. One of its functions is to distribute available funds between the regions;
- The *State foundation for training in employment (Fundación Estatal para la Formación en el Empleo – Fundae)* [SP7] is a public body comprising the State general administration, the regions and the most representative business and trade union organizations. It provides technical support to the State public employment service (SEPE), and to the Labor Ministry in the strategic development of the system of vocational training for employment in the work sphere.
- *Joint sectoral structures* [SP8] made up of the representative business and union organizations in each relevant sector [SP9] have the main task of anticipating training needs and proposing sectoral training based on their knowledge of the real productive environment.

Active labor market policies are agreed in the framework of the sectoral conference on labor affairs. The framework, coordination and implementation of these policies are based on three instruments: the Spanish strategy for employment activation, the annual plans for employment policy [SP10] and the information system for public employment services. Regional public employment services [SP11] design and manage their own policies based on this common framework, with a commitment to transparency, evaluation and results orientation.

Different types of institutions provide vocational training (ref. **Table 6**):

**Table 6 Bodies involved in Spanish VET**

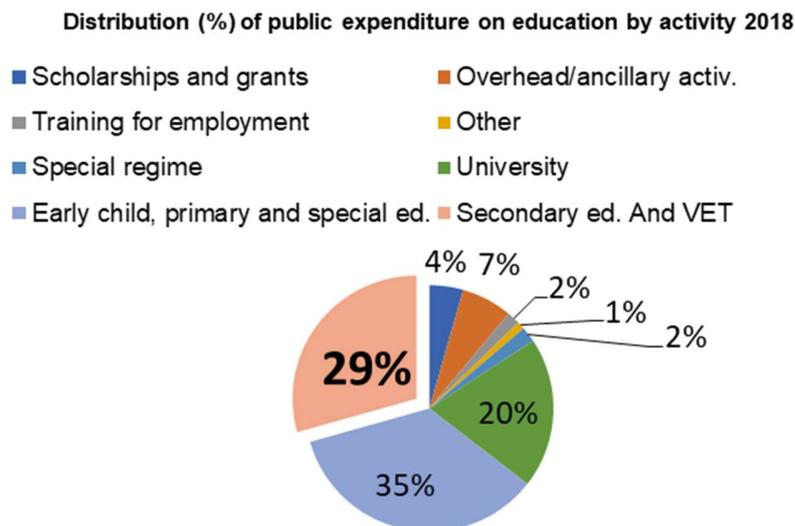
1	Publicly-funded vocational training integrated institutions, which have autonomy regarding their organization and management
2	Publicly-funded institutions offering vocational training
3	National reference institutions specialized in the different productive sectors, which are responsible for innovation and experimentation in vocational training. They may be owned and managed by different authorities
4	Public institutions of the national employment system. Integrated centers and private institutions can provide training programs leading to both types of VET qualification (VET diplomas and professional certificates, issued, respectively by the education and employment VET authorities).
5	Private authorized institutions of the national employment system offering vocational training for employment
6	Business organizations and trade unions, as well as other bodies benefiting from various funding schemes;
7	Companies developing training actions.

### Non-formal training CVET providers

Companies carrying out training activities (not leading to a State-recognized qualification) for their staff can hire external training providers or provide the training themselves. Funding for such activities comes mainly from business and worker contributions, collected and distributed countrywide. Around 70% of all companies that organized training for their employees in 2017 are micro SMEs with less than 10 employees [SP12]. There are subsidized training schemes (mainly through open calls for proposals) for different types of training activity for the (un)employed at no cost to learners (sectoral, cross-sectoral programs for the (un)employed, public employment services training schemes for the unemployed).

### 2.3.3. Support measures and financing in VET

Formal VET is mostly State-financed. The latest data on public spending on education (2018) are shown below in the graph (ref. **Figure 5**).



**Figure 5 Public expenditure on education by activity in 2018**

(Source: own elaboration, based on report “Estadística del Gasto Público en Educación. Resultados Año 2018)

In education authority VET, most VET providers are public or publicly-funded. Only one in four learners attends a private VET center. Training centers that are 100% private do not receive public funds. Training always leads to a formal VET qualification (*VET diplomas*). Qualifications in training for employment are delivered by private or public centers (integrated centers, national reference centers) accredited for each qualification. In some cases, providers can apply for public funds to cover expenses, with a cost limit per hour/per participant, for each course leading to a formal VET qualification (*professional certificates, CdPs*).

Funding for State-wide “training schemes for the employed” is managed by the State Foundation for Training in Employment (*Fundae*) together with the State Public Employment Service (*SEPE*). At regional level, training schemes are managed by the regional labor authorities. The National Institute of Public Administration (INAP) manages training for civil servants.

Funds allocated for vocational training for employment come mainly from the State budget. Other contributions come from SEPE and the regions. Training actions may be jointly financed through the European Social Fund or other European funding. These funds are allocated to different funding schemes, providing training free of charge for the unemployed and employees:

- Training organized by companies for their employees (*formación programada por la empresa*)
- Subsidized training schemes through open calls for proposals, such as sectoral and cross-sectoral training programs for the (self)employed, including those working in the social economy (cooperatives) (*planes de formación intersectoriales, sectoriales, autónomos, y economía social*)
- Subsidized training schemes for the unemployed, including ‘training plans’ (*planes de formación*) aimed at meeting needs identified by the public employment services and specific training programs. These are funded through open calls for proposals
- Other training initiatives, such as individual training leave (*permisos individuales de formación, PIF*), alternance training (*formación en alternancia*), civil servant training, training in prisons, among others. The way in which these initiatives are funded varies.

The funding destined in 2021 to VET reaches 1,628 million euros, of which 974 correspond to VET for employment. 654 million are allocated to VET in the educational system, which represents an increase of 349% compared to January 2020.

Of this investment, 127 million euros will allow the accreditation of the basic and professional skills of 532,800 people; 64 million will be allocated to the creation of 47,400 new VET vacancies (with the aim of reaching 200,000 vacancies in four years); 170 million will be invested for the conversion of Intermediate VET programs (ISCED 354) and Higher VET programs (ISCED 554) into bilinguals; and 30 million will go to the modular training offer in companies from which 125,000 employed and unemployed workers will benefit [SP13].

### *Funding on digitalization of VET*

The Governing Council has approved on the 20<sup>th</sup> of October 2020, at the proposal of the Minister of Education, the Order by which subsidies are convened, corresponding to the academic year 2020-2021, for the acquisition or lease of machinery and/or advanced equipment, directed to the implementation of technologies in the field of 4.0 environments. This call, with a global amount of one million Euros, is aimed at subsidized centers that offer VET courses.

Training for VET teachers in digitalization applied to productive sectors will have an investment of 2,5 million euros that will allow training 25,281 teachers.

These subsidies are therefore intended to finance the purchase or rental fees for machinery and/or advanced equipment (as well as installation costs for these), which allows the implementation of technologies associated with the environment 4.0 in the training IVET and higher VET programs, belonging also to the Energy sector training programs (as for example, Energy and Water VET programs at all levels) [SP10].

### 2.3.4. Incentives for VET learners

The schemes that exist in the Spanish VET system to encourage learning in VET environment are listed below. The information has been obtained from the document published in 2019 in *Cedefop* [SP15].

#### *IVET learners*

There are three types of financial incentive to begin or pursue a program of studies which are valid throughout the country:

1. Financial support based on the applicant's socio-economic circumstances;
2. Grants based on the applicant's socio-economic circumstances and academic achievement;
3. Awards aimed at students with high academic achievement.

The scholarships are given through different calls throughout the year. The requirements to receive them are related to the income level and are adjusted each year. The distribution of public expenditure among the various educational activities, scholarships and study grants reached 4.2% in 2016. In 2018, the budget allocated to scholarships and grants has been the highest in recent years. The trend is to increase the number of grant holders but reduce the average amount received per beneficiary.

#### *International internships*

Thanks to mobility programs such as the Erasmus + Program, VET students improve their personal, professional, language skills, etc. Under the Erasmus + 2015 program, extended until 2017, there were 310 VET mobility projects, mainly apprentice mobility (EUR 20 million investments) and staff mobility (EUR one million). Circa 86% of participants were learners, 14% were teachers and other staff.

#### *Information and guidance tools*

The education authority promotes VET through its dedicated web portal [SP11], visited by four million users per year. The portal was updated in 2017. It includes VET programs, Europass supplements [SP12], labor market information, and information on VET competitions such as SpainSkills, EuropeSkills and WorldSkills. It also has a dedicated section (Acredita) on validation of informal and non-formal learning [SP13].

Regional education authorities also have web sections directly linked to/from the portal and implement measures to boost VET enrolment in their territories.

#### *Incentives for dual VET learners and apprentices*

The introduction of a dual system in education authority VET offers young people at risk, an insight into the labor market. The employment rate of dual VET learners is usually higher than in traditional school based VET.

Training and apprenticeship contracts are offered in IVET and CVET. They target mostly unemployed people who lack formal qualifications and have seen positive results since the 2012 labor reform. Hired apprentices benefit from a 100% reduction in social security contributions, total social protection, unemployment benefit and training (training for at least 25% of working hours in the first year and 15% in the second and third year). The training may lead to a full qualification (professional certificate) or partial certification of a set of competence units towards a professional certificate or a VET diploma. [SP14]

#### *Incentives for the employed*

The 2012 Labor Reform and the 2015 Employment Authority VET Reform (Act 30/2015) laid down different incentives for workers such as the training account, linked to workers' social security number, and the 'training voucher' for workers to choose their training and provider. Neither of these incentives has yet been implemented.

Workers have the right to 20 hours of annual training related to the company's activity; these hours can be accumulated over a period of five years. Nevertheless, this right, in place since 2012, has not yet been fully developed through other legal provisions.

### *Individual training leave for the employed (PIF)*

Employees can take part in training programs run by their companies or participate in other training schemes. They can apply for individual training leave (PIF) from their companies, to improve their skills at no cost to the company. Employees have the right to 200 working hours for educational purposes, with the company agreement. The company is reimbursed for the salary of that worker by the State Foundation for Training in Employment (Fundae) and the worker receives his/her salary during the training leave. Individual training leave is directed to workers wishing to improve their personal and professional skills, providing them with an opportunity to attend officially recognized or formal training courses. Workers can also take this type of leave to undergo the procedure for recognition of prior learning acquired through work experience or non-formal education.

In 2017, only a minority of individual training leaves (4.5%) was used to carry out training to obtain a professional certificate (CdP). Individual training leave was mostly used to attend formal education (76.8%) or other training courses (18.7%) leading to other qualifications. More than 40% of individual training leave beneficiaries are between 36 and 45 years old; women beneficiaries account for 42.0% (a two percentage point increase since 2016).

### *Incentives for the unemployed*

Unemployed workers may also take part in some of the different training schemes within the training for employment system. Participants can request, if necessary, reimbursement for travel, accommodation and meal expenses during the training period. In some cases, they can also apply for financial aid for other issues, particularly if they have family responsibilities.

### *Supporting VET provider capacity*

Education authority VET programs are offered by both State-funded centers and private centers. One in four learners attends a private center. To ensure equity and equality of opportunities, private education centers may receive funds to offer teaching free of charge (these are called publicly-funded private centers).

Increased funding was also allocated to the regions for implementing VET policies in their territories.

- Dual VET (EUR 1.2 million).
- Basic VET (EUR 208.9 million); additional funding in 2017 for basic VET (EUR 149 million)
- Other VET programs (EUR 1.3 million); additional funding for other training programs (EUR 1.3 million).

Since the 2013 Education Reform (LOMCE Act), education centers have greater autonomy in using the funds allocated from the State budget to improve their training offer. They may run actions to test how to tailor their training offer to local needs/skills (pilot projects, new work plans or forms of organization, and increase hours devoted to certain subjects).

Vocational training providers under the Employment Authority can apply, on a competitive basis, for funding (with financial incentives or subsidies depending on the type of initiative) to carry out training actions in the regional or State calls for proposal published annually. Since Act 30/2015, only recognized training providers can apply for such financial aid. Training is funded based on cost per participant/hour, which differs by delivery mode (e-learning or frontal).

National reference centers, running innovative and experimental training activities, schedule training courses which, due to the lack of equipment and facility requirements, are not offered by the usual network of vocational training centers.

## **2.3.5. Incentives for companies that offer VET**

Within the training for employment system, companies receive discounts on their social security contributions for providing training to their employees. The yearly training credit available to each company (i.e., the amount for which they can receive a discount) is calculated by applying a fixed percentage to the training quota amount of the previous year. Companies with fewer than six employees receive a minimum credit (420€). This percentage is ranging from 100% for businesses with six to nine employees to 50% for big companies (250 or more). Businesses

with more than 10 employees are obliged to finance part of the training cost, which again varies depending on the size of the company: 10% for companies with 10-49 employees, up to 40% for large companies.

Training and apprenticeship contract regulations set different incentives for companies to hire trainees, in the form of reduced employer social security contributions, or additional bonuses to fund the costs of in-company tutors, as well as other incentives when apprentices become permanent staff. [SP15]

## 2.4. Country review: Greece

### 2.4.1. VET within the Greek education system

#### *VET in Greece: sketching the canvas*

Greek society is generally characterized by a strong demand for education and, more specifically, for a variety of educational options. However, VET has always had much less appeal to young people compared to general education. VET has always been associated with “laborious” and “inferior” manual work, while general education (meaning Regular Upper Secondary Schools and Universities) is linked with higher expectations and a more prestigious social standing, especially for University studies. To this day, young students continue to view vocational education as a last resort, once they don’t have the opportunity or the required abilities to access higher education. As a result, VET usually attracts low performers, who are most likely to come from low – income families, confirming and reinforcing negative stereotypes and creating a vicious circle not only for those young people who have limited educational opportunities, but for VET’s quality and social acceptance too. [GR1]

According to the current education system of Greece, Vocational Education and Training is provided both from public and private schools and belongs to the non – compulsory part of the system. VET Schools in general can be categorized in three different types that correspond to EQF Level 4 and 5. More specifically:

- Vocational Education Schools or Vocational Apprenticeship Schools (in Greek: Epaggelmatikes Scholes, EPAS), EQF Level 4
- Vocational Upper Secondary Schools (in Greek: Epaggelmatika Lykeia, EPAL), EQF Level 4
- Public and private Post – Secondary VET Schools (in Greek: Institouta Epaggelmatikis Katartisis IEK), EQF Level 5 [GR2]

An overview of the organization of the VET system is summarized in **Table 7** Organization of VET system in Greece:

**Table 7 Organization of VET system in Greece**

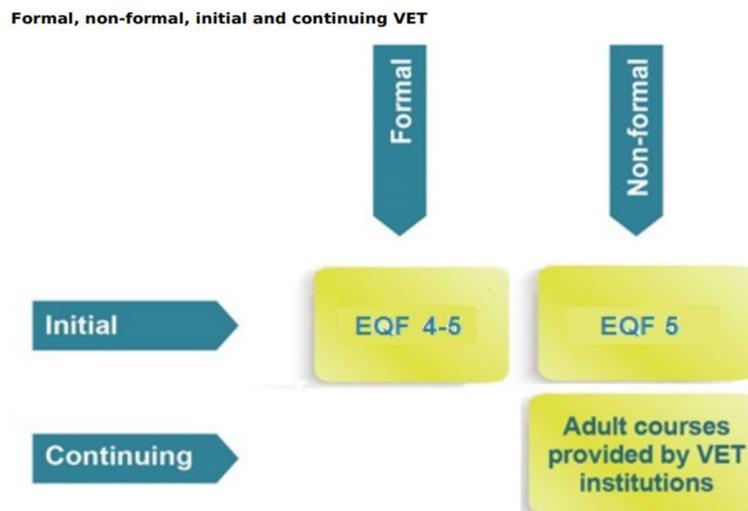
	GREECE					
	School-based	Apprenticeship programs	Post-secondary VET programs	Apprenticeship 1 year	Higher professional programs	KEE programs 2.5 years WBL>50
Country designation name	Information not available	Information available	Information not available	Information not available	Information not available	Information not available
Entry/completion Age	15 -18	17-18	18-21	18-18	18-21	18 -21

Length of program (years)	3	2	2,5	1	3-4	2,5
WBL (%)	>25%	>80%	>60%	100%		>50%
EQF/ISCED Level	4/ 354	4 /353	5/453	5 /453	5/655	5/-
Compulsory education (Y/N)	No	No	No	No	No	No
Formal education system (Y/N)	Yes	Yes	No	No	Yes	No
Initial VET (Y/N)	Yes	Yes	Yes	Yes	Yes	No
Continuing VET (Y/N)	No	No	No	No	No	Yes
Free of charge (Y/N)	Yes	Yes	Yes at Public schools No at private	Yes	Yes at Public schools No at private	Yes
Progression for opportunities	Yes	Limited	They can enter the labour market	They can enter the labour market	Yes	They can enter the labour market

Source: Cedefop, Compare System Tool [GR3]

### Law 3879/2010

Last but not least it deserves mentioning that according to the Law 3879/2010 the VET are distinguished in initial and continuing. This scheme is depicted in **Figure 6** Formal and non-formal VET in Greece.



Source: Cedefop and ReferNet Greece

**Figure 6 Formal and non-formal VET in Greece**

Although both types provide necessary skills to enter the labor market, only initial VET provides professional rights. The non-formal type is part of adult learning.

To sum, the most distinctive features of VET system in Greece are the following:

- School-based VET programs leading to EQF level 4. Usual entry age 16. The main target are graduates of lower secondary programs young people and adults. In addition, there are specific programs for learners with special educational needs, such as moderate and severe disability that are offered by special vocational schools.
- Apprenticeship programs leading to EQF level 4. Usual entry age 17+. The main target are learners that have successfully completed the first year of upper secondary education; they can also be adults.
- Post-secondary VET programs. Usual entry age 18+. These programs are available for all adults.
- Apprenticeship programs leading to EQF level 5. Usual entry age 18+. The main target are adult graduates of upper secondary vocational education.
- Higher professional programs leading to EQF level 5. Usual entry age 18+. They are available for all adults and special education needs learners can attend too.
- Post-secondary vocational programs provided by universities leading to EQF level 5. Usual entry age 18+. The programs are available for all adults. [GR2]

#### 2.4.2. VET governance

The Governance of VET depends on the decision of several committees. The education ministry designs the national education policy and the government approves it. The legislation depends on several trade unions and employer organisations.

General Secretariat of Lifelong Learning, the directorates of secondary or professional education of the education ministry or supervised organisations by the education ministry are monitoring and funding the public and private VET.

In 2017, the National committee for VET was introduced, that is in charge for the coordination of the Greek VET system and makes sure the procedures are aligned with the 2016 National strategic framework for the upgrade of VET and apprenticeship. With the introduction of two new bodies, the National apprentice coordination body (ESOM) and the National council for education and development of human resources (ESEKAAD), VET governance has been amplified.

Policy implementation goes through several bodies. Local education plans and coordinate activities are being prepared by county governments.

The corollary of these facts is that VET management does not have the necessary probity and consistency. [GR2], [GR4]

#### 2.4.3. Support measures and financing in VET

Formal VET is mostly State-financed.

Apprenticeship programs are funded by national, private and/or EU sources. Participating enterprises contribute 45% of the apprentices' remuneration. EU funds amount a total of approximately € 30 million.

#### 2.4.4. Incentives for VET learners

##### *Incentives used by the State*

There are two main incentives used by the state in order to increase VET participation:

Upper secondary vocational education (EPAL) graduates have the ability to participate in designated national examination and admit to tertiary education programs. They also have access to joint group of faculties at universities, tertiary not higher education schools and military schools regardless of their graduation field, by sitting the same examinations as the general education graduates. EPAL graduates will also have direct access to the newly formed two-year professional program provided by universities leading to a degree at level 5 of the National qualifications framework.

The “Post-secondary year - apprenticeship class” for EPAL graduates. This apprenticeship program gives EPAL graduates the opportunity to upgrade their professional qualifications by receiving a salary of 75% of the legal minimum wage and full insurance coverage. [GR2]

### *Regulatory incentives*

The lifelong learning law (Law 3879/2010) include three basic incentives to promote participation:

Workers (in all sectors) are entitled to education leave for participation in lifelong learning programs.

With the contribution of the employee, the employer and possibly the state, a personal education account is set up in order to cover the worker's needs.

Workers can participate in continuous training programs with the help of personal learning time accounts. [GR2]

### *Financial incentives*

The combination of a voucher for classroom training with remuneration foreseen for workplace training / work placements in many programs, is a main financial incentive, promoting key Active labour market policies (ALMP). Primarily the ESF but the Greek training fund (LAEK) as well provide subsidies for the Continuing training. [GR2]

## **2.4.5. Incentives for companies that offer VET**

The lifelong learning law (Law 3879/2010, Article 18) creates incentives for lifelong learning providers by providing subsidies supported by public funds.

Moreover, enterprises are entitled to receive back their contributions to the Greek training fund (LAEK) if they perform training programs for their staff. The revenues of this account, which is managed by the Manpower employment organisation (OAED), come from employers' contributions to the Social Security Organisation, with each company contributing 0.24% of its gross wage bill.

Financial incentive are given to companies that offer training places to students in or graduates of VET programs. In addition, subsidies are offered to companies that take part in vocational training actions funded by ESF that blend training with counselling and work placement schemes. [GR2], [GR5]

## **2.5. Country review: Romania**

The general legal framework to organize, administrate and provide education in Romania is established through the Constitution, the Law of National Education (Law 1/2011) – organic law, ordinary laws, and governmental ordinances. Specific procedures and regulations are established through Government Decisions and Orders of the Ministry of National Education.

Institutions belonging to State Pre-tertiary education (pre-primary, primary, secondary, and post-secondary non-tertiary education) are subordinated to the Ministry of National Education through County School Inspectorates. These inspectorates ensure observance of the legislation and evaluation of the education system and process, as well as the implementation at country level of education policies, established at central level.

Universities and other higher education institutions are autonomous and are guaranteed by law the right to establish and implement their own development policies, within the general provisions of the in-force legislation. The Ministry of National Education coordinates the activity of the universities and other higher education institutions, complying with the principles of university autonomy.

Current legislation provides the general framework for the establishment of private education institutions at all levels. In order to be recognized as part of the national education system, private education institutions must be accredited through specific procedures established by law. Diplomas and certificates emitted by the accredited private education institutions produce the same effects as the ones emitted by the public education institutions. [RO1]

The main challenges that Romania faces are unequal access to education and training and the high rate of early leaving. The former particularly affects children in rural areas or from poor communities. Furthermore, another significant challenge is reducing youth unemployment by fostering skills acquisition and securing smooth and sustainable transitions from education and training to the labor market.

Important steps in the regulation of the VET legal framework for modernizing and optimizing its function, started in 2011 by adding vocational education (between 6 month and 2 years duration) through the previous mention Law No 1/2011. This education should be done in independent professional schools or in the ones connected to technical high schools.

From 2014, the vocational education has extended to a 3-year duration, after the end of lower secondary school.

For the past years, the main complex action in the VET reform was the *2016 – 2020 Romanian Education and Vocational Training Strategy*, which takes on commitments of the Romanian Government and transposes them into a strategic document leading to the achievement of agreed results: the development of an accessible, attractive, competitive, and relevant for the labor market demands training system. It has four key reference dimensions: relevance in relationship with current and future labor market requirements; access to and participation in education; and vocational training, with a special focus on vulnerable groups and adaptation to individual needs; developing a culture of quality in the governance of the education system and training; innovation and cooperation.

Also, the sectorial *Operational Program Human Capital* includes in its strategic objectives important parts of the 2016-2020 Strategy, ensuring the chances as part of the results to be achieved with European funds.

The Dual VET education program, achieved as a result of the public consultation regarding the vocational education, was implemented for the first time in the scholar year 2016/2017, coming into practice also at the national level. [RO2] In November 2018, the labor ministry developed a list of basic occupations allowing to the unskilled adults access to participation in programs leading to qualifications at EQF level 1. The six-month apprenticeship programs are among them.

The National Center for Technical and Vocational Education and Training Development launched in 2019 a European Social Funded (ESF) - project with a number of critical objectives, such as: developing a mechanism for quality-assuring work-based learning and certification of learning outcomes; matching the education and training offer to the labor market requirements; delivering a monitoring system for initial VET graduates and a mechanism to identify, reward and promote excellence in initial VET. As a result, variable-duration training programs were created (from 180 hours for EQF level 1 to 1 080 for EQF level 4). [RO3]

### 2.5.1. VET within the Romanian education system

Romania follows four main models [RO4] for practical and theoretical education:

1. Dual VET program
2. Apprenticeship programs as specialization concomitant with other VET learnings.
3. Job-based education.
4. VET fully integrated in schools.

The *Dual VET program* combines apprenticeship into one company, where the apprentice benefits from practical training (on-the-job learning), and training theory in a vocational school. The content of the training and its costs are established and covered by the state and companies. The apprentice has an employment contract, and he is remunerated. The model offers a high level of skill ensuring the employability of most graduates, but it depends on the stability of the economy, the desire of the companies to assume a role in the field of vocational training and their technical capacity.

*Apprenticeship programs* can also be organized in parallel with other forms of VET, in which case a mixed approach is followed where the apprenticeship coexist with in-school VET (4<sup>th</sup> model). In many cases, the two types of training are managed by different ministries: the Dual one is in the responsibility of the Ministry of Labor, and the other under the authority of the Ministry of Education.

*Job-based education* elements are integrated into school curricula. Here the main option is school-level training, where features of on-the-job learning are integrated. Training periods within the company are mandatory. However, there are significant differences between this model and the previous ones: the basic activity is carried out in school, the periods of practice in the enterprise are not clearly defined, and there is no contractual relationship between the student and the practice provider.

*VET fully integrated in schools* occurs predominantly at the school level, which leads to a weaker cooperation between schools and companies and, implicitly, to a poor relevance in workforce sector. Therefore, this model has a lower degree of attractiveness for students.

The institutions and entities that deliver VET [RO5] are the following:

*For Initial VET (IVET):*

- Technological high schools or technical colleges;
- Professional schools;
- Vocational high schools;
- Post-secondary schools.

*For Continuing VET (CVET):*

- Public or private learning organizations or authorized entities.

**Figure 7** gives a general overview of how and where VET can be framed within the Romanian education system.

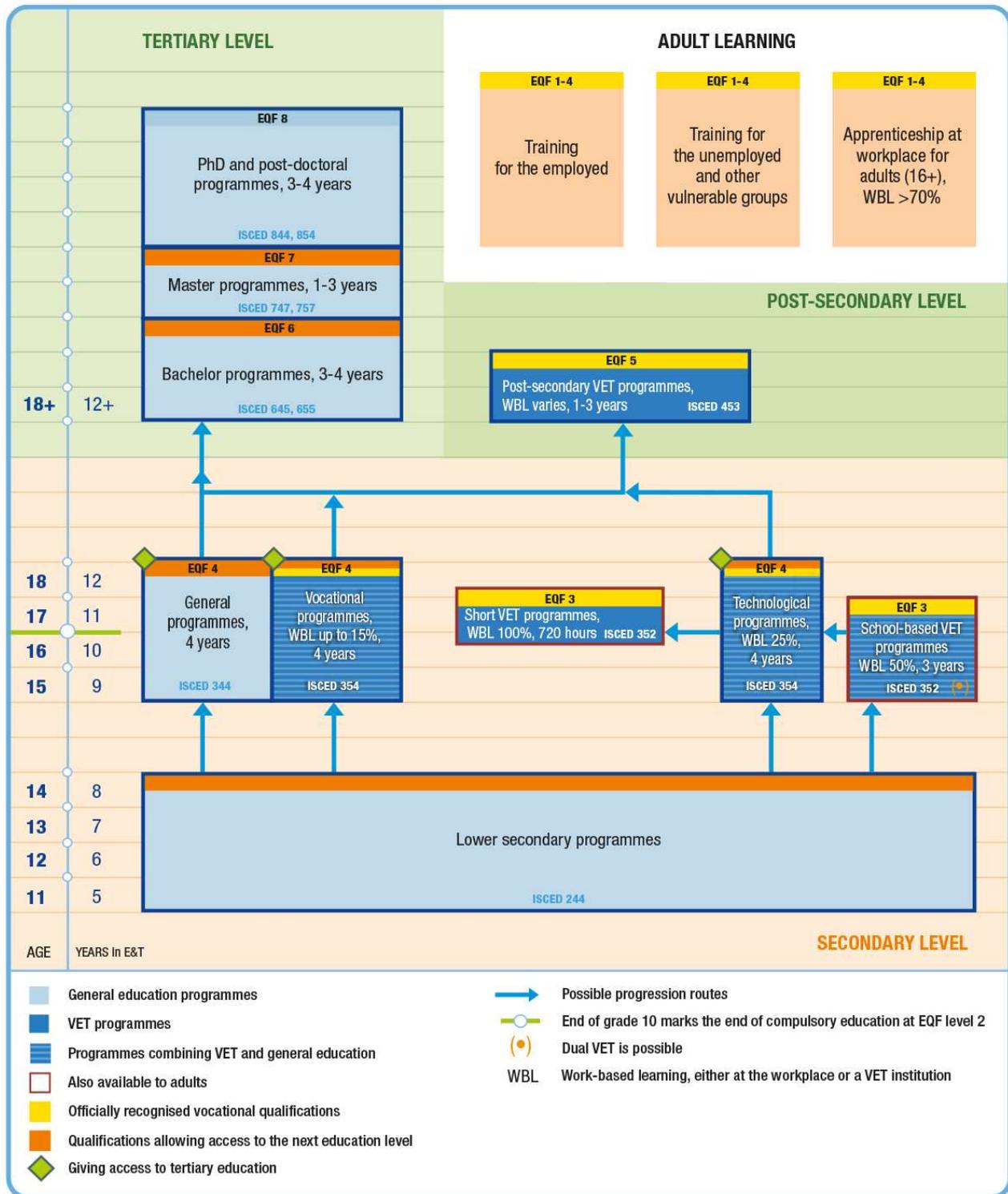


Figure 7 VET in the Romanian education system

(source: Cedefop & ReferNet Romania 2019)

## 2.5.2. VET governance

Entities, roles and responsibilities for both IVET and CVET are presented here according to [RO6].

### *Governance in initial VET*

#### *- Ministry of National Education*

The Ministry of Education designs and executes legislation in cooperation with stakeholders (academia, trade unions, teachers' associations, students, parents, public administration, businesses, and Non-Governmental Organizations (NGOs)). It approves financing and enrolment plans, awards VET certificates (both in initial and continuing VET), and coordinates national exams. It approves methodology for teacher enrolment, career advancement and transfers, and approves curricula through subordinate bodies, including school inspectorates.

#### *- National Center for Technical and Vocational Education and Training Development*

The center is accountable to the Education Ministry. It evaluates and suggests changes to policies and strategies, and coordinates their implementation. It coordinates the design, implementation and review of national curricula, and the assessment and certification for initial VET. Furthermore, it supervises the development of professional training standards for qualifications validated by sectoral committees (coordinated by the National Authority for Qualifications) and approved by the Education Ministry. Also, it develops methodologies for the quality assurance and monitoring of programs.

#### *- Romanian Agency for Quality Assurance in Pre-university Education*

It oversees authorization (license), accreditation and external quality evaluation of schools at pre-university education level, including initial VET schools.

#### *- Institute of Educational Sciences*

It is a national institution for research, development, innovation and training in education and youth. It establishes and coordinates working groups for the development and review of the national curriculum component. It develops various learning and curriculum resources.

#### *- Regional consortia*

These are advisory partnership bodies of the National Center for Technical and Vocational Education and Training Development, in charge of updating, implementing, and monitoring regional education action plans.

#### *- County school inspectorates*

They propose to the Education Ministry the VET enrolment plan for the next school year. This is based on proposals from schools and taking into consideration labor market needs, defined through direct requests from employers. The inspectorates also organize the national recruitment of teachers, including VET.

#### *- Local committees for development of social partnerships*

They are advisory managerial structures that aim at improving VET relevance and quality.

#### *- Teaching staff resource houses*

They organize continuing teacher training. There is one in each county and in the municipality of Bucharest. The teaching staff resource houses are subordinated to the education ministry.

#### *- County centers for resources and education assistance*

The centers support learners with special needs, including those in VET. There is one in each county and in Bucharest. The centers are under the control of the Education Ministry.

#### *- Local authorities*

They support the implementation of national strategies on education; ensure the joint financing of projects sponsored by the EU and other funds; maintain school infrastructure.

#### *- VET school administration boards*

They approve institutional development plans, local/school-based curricula and teacher training plans proposed by their schools.

- *Commissions for quality assurance and evaluation*

In each VET school, a Quality Assurance and Evaluation Commission is appointed to supervise all quality assurance processes and activities, in line with the quality assurance law.

### *Governance in continuing VET*

- *Ministry of Labor and Social Justice*

The Ministry of Labor develops and promotes policies in continuing VET, including training for the unemployed, apprenticeship at the workplace, actions for Not in Employment, Education, and Training (NEETs) and traineeship for graduates of higher education. In addition, it coordinates the authorization of continuing VET providers, and it manages and updates the nomenclature of qualifications. It also monitors, analyzes, controls, and evaluates vocational training for the unemployed.

- *National and county agencies for employment*

The National Agency for Employment coordinates vocational training of jobseekers at national level, carried out by the county employment agencies.

- *National Authority for Qualifications*

It is responsible for: the national qualifications' framework; the national registers of qualifications in higher education and professional qualifications; the centers for the evaluation and certification of professional competences obtained outside formal education; the evaluators of competences, external evaluators and evaluators of evaluators. The authority ensures the link between the standards used for defining qualifications and labor market needs, helps with development of occupational standards, and registers the standards in the national register of professional qualifications in education. It also approves the occupational standards for continuing VET and endorses the professional training standards used in initial VET programs.

- *County authorization commissions*

They oversee authorization and monitoring of training providers, and decide on the examination commissions at county level. County authorization commissions are set up by the labor ministry.

- *Continuing VET providers*

Adult vocational training providers carry out vocational training, after authorization by the county commission.

### **2.5.3. Support measures and financing in VET**

According to *Vocational Education and Training in Europe – Romania report* [RO7], the total public expenditure on education and training reached, in 2009, 4.24% of the Gross Domestic Product (GDP). Due to the economic crisis, it fell significantly in 2010-2011, reaching a percent of 3.6% in 2017. The Law No1/2011 targets 6%, although this number can realistically be achieved from 2025.

In 2018, per capita financing was as follows.

- Three-year 'professional'/school-based programs (all qualifications): EUR 1 115.
  - Programs offered in minority language(s): EUR 1 143.
- Four-year technological programs (all qualifications): EUR 1 057.
  - Programs offered in minority language(s): EUR 1 101.
- Four-year vocational programs (except music and sports): EUR 1 330.
  - Programs offered in minority language(s): EUR 1 403.

In each year the budget for education and training (including also the VET) is proposed and approved, by addressing per capita expenditure and coefficients that vary depending on the area (rural/urban), the number of students, EQF

level. The type of program, total number of learners in the school and teaching language can be other criteria for delivering financial supplements.

Financing is provided to schools by the Ministry of Education from the State budget (main source: value added tax) based on actual enrolment. According to Eurostat, *Total public expenditure on education-by-education level and program orientation* [RO8], most of the funds go to salary expenses/wages. It also covers allowances, staff continuous training, learner assessment expenditure, materials, services, and maintenance.

The basic financing of a school unit is obtained by multiplying the standard cost per student by the specific coefficients mentioned above, which is the Government decision in each year.

For private school, the VET learners must pay fees, while public schools are free.

Continuing VET has the following financing sources: employers/enterprises; unemployment insurance budget; EU structural and cohesion instruments; personal contributions; other sources. In the case of jobseekers, CVET is assured by the unemployment insurance budget.

#### 2.5.4. Incentives for VET learners

##### - *Professional scholarship for three-year professional programs*

The professional scholarship is a national social protection program that offers approximately EUR 43 (RON 200) per month for all students attending vocational education (three-year professional program learners). This scholarship can be combined with grants provided by training companies. Vocational education students cannot benefit simultaneously from the "Vocational Scholarship" and from the financial support granted to students within the National Social Protection Program "High School Money" [RO9].

##### - *Dual VET allowance*

In addition to a professional scholarship, dual VET learners receive at least approximately EUR 43 (RON 200) per month in allowances from the company where they undergo training. Companies also pay for work equipment for learners.

##### - *High school scholarship*

High school scholarship is a national social protection program that offers approximately EUR 54 (RON 250) to high school students (including those in VET, technological and vocational programs) in order to continue/complete their studies. By adopting the Government decision 712/2018 [RO10], starting with the 2018-2019 school year, each beneficiary received money for the entire duration of courses, in case of compliance with all legal conditions. The scholarship is linked to family income and is not available for all learners. For 2020-2021, depending on the allocated budget for this program it was established the number of beneficiaries to 28.588 [RO11].

##### - *School supplies*

To stimulate attendance at school, in 2002 the School Supplies Program was launched, targeting students in state, primary and secondary education, day courses. At the beginning of each school year, packages with school supplies specific to each class are distributed. The measure has been implemented since the school year 2017-2018 [RO12].

##### - *Euro 200 scholarship*

The Euro 200 scholarship is a national program that aims to stimulate the acquisition of computers by granting financial aid established on social criteria. In this way, the VET learners and other learners can develop their digital skills, since 2004 under Law No 269/2004. In 2018, the government spent more than EUR 2.6 million on this measure.

##### - *Local public transport*

All formal education learners, including VET, receive a 50% discount for local public transportation (bus, subway and train) up to age 26. Local authorities may also partly reimburse the cost of a monthly pass for learners with special education needs, orphans, or those from a children's home/orphanage.

### 2.5.5. Incentives for companies that offer VET

#### - Apprenticeship and traineeship cost reimbursement

Employers who sign an apprenticeship or traineeship contract may apply for subsidies to the public employment service. Therefore, they can receive approximately EUR 483 (RON 2 250) per month for each apprentice/trainee for the entire duration of the program. It can be from six months to three years for the apprenticeship programs and six months for the traineeship. In general, this support comes from the unemployment insurance budget or ESF.

Employers who hire graduates from initial education are eligible for a public employment service monthly grant of approximately EUR 483 (RON 2 250) for each graduate for a period of 12 or 18 months, with the condition of not maintaining the contract at least 18 months from its start. [RO13]

#### - Tax exemption

Authorised VET providers are exempt from paying value added tax for training operations. Companies may also deduct the training costs from their taxable income.

## 2.6. Country review: Sweden

Development of the Swedish model of vocational education during the past one hundred years has entailed a less prominent role for apprenticeship as compared to school-based education. In Sweden, the involvement and operative responsibility of trade and industry in relation to education came to be less evident than in countries with strong apprenticeship systems.

As in other countries, the origins of vocational training in Sweden can be found within the traditional handcrafts. Up to the mid-19th century, there were laws regulating the training of apprentices and journeymen as well as stipulating the status of being a master. Around the mid-19th century, however, freedom of trade reforms and a decline in traditional handcrafts resulted in a loss of momentum for that form of education. When vocational education came back into focus at the end of the 19th and beginning of the 20th century, the decision to establish special vocational schools was motivated by the needs of industry.

Today the Swedish National Agency for Higher Vocational Education is responsible for Higher Vocational Education in Sweden (HVE) and the key function is to ensure that HVE programs meet the labor market's needs for qualified workforce.

### 2.6.1. VET within the Swedish education system

Vocational training in Sweden starts after compulsory school, before the age of 20, and includes:

- upper secondary education (ISCED level 3, EQF level 4);
- post-secondary non-tertiary education (ISCED level 4, EQF levels 5-6);
- higher education (ISCED levels 5, 6, 7 and 8, EQF levels 6-8);
- municipal adult education.

Students can access 12 vocational programs (*yrkesprogram*) and six general preparation programs for higher education (*högskoleförberedande program*) in upper secondary school (*gymnasieskola*).

Those who are over 20 years old - without upper secondary education - and wish to change their careers, can enrol in upper secondary VET courses at municipal adult education institutions (*kommunal vuxenutbildning*) acquiring a secondary education diploma (the qualification is placed at EQF level 4).

At tertiary level, there are HVET (higher vocational education programs, *yrkeshögskoleutbildningar*) which enable the person to obtain first or second cycle VET qualifications at EQF levels 5 and 6. This is required for professions requiring specific knowledge or certification (e.g. health care, agriculture, education, etc.). [SW1]

Following a formal education path, students can choose among several options to achieve an initial VET at upper secondary level leading to EQF 4:

- School-based learning for the young and adults.
- Work practice (mandatory in vet for the young, and encouraged through state grants in municipal adult VET).
- Distance learning (available in municipal adult VET-education).

In addition, outside the formal school system, Sweden offers *liberal adult education (folkbildning)*. This is a "free and voluntary " type of education and it is offered by folk high schools (*folkhögskolor*) and adult education associations (*studieförbund*).

Contents and duration of these educational paths are chosen by the folk high school or the educational association providing them.

Concerning the programs' duration, we can distinguish between:

- One- to three-year VET programs: special courses for specific professions (i.e. journalist, recreational activity leader, therapeutic assistant, singer or sign language interpreter).
- Shorter and longer courses in crafts, art, music and theatre.

The main features of the Swedish VET are:

- A highly decentralized system. Education providers are responsible for providing programs;
- Recent increase in the number of VET programs, linked to the high number of immigrants;
- Highest participation rate in lifelong learning in the EU – Eurostat - (over 30% in 2017).
- It is provided in many forms and students can also acquire an upper secondary vocational diploma.

**Figure 8** provides an infographic of the VET system in Sweden.

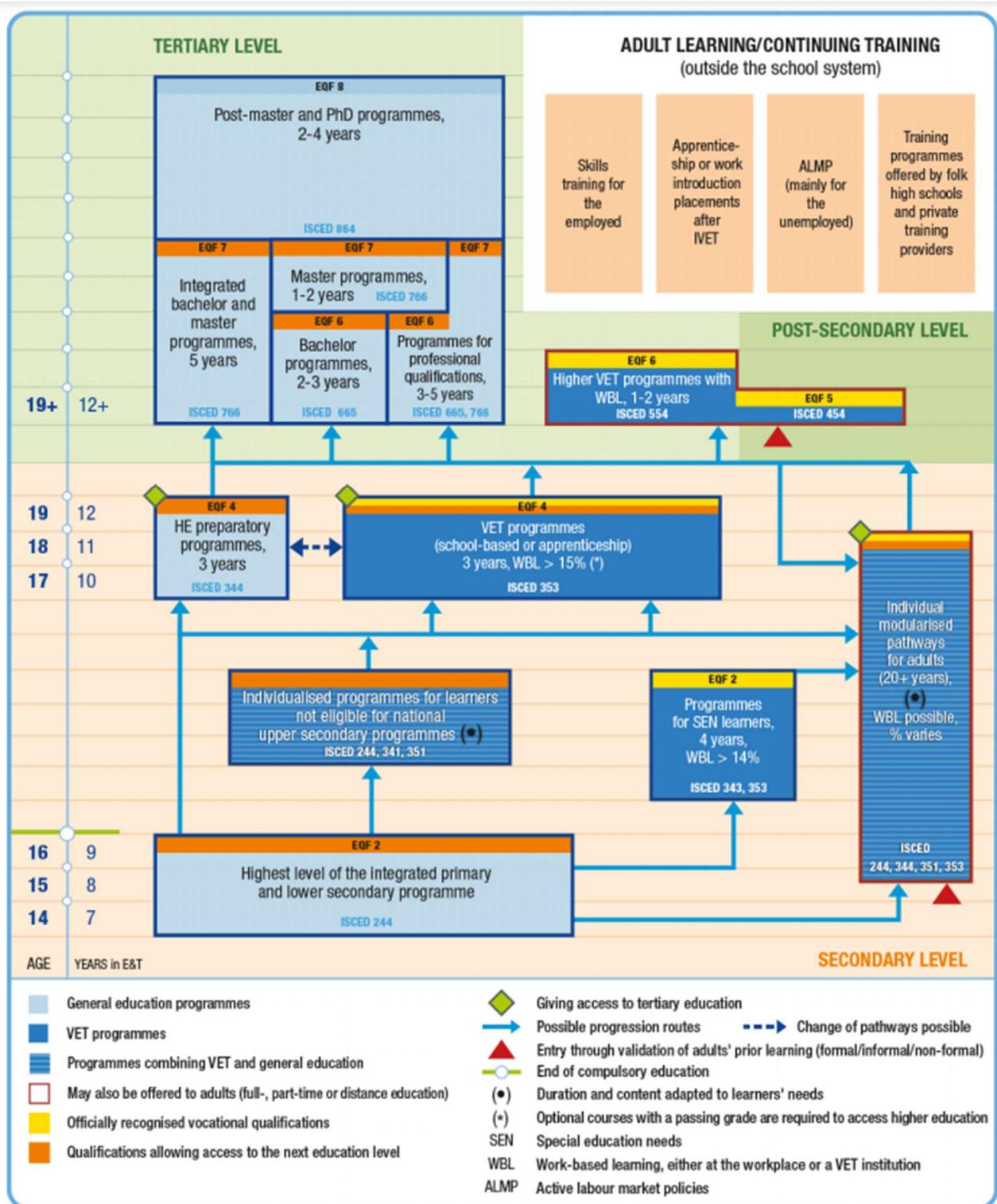


Figure 8 VET in the Swedish education system

(Source: Cedefop and ReferNet Sweden, 2019)

## 2.6.2. Governance and responsibilities

### Upper secondary VET

The Swedish education system is a goal-driven system with a high level of local responsibility: funding is mainly responsibility of the municipalities, while the responsibility for program delivery lies both with the municipalities and the organizers of the independent schools (ref. **Figure 9**).

Also, private entities can organize and run independent upper secondary schools, upon approval by the Swedish Schools Inspectorate.

Responsible body	Responsibility
Parliament	<ul style="list-style-type: none"> <li>Education Act</li> </ul>
Government	<ul style="list-style-type: none"> <li>Ordinances, including the curricula</li> <li>Diploma goals</li> <li>Programme specific content and orientations of VET and HE programmes</li> <li>Syllabuses (foundation subjects)</li> </ul>
The National Agency for Education	<ul style="list-style-type: none"> <li>Content of orientations of VET and HE programmes</li> <li>Syllabuses (all other subjects)</li> <li>Regulations</li> <li>General guidelines</li> <li>Support to providers</li> </ul>
Stakeholders, social partners (National programme councils)	<ul style="list-style-type: none"> <li>Advice to The National Agency for Education</li> </ul>
Municipalities	<ul style="list-style-type: none"> <li>Funding</li> </ul>
Governing bodies of school organisers (municipalities and independent organisers).	<ul style="list-style-type: none"> <li>Provision of education</li> </ul>
The Schools Inspectorate	<ul style="list-style-type: none"> <li>Approval of independent schools</li> <li>Inspections and quality auditing.</li> </ul>

**Figure 9 Governance and responsibilities in upper secondary education**

(Source: Skolverket)

The core content of the national upper secondary VET programs (foundation subjects, program-specific subjects and orientations) is defined by the Government, but, at municipal/school level it is possible to modify and adapt the programs to meet the local needs.

Nevertheless, there are also program specializations: the National Education Agency decides whether the courses/subjects are consistent with the diploma objectives of a program and makes them accessible for each program specialization. Furthermore, the Agency for Higher Vocational Education and Training supervises programs through inspections and quality control.

The different courses can be applied by schools to create program specializations that fit regional and local labor market needs. The organizer's governing board (local government and school organizer) is responsible for deciding and checking the local adaptations of the program specializations.

As already mentioned, the contents of the national VET programs are mainly defined by the Government, but also other parties can influence the program design process: learners, employers and industry representatives. Employers and industry influence the content of the program by participating as lecturers, taking part in projects, hosting study visits and offering internships.

Hence, VET providers programs include information on:

- Knowledge, skills and competences to be achieved
- Assessment criteria
- The companies or organizations that have contributed to the program planning.

Higher vocational education may also be run in the form of distance courses.

### 2.6.3. Support measures and financing in VET

#### *Upper secondary VET*

School funding is provided by municipal tax revenues and by Central Government state grants to municipalities. The Central Government provides funds according to different parameters including population, social structure and number of immigrants. It is up to the municipality to determine how to allocate the resources. There are significant differences in the calculated costs between different programs, moreover, for some programs, there are differences in costs between orientations. The funds allocated are based on a system for calculating the average cost of a learner for a particular program (*Riksprislistan*) developed by the National Agency for Education. Upper secondary school and municipal adult education at upper secondary level are free of charge, while in adult education, the cost of learning materials is charged to the learner.

#### *Adult municipal VET education*

The Swedish Government provides state subsidies to municipalities to run adult education programs to tackle the shortage of skilled labor and to reach groups who have not completed upper secondary education or who need to supplement it. Municipalities often do not run upper secondary adult education themselves, but prefer to outsource it to public or private providers on the education market.

#### *Higher VET*

Higher vocational education programs, which are partly financed by public funds, can be organized by state higher education institutions, municipalities, county councils and individuals or legal entities. These programs are free of charge for the learner, who only has to cover minor costs (i.e., study visits, teaching materials...). In addition, students enrolled in these types of courses are eligible for State aid. State subsidies for education providers are regulated by the Swedish National Agency for Higher Vocational Education (*Myndigheten för yrkeshögskolan*). The National Agency is also in charge of approving programs and controlling their delivery, according to the needs of the labor market.

#### *Liberal (non-formal) adult education*

Folk high schools may be run by county councils and regions, but most of them are controlled by NGOs, non-commercial organizations, foundations or associations and trade unions. Major adult education associations are also run by NGOs, associations and other organizations. Study circles are often provided by local or regional associations. Finally, liberal adult education is largely financed through support from the State, regions and municipalities.

Grants to adult education associations and folk high schools are about 70% provided by the State. The grants are distributed by the Swedish National Council for Adult Education (*Folkbildningsrådet*), a non-profit association, which is also in charge of assessing the performance of the activities. Classes in folk high schools are free of charge and, in some cases, qualify for financial support. Students only have to pay for study materials, lunch and accommodation-related expenses. Study circles and other adult education activities, on the other hand, are subject to tuition fees and do not qualify for financial aid.

### 2.6.4. Incentives for learners

Sweden has put in place a strong system of study allowances and student aid, called *Studiestöd*, which depends on age, life situation, scope and level of studies. The result is that all the individuals have the possibility to study:

- trainees receive different type of support for both upper secondary and tertiary studies;
- employees can take leave of absence to study.

The Swedish Government through the Study Support Ordinance defines the education programs receiving support.

The Swedish Board for Study Support (*Centrala Studiestödsnämnden, CSN*) administers most of the trainees' support.

Special investments in higher levels of grant are used as an incentive for further studies. More than 475,000 students aged 20 and above received financial aid in 2018 (12% were studying in a higher VET program). [SW2].

### Aged 20 or less

Trainees aged 20 or less, studying in upper secondary school, municipal adult education or folk high schools, can receive study allowance (*studiehjälp*) in the form of:

The grant can also be awarded to studies abroad if the learner studies full-time and participates in the relevant courses.

Learners can apply for a boarding supplement from the Swedish Board for Study Support or from the municipality if they want to study in a place different from their municipality, if the home municipality does not provide the required program, or it is open to national admission.

In 2014 a supplement was introduced for learners attending apprenticeship education (*lärlingsutbildning*) in upper secondary school to cover extra living costs (mobility and lunch). As of July 2014, learners attending apprenticeship education in upper secondary school may be employed and remunerated by the employer. In this case he/she cannot receive the supplement.

### Aged 20 and above

Student aid (*studiemedel*) can be granted to learners in post-secondary education such as:

- higher vocational education,
- supplementary education,
- vocational education in folk high schools.

Trainees at upper secondary level aged 20 or more can ask for student aid in form of grants, loans and supplementary allowances (i.e. parents of minors). Learners must achieve satisfactory results in previous studies to receive further funding.

Despite all these supporting measures, a part of the population is still out of the education system, mainly due to economic reasons. To tackle this challenge, the Swedish Government has introduced since mid-2017 the *Education Entry Grant*, a new study allowance [SW3] addressing unemployed people, aged 25-56, with short previous education (at the primary or upper-secondary level).

### Adults

As early as 2009, Swedish municipalities have had the opportunity to apply for state subsidies for an extended implementation of VET for adults.

Since 2015, the Swedish government has been implementing an educational initiative aimed at lifelong learning projects to increase employment. With this initiative, the State finances VET programs for adults at upper secondary level, higher vocational education, education in popular high schools, universities, and colleges. The initiative is aimed at unemployed adults, adults without upper secondary education or with secondary vocational education to be completed.

In January 2016, the funds were expanded to cover all people in need of vocational training, courses in Swedish for immigrants or Swedish as a second language.

In 2017, the Government updated the regulation of the initiative, based on which: in order to receive a grant, the cooperation of at least three municipalities is now required for planning and offering education and training at regional level. Planning is now carried out in consultation with the public employment services and the various actors responsible for regional development, so that the needs of the labor market are better met.

### *Migrants*

In recent years, work introduction agreements (*Yrkesintroduktionsanställningar*) have been signed with the aim of facilitating the transition of young people (15-24 years old) from school to working life and safeguarding the long-term skills supply for companies.

Under these agreements, coaching and training is offered to young people with no professional experience. The agreement foresees that young workers, occupying a full-time position, receive a salary equal to 75% of a full-time job (due to the time invested in vocational training).

The training program is defined in advance and its implementation is monitored by a supervising trainer appointed by the enterprise.

From 1 June 2016 also the newly arrived immigrants older than 25 and long-term unemployed can benefit of these agreements. Thanks to a further agreement between the social partners of the employment sector, a minimum wage is paid by the employer to the employee. [SW4]

### **2.6.5. Incentives for companies that offer VET**

In recent years, Sweden has successfully involved social partners (employers and trade unions) in vocational education and training (VET) at the national level, but the same involvement at the local level is not homogeneous, resulting in a different quality of the provision of education and training. In 2010, Sweden established *Program Councils* for each national upper-secondary VET program. Each council is composed by 8-10 members representing industry, social partners, and sometimes national and regional authorities: they act as advisors of the National Agency for Education on the quality, content and organization of upper-secondary VET for youth and adults.

At local level, schools should collaborate with one or more Local Program Councils (*lokala programråd*) including representatives from local working life, in areas corresponding to the VET programs they provide. But some research shows that the influence of local councils varies because schools are free to organize local councils. [SW5]

To fund support activities in the enterprises (i.e. to support WBL, or to promote an interest to pursue a career as VET teacher), Sweden provides State grants, managed by the governing board of education providers. [SW6]

Furthermore, the public employment services pay employment taxes of 31.42% as well as a compensation of SEK 115 (EUR 11 as of April 10, 2019) per day for the trainer in the workplace in case of employers offering workplaces in the scope of introduction agreements.

**Figure 10** represents the funding mechanism.

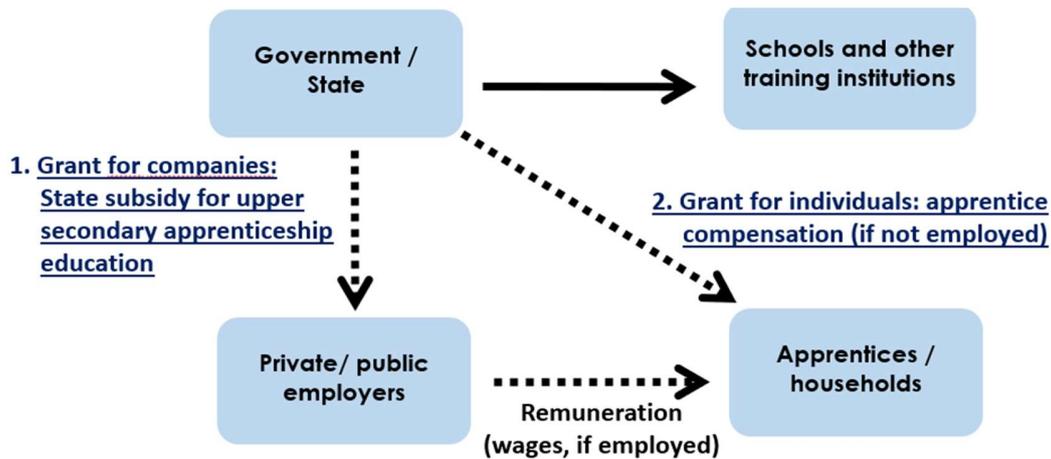


Figure 10 Funding sources and financial flows for Swedish VET

(Source: Cedefop)

According to the CEDEFOP Database on Financing apprenticeship in the EU/Section Sweden “The total amount of ‘Apprentice compensation’ in 2016 was approximately EUR 6.39 million and of the state subsidy to employers for the school year 2016-2017 approximately EUR 50 million.” [SW7]

The ‘State subsidy for upper secondary apprenticeship’ targets schools and employers: it should encourage employers to be involved in the process but data show that it fails in fostering it. Only 3% of employers report the subsidy to be a prerequisite for them to take on apprentices, and one third report the subsidy to impact this decision. [SW8]

### 3. Organization and delivery of vocational education and training

In this chapter, we review how European VET systems deliver education and training, focusing the main procedures and approaches for organization of the teaching and learning, for admission to programs, and for the certification of qualifications.

As in Chapter 2, we provide first a “broad picture” at EU level. Once again in this case, it is out of our scope to provide a systemic and global analysis of the relevant information for all countries, due to the already mentioned diversification of VET around the EU member countries. We aim instead at capturing the most characteristic differences that arise among the countries, in terms of organization and delivery of VET, in order to evaluate the possible margins of harmonization among them and integration of the project’s Blueprint paradigms. Following the European overview, is the review of VET organization and delivery in the five focus countries.

#### 3.1. Generalities for Europe

A study conducted on 30 European countries has revealed substantial differences in terminology (terms used in the national language), conception and operation of VET. Nevertheless, in almost all countries the dominant perception of VET is that of *occupation-specific education and training geared towards securing a supply of skilled labor*. Broadly speaking, vocational education and training covers any curriculum content in school that aims at preparing its students for the labor market, in great part at higher education level, and with a great deal of formal and non-formal/informal learning and training conducted within firms. Across Europe, this concept is interpreted and implemented differently. There is outstanding diversity in terms of programs, target groups, typology of programs qualifications recognition and teaching/learning typologies. For instance, the interpretation of VET as “always occupation-related” does not hold true in countries such as Ireland, where vocational studies are not only intended

for development of professional skills and knowledge but also conceived as adult literacy and community education (which are regarded as *liberal adult education* - as opposed to VET - in most countries). Or, in some other countries (e.g., the *Visegrád group* – Czech Republic, Hungary, Poland and Slovakia), continuing VET is interpreted exclusively as job-related nonformal learning for adults.

Furthermore, the various setups of upper secondary education and training are strongly tied to the territoriality of labor market and the educational outcomes. Countries where the apprenticeship system is dominant (e.g., Germany, Denmark, Switzerland), or countries where vocational education is based on combined work and school (e.g., the Netherlands and Austria), have a positive impact on the labor market entry of VET graduates, preventing their unemployment and securing their access to skilled positions in the occupation ladder. However, these countries do not offer by default the opportunity of continuing learning in formal or non-formal education later in life. In contrast, in countries where general upper secondary education dominates (e.g. Mediterranean and Baltic countries) the rate of VET graduates continuing their studies in formal education is low, whereas the participation in non-formal education and training is good (which may indicate a 'compensation' effect, where VET graduates want to fill gaps in skills left by formal vocational education in the upper secondary phase). In these countries, overall the vocational education does not have a strong negative effect on educational and labor market outcomes.

Across European, other important differences and territory-specific characteristics resonate:

- In some countries more than in others, VET and general education are differently regarded in their respective status, with the former being largely perceived as inferior compared to the latter (some notable exceptions to this tendency can be found in: Finland, where VET is considered equal to general education, and a 1998 law gives graduates of the vocational track eligibility access polytechnics and universities; or in Austria, where school-based VET is regarded as equal to, or even better than, general education).
- In many countries, a clear majority (at least 2/3) of all students at upper secondary level are engaged in some sort of VET, whereas there are also regions where VET is a minority track (Iberian peninsula, Baltic States and the east Mediterranean part of Europe).
- There are also conceptions of VET which would be better described as '*further training*' (e.g. in Ireland or the UK), and there are countries which seem to have abandoned the dichotomy of initial and continuing education and perceive VET as a part of lifelong learning (e.g., Finland or Germany).

For what concerns apprenticeship programs, leaving national differences and details aside, two are the fundamentally dominant notions. One sees the apprenticeship as a specific type of program that aims at qualifying people for jobs as skilled workers. In this case, the qualification obtained is usually unique for the type of program (as in Denmark, Germany, Croatia and Austria). The other notion sees the apprenticeship as a type of learning that includes on- and off-the-job learning, but which is not confined to the level of skilled workers or to a particular type of program, being instead applicable at any level and for different qualifications (as in France, Finland or the UK)

## 3.2. Country review: Germany

### 3.2.1. Procedures for admission, training and awarding of qualifications

The *dual apprenticeship scheme at upper secondary level (EQF level 4)* is the main pillar of VET, which also attracts upper secondary graduates. Parallel to the apprenticeships are school-based VET programs at upper secondary level (EQF levels 2 to 4), which differ in terms of access, length and levels of qualification they lead to (ref. Figure 3 in Section 2.1.1)

The most important evaluation instrument for *non-formal* learning outcomes is the admission to final exams (*Externen-Prüfung*, literally "examination for external candidates", i.e., candidates who did not take part in a formal vocational training program) (Under Section 45(2) of the Vocational Training Act (BBiG)). Under this provision, candidates can be admitted to a final examination for a recognized occupation requiring formal training (training occupation) if they provide evidence that they have been employed in the relevant occupation for at least one and a half times the period prescribed for initial training.

At *post-secondary level (EQF levels 4 and 5)*, specialized programs building on secondary VET provide more thorough occupational knowledge, leading to qualifications for entrance into higher education.

The *tertiary level* comprises three levels of advanced vocational qualifications (and exams) (EQF levels 5 to 7), which differ in competence requirements and related operational deployment in companies. Admission to level 7 qualifications requires level 6 qualifications; level 6 qualifications do not require level 5 qualification but can be acquired directly after IVET in the dual system (since work experience is the main requirement).

The definition and description of examinations and qualifications is given in the Advanced Training Regulations (decreed by the BMBF by agreement with the competent Ministries and after consultation with the primary board of the BIBB). These regulations also specify:

- a) The designation of the advanced qualification.
- b) The aim, contents and requirements of the examination.
- c) The admission requirements.
- d) The examination procedure.

In order to be admitted to an examination, candidates are usually required to have completed a vocational training course and/or to prove appropriate vocational experience.

**Table 8-Table 10** provide a summary of the main organizational features of the VET from upper secondary level to tertiary level.

**Table 8 Overview of upper secondary VET in Germany**

<b>EQF 3-4 (ISCED level 354)</b>	
<b>Apprenticeship (WBL ca. 75%) 2-3.5 years</b>	
<b>Learning form</b> (e.g., dual, part time, distance)	<ul style="list-style-type: none"> <li>• school-based and practical learning in schools and inter-company vocational training centers (e.g. one or two days per week or one week per month);</li> <li>• company-based learning (share of approx. 70%).</li> </ul>
<b>Main provider</b>	Companies in cooperation with vocational schools
<b>Work-based learning type</b> (e.g., workshop, at school, in-company training, apprenticeship)	<ul style="list-style-type: none"> <li>• in-company practice (about 70%),</li> <li>• practical training at school,</li> <li>• practical training in inter-company vocational training centers</li> </ul>
<b>Main target groups</b>	Programs available for young people and also for adults
<b>Entry requirements for learners</b>	Completion of full-time compulsory education, no further requirements for access (but companies select their apprentices)
<b>Assessment of learning outcomes</b>	A final exam is testing the practical and general knowledge of the learner based on the work requirements and processes of occupation. As a rule, a final exam covers four or five fields relevant to the occupation. Performance in general subjects is evaluated via school reports. The exams are regulated by law (Vocational Training Act – BBiG) and is performed by the chambers.
<b>Certificates provided</b>	<ul style="list-style-type: none"> <li>• certificate from the training company</li> <li>• certificate from the vocational school</li> <li>• final examination certificate of apprenticeship</li> </ul>
<b>Examples of qualifications</b>	Office manager, management or sales assistant for retail services, motor vehicle mechatronics technician, industrial clerk, medical assistant, IT specialist.
<b>Progression opportunities</b>	In general, graduates of dual apprenticeship programs are fully qualified to enter the labor market and most of them do so.

**Table 9 overview of post-secondary VET in Germany**

<b>EQF 4- 5 (ISCED 444, 453, 454)</b>	
<b>Specialised programs incl. WBL</b>	
<b>Learning form</b> (e.g., dual, part time, distance)	<ul style="list-style-type: none"> <li>• School-based learning;</li> <li>• Work-based learning (practical training at school and work practice);</li> <li>• BOS: full time vocational schools;</li> <li>• FOS: school- and work-based VET programs</li> <li>• GES: VET programs attached to hospitals providing both theoretical and practical training.</li> </ul>
<b>Main provider</b>	<p>Regulated by Federal or state law</p> <ul style="list-style-type: none"> <li>• senior vocational school (<i>Berufsoberschule BOS</i>)</li> <li>• specialised upper secondary school (<i>Fachoberschule FOS</i>)</li> <li>• schools of health, education and social care (GES)</li> <li>• other vocational schools such as <i>Fachschule and Fachakademie</i></li> </ul>
<b>Work-based learning type</b> (e.g., workshop, at school, in-company training, apprenticeship)	<ul style="list-style-type: none"> <li>• practical training at school</li> <li>• work practice (e.g. in attached hospital in the case of healthcare schools)</li> </ul>
<b>Main target groups</b>	Programs available for young people and also for adults.
<b>Entry requirements for learners</b>	<p>Leaving certificate from intermediate secondary school (at the end of grade 10) and</p> <p>(1) two years' successful vocational training or</p> <p>(2) five years' practical experience</p>
<b>Assessment of learning outcomes</b>	Final examinations
<b>Certificates provided</b>	Programs at post-secondary level aim at increasing the permeability between secondary (for holders of general intermediate secondary leaving certificate) and tertiary education, by acquiring a higher education entrance qualification (subject-specific or not).
<b>Examples of qualifications</b>	Health/education/social sector schools: nurse, physical therapist, pharmaceutical-technical assistant, educator, social worker
<b>Progression opportunities</b>	Depending on chosen program and duration, graduates from specialised programs can further progress to vocational and general bachelor programs, as well as to technician specialists program

**Table 10 Overview of tertiary VET in Germany**

<b>EQF 5 – 7 (ISCED 554, 655)</b>	
<b>Qualifications and exams for Management and expert/Master craftspersonspecialist/ Certified advisor</b>	
<b>Learning form</b> (e.g., dual, part time, distance)	These advanced vocational qualifications do not contain a curriculum; however, they do define and describe examinations. Candidates can prepare themselves while continuing to work. Most candidates attend preparatory courses. These courses may be full-time, part-time or distance learning.
<b>Main provider</b>	<p>Exams: Assessment/certification by the chambers;</p> <p>Preparatory courses: provided by the chambers.</p>

<b>Wok-based learning type (e.g.. workshop, at school, in-company training, apprenticeship)</b>	Candidates prepare themselves while continuing to work. Most candidates attend preparatory courses, which mostly do not include any work-based learning. However, professional practice is required to access each new level of qualifications.
<b>Main target groups</b>	People who have already completed vocational or professional training and/or have a number of years of professional experience.
<b>Entry requirements for learners</b>	<ul style="list-style-type: none"> <li>• IVET qualification</li> <li>• work experience</li> <li>• advanced vocational qualification at EQF level 6 to do an advanced vocational qualification at EQF level.</li> </ul>
<b>Assessment of learning outcomes</b>	Final examinations as specified in the advanced training regulations
<b>Certificates provided</b>	<ul style="list-style-type: none"> <li>• certified advisor in specific professional areas;</li> <li>• technician (EQF5),</li> <li>• master craftsperson, specialist, etc. (EQF 6),</li> <li>• management expert; vocational pedagogue, IT-Professional(EQF 7).</li> </ul>
<b>Examples of qualifications</b>	NA
<b>Progression opportunities</b>	Completion of advanced vocational training at EQF level 6 as a master craftsperson (Meister) and at EQF level 7 opens up access to higher education.

*Advanced vocational programs (ISCED 655; EQF 6)* are offered at trade and technical schools, which are regulated according to the State law. Entrance requirements vary depending on the subject area. Normal requirements for an applicant include: either a qualification in a recognized training occupation appropriate for the chosen subject, and relevant work experience of at least one year; or alternatively, a qualification from a full-time vocational school and relevant work experience of at least five years. The training can be followed as a part-time or full-time program (the latter having a duration from one to three years), and leads to a State vocational qualification (e.g. educator; technician). Some trade and technical schools also offer programs that lead to a formal entrance qualification for the universities of applied sciences. They exist for the following occupational fields: agriculture, design, technology, business and social care. They end with a final State examination under State law.

*Dual programs (EQF levels 6 and 7)* combine two learning venues (the workplace and the education institution) and are offered by universities of applied sciences (*UASs, Fachhochschulen*), the dual university (*Duale Hochschulen*), universities of cooperative education (*Berufsakademien*) as well as some universities.

**Table 11-Table 12** provide a summary of the main organizational features of, respectively, advanced VET programs and advanced dual VET programs.

**Table 11 Overview of advanced/specialistic VET program in Germany**

<b>EQF 6 (ISCED 655)</b>	
<b>Technician, specialist etc. programs (incl. WBL)</b>	
<b>Learning form (e.g., dual, part time, distance)</b>	Depends on the field of study: mostly school-based learning but also work-based learning.
<b>Main provider</b>	State regulated technical and trade schools, in the following occupational fields: agriculture, design, technology, business and social care.
<b>Wok-based learning type (e.g.. workshop, at school, in-company training, apprenticeship)</b>	Work practice

<b>Main target groups</b>	Graduates from apprenticeship and school-based VET programs after a certain number of years working in the related profession
<b>Entry requirements for learners</b>	Entrance requirements vary by subject area: an applicant normally needs a qualification in a recognized training occupation relevant to the chosen subject and relevant work experience of at least one year, or a qualification from a full-time vocational school and relevant work experience of at least five years.
<b>Assessment of learning outcomes</b>	Final state examination under state law
<b>Certificates provided</b>	State certified qualification
<b>Examples of qualifications</b>	State vocational qualification (e.g. educator; technician)
<b>Progression opportunities</b>	Progression to vocational bachelor program is possible and prior education may be recognized affecting the program duration

**Table 12 Overview of advanced/master VET program in Germany**

<b>EQF 7 (ISCED 747)</b>	
<b>Master programs</b>	
<b>Learning form</b> (e.g., dual, part time, distance)	Dual: school- and work-based
<b>Main provider</b>	<ul style="list-style-type: none"> <li>• Universities of applied sciences (UASs, Fachhochschulen): 69% of all dual study programs</li> <li>• the dual university (Duale Hochschulen): 13%</li> <li>• universities of cooperative education (Berufsakademien): 12 %</li> <li>• other universities</li> </ul>
<b>Work-based learning type</b> (e.g., workshop, at school, in-company training, apprenticeship)	Practical training at school and in-company practice
<b>Main target groups</b>	People who have already completed vocational or professional training and/or have a number of years of professional experience as well as the bachelor diploma
<b>Entry requirements for learners</b>	Applicants must have successfully graduated from a general or vocational Bachelor program.
<b>Assessment of learning outcomes</b>	The examinations are in general performed as an accompaniment to studies. The study courses are provided with a credit point system (at least 120 ECTS for a Master's degree). A written dissertation (Master's thesis) is obligatory. The examinations regulations ( <i>Prüfungsordnungen</i> ) prescribe the objectives of and subject-matter on the examinations, the required standards and the exam procedures for each study course
<b>Certificates provided</b>	NA
<b>Examples of qualifications</b>	Most common combination is a business management program plus commercial training, as well as an engineering or computer science program combined with technical training.
<b>Progression opportunities</b>	Graduates holding a Master degree can progress to do a PhD program and degree.

## Validation of informal and non-formal learning

Because of Germany's federal structure, there is no common legal framework nor standardized system for the validation of informal and non-formal learning at national level, which takes place following different approaches at the various education levels all across the country.

The lack of standardization became an issue particularly in connection with the introduction of the German Qualifications Framework (*Deutscher Qualifikationsrahmen, DQR*). [DE20]. In 2011, the Federal Ministry of Education and Research (BMB) engaged various groups of experts (from cultural education, adult education, youth education, sports, youth associations and social partners) to explore how competences acquired in non-formal and informal settings could be incorporated into the DQR. It was discussed if and how to formally give equal recognition to competences acquired in this manner, and three possible options of validation were examined, namely:

1. *Maintenance of the formal education system*: assessment and validation of informal and non-formal learning in the context of the standards and criteria applicable to formal learning, and maintaining the same existing certificates.
2. *Competence-centered system*: Competence-centered revision of standards and criteria while giving equal recognition to informal and non-formal learning achievements; implementation of audit and assessment processes and certificates.
3. *Parallel system*: blended formal & competence-centered system, with the latter used to assess, audit and certify agreed standards concerning informally and non-formally acquired competences.

Despite the backing of the European Council Recommendation on the validation of non-formal and informal learning in 2012, none of these three options came to fruition, due to rejection from the representatives of the formal education sector (*Vertreter des formalen Bildungssystems*). [DE21] Therefore, nowadays the validation for non-formally and informally acquired competences still remains as it was established in 2011 [DE22], that is to say, using the following instruments:

### For the recognition

- Higher education entrance qualification: aptitude examination (*Begabtenprüfung*), university access without "*Abitur*" (the higher education entrance qualifications).
- Possibilities afforded under the Vocational Training Act (BBiG), e.g., crediting of previous vocational education and training (*berufliche Vorbildung*) or equivalence of examination certificates (*Zeugnisgleichstellung*).
- IT continued professional development system.

### For the crediting

- External examinations, for individuals who meet the requirements of general lower secondary school qualification (*Hauptschulabschluss*) or higher education entrance qualifications (*Abitur*)
- IT continued professional development system.
- Professionally acquired competences credited towards university degree courses.

In 2015, the BMBF has launched an initiative known as VALIKOM [DE23], specifically as a means to identify and validate "vocationally relevant" (*berufsrelevante*) competences to determine equivalent professions. The initiative - which targets individuals aged 25 and over, who demonstrate prior professional experience (also from abroad) but don't have vocational qualification - covers the four steps of a classic (formal) validation scheme:

- 1) Identification (information and advice)
- 2) Documentation
- 3) Assessment
- 4) Certification.

The competences of learners are documented in a portfolio, or can be demonstrated via work samples, professional interviews and/or a trial working period in a company. The "certification" consists in a validation certificate issued by the Chambers of Industry and Trade, which confirms partial or full equivalency with the profession in question.

This certificate, however, does not give the holder any entitlement to the formal education system or a formal vocational qualification. It can only be used on the labor market, as a form of proof of correspondence to the existing “qualification analysis” scheme.

### 3.2.2. Organization of the dual apprenticeship scheme

In Germany, the dual education and training system is associated with about 330 recognized occupations. It formally emerged after the passage of the Vocational Training Act of 1969, and since then it has undergone continuous updating in terms of regulations and functioning.

Historically, vocational training was organized by the various trade unions through apprenticeships, as a way to ensure that they had a talented labor pool to keep their respective industries alive. The Vocational Training Act regulated and standardized this system across Germany, serving as the foundation upon which the State, the private sector, and trade unions could effectively coordinate to deliver highly skilled labor for the progress of Germany. This high level of coordination made it possible – over the years – to develop public education programs and firm specific apprenticeships in a way that is complementary and mutually reinforcing.

#### *Work-based component*

Students are trained in a company for three to five days a week. The company is responsible for ensuring that students get the standard quantity and quality of training set down in the training descriptions for each trade.

This practical training may be complemented by more practical lessons at workshops run by the trade unions and chamber of commerce, in order to compensate for the bias caused by training at only one company. These extra courses usually take three or four weeks a year.

#### *School-based component*

The time that students spend at vocational school (*Berufsschule*) is approximately 60 days a year. The responsibility for this component of the learning lies with the school authorities in every German federal state. The lessons cover both general subjects (e.g., German, politics, economics, mathematics, physics, religion or even sport) and occupation-specific theory.

Lessons can be provided part-time (one or two days a week) or in blocks of one-two weeks. The latter is usually preferred when students may have to travel long distances to get to the nearest vocational school which teaches their subject.

#### *Assessment of learning outcomes*

For most trades, learning outcomes are tested during the course of the training and then at the end.

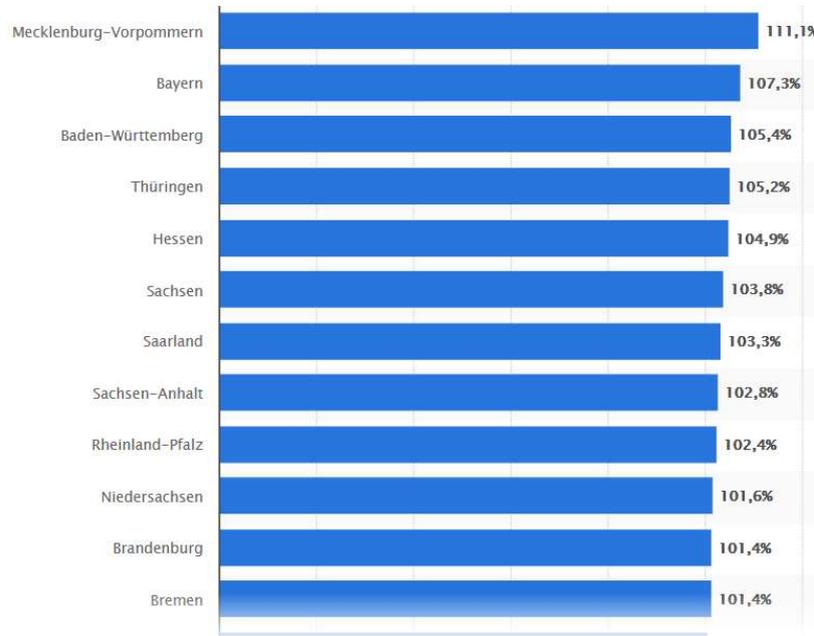
The first examination normally takes place about half-way through the program and its objective is only assessing how well the student is doing until that point of the training. The grades are usually not taken into consideration in the final exam, or – in some cases (especially for occupations that have been recognized more recently) – they count as 40% of the total result, with the final examination making up the other 60%.

The final exam, conducted by the Chambers, completes the apprenticeship. For this task, the Chambers are authorised by the State and are officially acting as a public institution.

Upon passing the final examination, apprentices receive a certificate documenting that training has been successfully completed. This certification of qualification is fully recognized and highly trusted among employers. Candidates who fail the exam can apply to have their training extended until the following year. Only one extension is allowed.

The training period in most occupations is 3 or 3 ½ years (36 or 42 months) depending on the occupation. The duration is specified for each occupation in the respective training ordinance (*Ausbildungsverordnung*). Apprentices with an advanced certificate such as the ‘*Abitur*’ (university entrance qualification) have the opportunity to reduce the training period by one year. Besides these ‘standard’ apprenticeship programs, apprenticeships with a duration of 2 years were introduced as a stepping stone for learners who might find a full-fledged training program too challenging.

On average, young people take up VET at the age of 19. According to statistics, in 2019 the number of training places offered was 578.218, of which 525.081 resulted in newly concluded contracts. The highest density of training places was recorded in the region of Mecklenburg-Vorpommern (ref. **Figure 11**)



**Figure 11 Density rates of apprentices around Germany (2019)**

(Source CEDEFOP)

### *Advantages and disadvantages of the dual apprenticeship*

The German dual apprenticeship model comes with very favourable aspects to both students and companies, but also has some drawbacks and flaws.

In terms of advantages, apprentices are employees of the company from the beginning and receive tasks that align with their growing skills. On the other hand if a company decides to make an employment-contract with the apprentice after his/her dual education and training, it gets an employee who knows the company's workflow. Moreover, the students learn also benefitting from the knowledge of hard and soft skills of more experienced co-workers, and develop their expertise under real conditions. This is an important aspect for both the student but also the company since both parties can see quite early if the former is not a good fit for the job, and not only after the final exams. Finally, the students earn money from the beginning.

Since the dual system provides high quality vocational training and education, usually – after successful completion of the apprenticeship - the students are well prepared to enter the job market, and the firms that participate in their training are more willing to hire them when they graduate. Consequently, Germany has the lowest rate of youth unemployment in the EU (Austria has similarly low rates).

Another important note is that the dual system effectively provides advantageous savings for firms on recruitment costs, as they are aware of and invested in the skills of potential hires. This also represents a contributor to the economic success of the German industry, as the highly skilled workforce can contribute directly to improvements in production and service delivery.

Although the dual system is generally considered to be an ideal model, apprenticeships are in the last years less popular among young people, who more and more prefer to take on VET courses at training sites and schools rather than in real companies. This is due to various reasons. First of all, firms that provide apprenticeships have to follow many regulations, and the training itself is very expensive. On the other hand, the requirements demanded for several positions have become more complex and many high school graduates do not possess the right level of education to embrace an in-company training. The less complex positions are of interest, in fact, only to graduates

with very little education, and even they prove soon to be unable to keep up with the course. This aspect is worsened by the fact that companies are often highly specialized and unable to train apprentices in all the required areas.

The Cabinet of Germany considered making it mandatory for companies to take on apprentices, however, the idea was dropped when the trade associations agreed to a voluntary training pact. Two alternative solutions put forward so far are "contractual education" (*Auftragsausbildung*) and state-run courses. The former would involve companies training apprentices that they do not plan to employ; the contract would also not be an employment contract. The latter would involve training outside companies: in schools and colleges.

### *Difficulties in exporting the German Dual Education model*

Although the German dual VET model shows promise in realizing an effective match between future employees and potential jobs in their industry, it is not applicable in every country.

The system works well in Germany because it is highly regulated and strongly funded by both the Federal Government and the German States; moreover, there is close coordination with the German industry for maximum success.

The model cannot be easily adapted in other countries for a variety of reasons. First, the high degree of success in Germany can be attributed to the long history of apprenticeships in the country: the dual system has grown and developed over a period of time under very specific conditions and this could not be reproduced in other modernized countries. One important aspect is the high standard of education provided by the German government, which enables apprentices not only to specialize at early age but also to maintain the basic education and skills to react flexibly to future changes in the economy and the industry's demand. Furthermore, in other developed or developing countries, the social, economic and political conditions differ from those in Germany, and these could be incompatible with the creation or the effective operation of a potential dual education system. Finally, the long culture of apprenticeship makes sense in Germany but could cause social stigmas in other nations as it is seen as inferior as opposed to the traditional educational pathway (e.g., in Italy, where university education received the highest recognition in all cases).

### **3.2.3. Organization of the teaching**

In Germany a differentiation exists between teachers and trainers in initial VET (IVET) and continuing VET (CVET).

Teachers and trainers involved in dual IVET can be grouped into two main categories, as follows:

- *VET school teachers*
  - vocational school teachers
  - practical work teachers
- *in-company trainers*

The former (*VET school teachers*) teach theoretical subjects, both general and occupation-related. General subjects teachers (including those teaching at vocational schools) must have a university degree at the master level (EQF 7), whereas occupation-related subjects are mostly taught by special teachers for vocational practice. Vocational school teachers are trained under the jurisdiction of the Federal States. Their training has a two-phase structure: first university studies, then a preparatory practical service (the probationary period). The training process follows the regulations in a framework agreement set in 1995 by the Conference of Ministers of Education and Cultural Affairs, later amended in 2013.

*In-company trainers* take over the training of the apprentice at the workplace according to the training regulation for the specific occupation and the individual training plan. According to the Vocational Training Act, only in-company trainers with certified pedagogical and professional competence are eligible to train. This competence is guaranteed by the chamber that registers them (e.g. Chambers of Industry and Commerce, Chambers of Skilled Crafts). The Chamber is also responsible for adopting examination regulations and setting up examination boards to conduct aptitude examinations for trainers, according to the Trainer Aptitude Regulation (AEVO). To support in-company trainers in the acquisition of pedagogical and technical/professional aptitude, the Chambers and other education providers offer different types of course.

Most IVET trainers are skilled workers, forepersons or journeymen. Nevertheless, any company providing apprenticeship training has at least one employee who is the designated (full-time) trainer and has proven aptitude for the role. In-company trainers have an important role in helping the apprentices develop a professional identity and occupational profile together with a strong identification with their company.

Table 13 provides an overview of the teaching categories per initial VET program.

**Table 13 Specific categories of teachers and trainers in German IVET**

Type of vocational training	Type of Staff
Dual system	<ul style="list-style-type: none"> <li>Trainers (instructors) or masters within companies (certified educators/trainers in professional education, certified educators/trainers in initial and continuing vocational education) including the responsible VET managers in large companies)</li> <li>VET teachers in vocational schools - two categories               <ol style="list-style-type: none"> <li>university trained teachers for job-related theory and general education subjects;</li> <li><i>Werklehrer</i> (master craftsmen or technicians with additional further training) imparting practical skills)</li> </ol> </li> <li>Instructors and trainers within inter-company VET centers</li> </ul>
Special VET for disadvantaged leading to dual system diplomas	VET teachers/trainers within private institution
Full-time vocational schools	VET teachers in vocational schools
Learning facilitators	Youth workers in training schemes for the disadvantaged, training counsellors in the chambers, vocational guidance counsellors employed by the Federal Employment Agencies

Many and various categories of professionals are involved in non-formal CVET as teachers or trainers, due to the fact that there is no common standard for what constitutes a continuing VET teacher or trainer. The formal qualifications of these teachers and trainers can therefore vary widely, as does their occupational status (retired, unemployed, qualified employees in training institutions).

There are no specific training models addressing CVET trainers. Only few university courses are offered, mostly related to management functions in general adult education. But very often the trainers have an academic degree in their specific domain of technical knowledge (university or university of applied sciences) and hold one or more trainer certificates offered by various associations/education providers.

The situation is different in case of formal CVET. If formal advanced VET takes place in public sector establishments (such as trade and technical schools, or colleges), thus the training, employment and activities of the teaching staff are based on strict criteria decreed in the relevant State legislation for teaching staff.

Table 14 provides an overview of the teaching categories per continuing VET program.

**Table 14 Specific categories of teachers and trainers in German CVET**

Type of vocational training	Type of Staff
Private or public VET schools.	Teachers
State CVET institutions (i.e., CVET colleges sponsored by the state,	Teachers

which offer provision for public employees)	
Community adult education centers ( <i>Volkshochschulen</i> ).	<ul style="list-style-type: none"> <li>• Unpaid volunteers</li> <li>• People that teach a few hours aside from their normal job (often school teachers)</li> <li>• Freelance workers that sell their courses on a commercial basis</li> </ul>
Chambers of industry and commerce - Chamber of craft trades and agriculture	Subject specialist with varied specific educational qualification (full-time, part-time, freelance)
Company-based CVET.	<ul style="list-style-type: none"> <li>• Company employees (full-time, part-time or volunteer)</li> <li>• Certified educators/trainers in initial and continuing vocational education</li> <li>• Certified educators/trainers in professional education</li> </ul>
CVET by the German Federation of Trade Unions (DGB)	Subject specialists with varied specific educational qualification (full-time, part-time, freelance)
Commercial CVET institutions (these target who can pay, particularly in the areas of foreign language teaching and data processing, and take an active part in competing for public funds, notably under the Employment Promotion Act)	Employees and freelance subject specialist
Institutes of distance education	Employees and freelance subject specialist
Training organizations of various economic sectors, which organize vocational and industrial continuing education, especially in SMEs.	Employees and freelance subject specialist
Higher education institutions, which have an obligation to CVET under the Basic Higher Education Act. Some higher education institutions and vocational higher education institutions have their own CVET centers. Many offer CVET in cooperation with other providers, trade unions and employers.	Teachers

### *Professional development of teachers and trainer*

Germany puts a lot of stress in the professional development of every occupational category, as this must progress in line with the advancements and changes of the economy and industry. This applies also to the field of vocational education and training.

The conditions for continuing professional development (CPD) of trainers and teachers involved in vocational education and training, are set and described in the Education Act (*Schulgesetz*) of the relevant State. Therefore they might differ among the single States. There are however some general prescriptions that apply to all States. First, teachers/trainers are obliged to follow continuing training to maintain and further develop their skills and

competences. Secondly, the teachers/trainers can organize on their own relevant training offered by one of various training providers (upon approval of their employer).

The CPD can be organized and offered by the employer and be compulsory for the teaching staff. It can take place during school holidays as well as during the school year. Continuing training during teaching time depends on the possibility for the teacher requesting it, either to find a substitute or to reschedule his/her calendar of teaching lessons at an alternative time.

Every year, training schools receive a certain amount of money from the State for CPD. Teachers might supplement this with their own money.

Various opportunities exist that justify continuing education and training. For example, regular updating of specialist knowledge and skills is necessary, particularly in the technical-commercial and the trades and crafts occupations. Digitalization, for example, is of high importance in many occupations. The ability to handle confidently the new digital tools (such as media applications and the internet, but also more advanced tools depending on the occupational field) is nowadays a prerequisite, not only for learners but also for training staff.

If a company needs further qualification of their training staff, the necessary courses can be provided in or outside the company. Large companies usually have their own personnel development and training units, training rooms and particular teachers and trainers for the training of their staff. SMEs, on the contrary, tend to support their trainers in the CDP by offering participation in courses organized by Chambers or education providers in dedicated inter-company training centers (as described above in Section 2.2.5).

The types of course on offer by Chambers and external training centers for CDP are different, providing both theoretical and practical knowledge. The courses can be differentiated between attendance, distance learning and a mix of attendance and self-directed learning.

### 3.3. Country review: Spain

#### 3.3.1. Educational procedures for admission, training and awarding of qualifications

Formal general education and vocational programs are regulated by the Ministry of Education and Vocational Training. Vocational programs are offered at three levels (ref. **Table 15-Table 17**):

- Lower secondary basic VET (ISCED 353) programs target learners over 15.
- Upper secondary intermediate VET (ISCED 354) programs for learners aged 17-18.
- Higher VET (ISCED 554) programs for learners 18-19.

All programs last two years (2 000 hours) and include work-based learning in a company and at a VET school:

- *Basic VET programs* (ISCED 353) are available in the last year of compulsory education, to learners aged 15 or 16. They allow students at risk of leaving education without qualifications to develop their basic skills and prepare for an occupation (such as kitchen assistant, agro-gardening) and obtain a basic VET qualification. Students may move on to upper secondary VET and, in some cases, also attain the compulsory secondary qualification opening up the general education path;
- *Intermediate VET programs* can begin at age 16, after the end of compulsory education. These lead to technician qualifications at ISCED 354 (such as cookery and gastronomy, emergencies and civil protection). Access to higher VET in the same field of study is possible, via an admission procedure;
- At tertiary level, *higher VET programs* (ISCED 554) lead to an advanced technician qualification (such as logistics coordinator, 3D animations and games). Graduates can progress to bachelor programs through an admission procedure.

The Spanish VET system is modular allowing recognition and transfer of (units of) competences gained in one VET program to another, shortening its duration.

**Table 15 Overview of Lower secondary basic VET in Spain**

<b>ISCED level 353 (The Spanish education system is not referenced to EQF levels)</b>	
<b>Apprenticeship (WBL up to 50%) 2 years</b>	
<b>Learning form</b> (e.g., dual, part time, distance)	<ul style="list-style-type: none"> <li>School based learning, including work-based learning at workshops, labs, simulations/full-time (young people); or on a part-time modular basis (adults);</li> <li>work placement module (Formación en Centros de Trabajo, FCT)</li> <li>dual VET</li> </ul>
<b>Main provider</b>	<ul style="list-style-type: none"> <li>Public, publicly-funded private and private centers are the main providers of education authority VET programs; only one in four learners attends private centers.</li> </ul>
<b>Work-based learning type (e.g., workshop, at school, in-company training, apprenticeship)</b>	<ul style="list-style-type: none"> <li>practical training at school (workshops, labs, simulations);</li> <li>work placement module (FCT), of 240 hours at a workplace;</li> <li>dual VET (apprenticeships);</li> <li>training and apprenticeship contracts</li> <li>dual VET projects offered within the education system and implemented by the regions (based on learning agreements between the VET provider and the company)</li> </ul>
<b>Main target groups</b>	<ul style="list-style-type: none"> <li>Programs available for young people (over 15) and also for adults Under specific conditions). Basic VET programs were first developed to prevent early leaving from education and training. They allow people to complete compulsory education and gain a basic VET qualification (VET diploma, in the national context or Título profesional básico).</li> </ul>
<b>Entry requirements for learners</b>	<ul style="list-style-type: none"> <li>to be between 15 and 17 years old by the end of the year they start these studies;</li> <li>to have finished the first cycle of secondary compulsory education (three years) or exceptionally, have finished the second course of secondary compulsory education;</li> <li>to be recommended by teaching staff and have parents (or by self if he/she is emancipated) consent.</li> </ul>
<b>Assessment of learning outcomes</b>	<ul style="list-style-type: none"> <li>Assessment has a continuous, formative nature and is carried out in modules. Progression to the following year depends on the result of the assessment.</li> <li>Completion of a VET program requires a pass grade in all the modules, and students may take the same program up to a maximum of four years.</li> </ul>
<b>Certificates provided</b>	<ul style="list-style-type: none"> <li>Basic VET programs lead to a basic VET diploma (Título profesional básico) that has academic and professional validity.</li> <li>Students who finish basic VET will obtain the lower secondary education diploma (título ESO) directly if the teaching staff considers they have achieved the objectives and necessary skills of ESO level.</li> </ul>
<b>Examples of qualifications</b>	<ul style="list-style-type: none"> <li>Electrotechnical and mechanical installations, electricity and electronics, administrative services, hairdressing and aesthetics.</li> </ul>
<b>Progression opportunities</b>	<ul style="list-style-type: none"> <li>enter the labor market</li> </ul>

	<ul style="list-style-type: none"> <li>enrol directly to intermediate VET programs (ISCED 354) or</li> <li>obtain the ESO ([121]) diploma, if the teaching staff considers they have achieved the objectives and necessary skills of ESO level, opening up access to upper secondary general education programs</li> </ul>
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**Table 16 Overview of upper secondary intermediate VET in Spain**

<b>ISCED 354 EQF 3-4</b>	
<b>WBL up to 65% 2 years</b>	
<b>Learning form</b> (e.g., dual, part time, distance)	<ul style="list-style-type: none"> <li>school based learning (face to face), including work-based learning at workshops, labs, simulations, etc./full-time (young people);or on a part time modular basis (adults);</li> <li>distance learning (adults);</li> <li>dual VET</li> <li>work placement module (FCT)</li> </ul>
<b>Main provider</b>	<ul style="list-style-type: none"> <li>public, publicly-funded private and private institutions approved by the competent educational authority;</li> <li>integrated training centers which are public and provide both initial vocational training within the education system, and vocational training for employment;</li> <li>occasionally, national reference centers, which are public institutions specialised in the different professional branches, in charge of carrying out innovation and experimentation initiatives in the area of vocational training.</li> </ul>
<b>Wok-based learning type (e.g.. workshop, at school, in-company training, apprenticeship)</b>	<ul style="list-style-type: none"> <li>Practical training at school (workshops, labs, simulations, etc.);</li> <li>work placement module (FCT) – compulsory training module of 400 hours at a workplace (students with previous work experience may be exempt);</li> <li>dual VET (apprenticeships)</li> </ul>
<b>Main target groups</b>	<ul style="list-style-type: none"> <li>holders of the ESO diploma ( is the end of lower secondary compulsory education diploma, necessary to access higher level studies);</li> <li>graduates from Basic VET (ISCED 353) programs;</li> <li>young people over 17 and adults, through validation of prior learning (formal/informal/non-formal).</li> </ul>
<b>Entry requirements for learners</b>	Leaving certificate from intermediate secondary school (at the end of grade 10) and (1) two years’ successful vocational training or (2) five years’ practical experience
<b>Assessment of learning outcomes</b>	A pass grade in all the vocational modules.
<b>Certificates provided</b>	Intermediate VET programs lead to a VET diploma with academic and professional validity (Título de Técnico) at ISCED level 354 allowing access to higher VET (ISCED 554) studies at tertiary level.
<b>Examples of qualifications</b>	Technician in Electrical and Automatic Installations, technician in Networks and Water Treatment Stations, technician in Assembly of Structures and Installation of Aeronautical Systems, technician in microcomputer systems and networks.
<b>Progression opportunities</b>	<ul style="list-style-type: none"> <li>enter the labor market;</li> </ul>

	<ul style="list-style-type: none"> <li>enrol directly to higher VET programs (ISCED 554);</li> <li>return to upper secondary general education programs if they wish, but this is rather an unusual option.</li> </ul>
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**Table 17 Overview of Higher VET in Spain**

<b>ISCED 554 EQF 5</b>	
<b>WBL up to 65% 2 years</b>	
<b>Learning form</b> (e.g., dual, part time, distance)	<ul style="list-style-type: none"> <li>school based learning (face to face), including work-based learning at workshops, labs, simulations, etc./full-time; or on a part time modular basis;</li> <li>distance learning;</li> <li>dual VET (with or without a training and apprenticeship contract);</li> <li>work placement module (FCT)</li> </ul>
<b>Main provider</b>	<ul style="list-style-type: none"> <li>public, publicly-funded private and private institutions approved by the competent educational authority;</li> <li>integrated training centers which are public and provide both initial vocational training within the education system, and vocational training for employment;</li> <li>national reference centers, which are public institutions specialised in the different professional branches, in charge of carrying out innovation and experimentation initiatives in the area of vocational training.</li> </ul>
<b>Wok-based learning type (e.g.. workshop, at school, in-company training, apprenticeship)</b>	<ul style="list-style-type: none"> <li>practical training at school (workshops, labs, simulations, etc.);</li> <li>work placement module (FCT) – compulsory training module of 400 hours at a workplace (students with previous work experience may be exempt);</li> <li>dual VET (apprenticeships);</li> </ul>
<b>Main target groups</b>	<ul style="list-style-type: none"> <li>Learners over 18.</li> </ul>
<b>Entry requirements for learners</b>	<ul style="list-style-type: none"> <li>holders of the Bachillerato diploma (The end of upper secondary education diploma, allowing access to tertiary level academic or vocational studies);</li> <li>graduates from Intermediate VET (ISCED 354) programs;</li> <li>learners over 18, through validation of prior learning (formal/informal/non-formal).</li> </ul>
<b>Assessment of learning outcomes</b>	A pass grade in all the vocational modules.
<b>Certificates provided</b>	Higher VET programs lead to a VET diploma (título de Técnico Superior) at ISCED level 554 allowing access to academic studies at tertiary level (programs offered at ISCED levels 665 and 766) bachelor programs through an admission procedure.
<b>Examples of qualifications</b>	Technician in Automation and Industrial Robotics, technician in Telecommunications and Computer Systems, technician in Energy Efficiency and Solar Thermal Energy, technician in Renewable Energies.
<b>Progression opportunities</b>	<ul style="list-style-type: none"> <li>enter the labor market;</li> <li>access academic programs offered at ISCED level 665 (Bachelor programs 3-4 years).</li> </ul>

At the upper secondary level (ISCED 354) and Tertiary level (ISCED 554) there are also Arts and design programs as well as the Sports programs. They have the same characters as the programs summarized in **Table 15-Table 17**.

### *Validation of non-formal and informal learning*

The Autonomous Regions are responsible for the calls (*convocatorias*) for the validation of skills acquired through non-formal and informal learning. The recognition of these competencies is carried out at the sub-national level and regulated by *Royal Decree 1224/2009 of recognition of the professional skills acquired by work experience* [SP21]. The procedure consists of three phases: [SP22]

- Advice
- Evaluation
- Accreditation and registration.

In the *article 12 of the Organic Law 5/2002, 19th of June, on Qualifications And Vocational Training*, establishes that de Local Administrations should offer specific training for young people with academic risk of failure. These offers "*should encourage the acquisition of capacities in a lifelong learning process and, in addition to including modules associated with the National Catalogue Of Professional Qualifications (Catálogo Nacional de Cualificaciones Profesionales), they may incorporate appropriate modules for the adaptation to specific needs of the target group*".

Different programs have been developed for the validation and recognition of these skills in young people:

- Recognize Project (Proyecto Reconoce) for recognizing competencies and skills, obtained through voluntary action that improve the employability of young people.
- Specific recognition system for non-formal and informal learning in the sphere of Youth in Spain, established in February 2017, by joint agreement between the Youth Institute (Instituto de la Juventud (INJUVE)) and the youth organizations of the Autonomous Communities, has agreed on the implementation of a.

The *Royal Decree 1224/2009, 17th of July, for recognition of the professional competencies acquired by work experience (Real Decreto 1224/2009, de 17 de julio, de reconocimiento de las competencias profesionales adquiridas por experiencia laboral)* takes care of the quality of the accreditation procedure of knowledge acquired by work experiences and non-formal or informal learning. In this Decree, Article 30 states that the General Administration in collaboration with the Autonomous Regions and the General Council of Vocational Training, have developed a Monitoring and Evaluation Plan to check the quality efficiency and impact of the accreditation procedure.

### **3.3.2. Organization of the dual apprenticeship scheme**

The dual VET system is well valued internationally. However, in Spain the implementation of this model is still in an initial stage ([SP16]). The percentage of dual VET in Spain is around 3% of the total offer of this training. This data, a priori so limited, must be modulated taking into account that the entire VET offer in the Spanish country has a Training module in work centers, which represents 20% of the total duration of training. This means that there is no VET graduate who has not received part of their training (at least 20%) in the company [SP17].

In the case of dual projects, participating VET providers must be authorized to offer dual VET, must have signed an agreement with companies within each specific industry, and their dual VET projects are to be carried out in a productive environment which complies with all suitable requirements for its implementation. Also, the introduction of this modality in the offer of VET teachings depends, as in the entire educational offer, of each region.

### **3.3.3. Organization of the teaching**

The 2006 Education Act and the 2013 Act for the improvement of educational quality [SP25] regulate State-wide requirements for teaching staff, initial and continuing professional development (CPD), and the conditions for

recognition, support and value of VET teachers. The same requirements apply for all secondary non-university education.

The main categories of VET teachers and trainers are:

- *In education authority VET programs*

- Secondary school teachers;
- Technical vocational teachers;
- When necessary, experts in different professional sectors and in-company trainers (trainers/tutors involved in practical training modules at workplaces) can participate in training delivery.

- *In employment authority vocational programs:*

- Trainers/instructors, teaching theoretical technical content;
- Technical teachers, providing vocational technical and practical content in situations closer to the reality of work;
- In-company trainers/tutors.

In formal education, VET teachers must comply with the following requirements:

- Holding a university degree (ISCED 6);
- Holding a master degree (university master degree in teacher training);
- Undergoing an internship at an education center;
- In public education, teachers have the status of civil servants, and need to pass a complex selection process to acquire such condition.

In-company trainers are experienced professionals who guide, monitor and assess apprentices; there are no formal teaching requirements for in-company trainers.

### *Formal requirements in the employment sphere*

Requirements for trainers/instructors depend on the type of training that has to be provided. In the case of training linked to the National Catalogue of Occupational Standards (CNCP), each professional certificate regulation sets the academic and teaching qualifications and experience that trainers must meet for each training module.

Trainers must generally hold a higher qualification than the one they are delivering, at least one year of experience, and some qualification on teaching methodology for adults.

In the case of training specializations not linked to the CNCP, requirements for trainers are set in terms of qualifications, professional experience and teaching competence.

### *Continuing professional development of teachers/trainers:*

Continuing professional development (CPD) is a right and a professional duty. Education acts (LOE and LOMCE) [SP26] set a series of guidelines for CPD. The education authorities are responsible for planning, organizing and recognizing CPD within their scope, providing teachers with a wide range of activities.

The National Institute of Education Technologies and Teacher Training [SP27] is developing interactive and multimedia digital education resources (including professional training) in collaboration with the regions, to support social networking, integration of ICT in non-university education, and teachers' digital skills. The digital competence passport allows teachers to measure and monitor ICT skills development.

## 3.4. Country review: Greece

### 3.4.1. Procedures for admission, training and awarding of qualifications

As it was mentioned earlier the VET Schools are generally categorized in the following types: Vocational Education Schools or Vocational Apprenticeship Schools (Epaggelmatikes Scholes, EPAS) and Vocational Upper Secondary Schools (Epaggelmatika Lykeia, EPAL) that provide qualification corresponding to EQF Level 4, and public and private Post – Secondary VET Schools (non-formal, IEK) that provide Diplomas at EQF Level 5.

#### *EPAS and EPAL Schools*

The Greek public Manpower Employment Organization Service (Οργανισμός Απασχόλησης Εργατικού Δυναμικού, ΟΑΕΔ) operates in total 51 EPAS, distributed in almost every region of the country. Their courses last two academic years (four semesters), during which all students attend theoretical and laboratory courses and at the same perform apprenticeship work in fields relevant to their studies. Enterprises that employ students for their apprenticeship work are subsidized by the government, while Schools are responsible for finding the most appropriate work placements for their students. As the available open positions for studying in EPAS are limited, selection of students is based on specific criteria, such as socioeconomic conditions and education performance indicators. To enroll to EPAS, students should be no more than 23 years old and should have already completed the first grade of Upper Secondary School. It should be noticed that according to the latest Ministerial Decision, the operation of EPAS was extended at least until the academic year of 2020 -2021. Graduates of EPAS have the options to:

- receive a license to practice a trade or profession (upon completion of exams),
- enroll to the second grade of Vocational Upper Secondary School,
- register to a Post – Secondary VET School in a similar specialization.

The Vocational Upper Secondary Schools (EPAL) can lead to two levels: a three-year program, and an additional “apprenticeship year” that is optional. The curriculum of the EPAL consists of general education subjects and technical – vocational education subjects, the latter including theoretical, design, and combined classes. The specialties offered in EPAL are listed in Greek legislation, which also indicates that offered specialties should be tailored to national and regional economic needs, following the recommendations of Ministries, regional administrations and social partners. Graduates of EPAL have the following options:

- seek admission to higher education programs of studies relevant to their specialization upon completion of national exams,
- receive a license to practice a trade or profession (upon completion of exams),
- enroll to a Post – Secondary VET School in a similar specialization,
- enroll to the “apprenticeship year”, and after its completion participate in certificate exams.

For the students to complete this program, they need to pass a final examination. The graduates might qualified as vehicle technician, employee in administration and finance, technician of electrical systems, installations and networks, IT applications technician etc. In general, they will attend general education lessons.

Comparing EPAS and EPAL, students who want to have a chance in continuing their studies to higher education prefer to choose EPAL, as through national exams they can claim a position at a University or Technological Educational Institute. On the other hand, those who do not have further educational ambitions prefer to enroll to EPAS, as they provide a more practical approach and at the same time students manage to gain some income from the apprenticeship work they have to perform. [GR2]

### *IEK Schools*

Public and private Post – Secondary VET Schools (IEK) provide initial vocational training to graduates of non – compulsory Secondary Education: General Upper Secondary School, Vocational Upper Secondary School, Vocational Apprenticeship Schools, or higher education. IEK programs last five academic semesters, in the first four of which learners undertake theoretical and laboratory training lasting 1200 hours. During the fifth semester, students participate in an internship or apprenticeship scheme, lasting 960 hours. Students who successfully complete all five semesters are allowed to take part in the certification exam for graduates of initial vocational training institutes. Upon passing the exam, graduates of IEK are awarded Initial Vocational Training Diplomas at EQF Level 5. [GR2]

### **3.4.2. VET types and the apprenticeship scheme**

The 2 years Apprenticeship programs offered by EPAS is a type of practical and theoretical training at school. After learners pass their final examination, they might receive qualification such as beautician, metal working technician, agrotourism and agroindustry businesses, dairy - cheese making etc.

The 1-year Apprenticeship program offered by EPAL is a type of apprenticeship with one workshop a week. After the completion of examinations, learners will receive the Degree of VET specialty and will be qualified as vehicle technician, employee in administration and finance, technician of electrical systems, installations and networks, IT applications technician.

Finally, in the framework of the KEE programs, there is a type of practical training and workshops at schools. It concerns only adults and after they pass their examination they can receive their diploma. Examples of qualifications are in the fields of fish tourism, agrotourism, etc. [GR2]

### **3.4.3. Organization of the teaching**

#### *VET learning options*

There are three learning options:

1. School based learning
2. Work practice (that includes internships and apprenticeships)
3. Self-learning (too partial)

The certification in all types is received after the final examination that usually includes a theoretical and a practical part.

The strategic framework for upgrading VET specifies that the specialties offered should reflect the need of the economy, the proposals of regional VET boards, social partners, chambers, professional associations and the recommendations of the labor ministry. However, there is no structured procedure for this type of consultation. Each specialty designs its curriculum in accordance with the relevant occupational profile and the principles given by ECVET.

The EPAL curricula has been recently updated by the education ministry, with new educational material and training for the teachers, taking into account many factors such as demand for specific specialties and regional recommendations.

Post-secondary VET programs include a study guide with each specialty's job profile, outcomes and expected skills. It also refers to the designed timetable, the corresponding credits, the labour market placement and the teaching methods required along with the equipment needed. [GR2]

### *VET teacher types*

In VET programs there are 5 types of teachers and trainers.

- General subject teachers
- Vocational subject teachers
- Teachers of practical training
- Post-secondary VET teachers (in-school trainers)
- In company trainers

Regarding their training, ESF funds continuously support the training of formal VET teachers (EPAL). However, the informal VET trainers must participate in continuous programs as well. With the 2016 National strategic framework that aims to upgrade the VET and apprenticeship, new requirements introduced for the in-company trainers. [GR2]

### *Formal requirements for VET general subject teachers*

It is required that they hold a higher education degree and pedagogical and didactical expertise.

### *Formal requirements VET vocational subject teachers*

It is required that they hold either a higher education degree and pedagogical and didactical expertise, or a lower vocational degree and relevant work experience.

The teaching staff in the institutions of post secondary VET are either:

- - Holders of the teaching competence certification or
- - Others with tertiary education degrees, teaching experience or relevant training.

### *Continuing professional development of teachers/trainers*

Significant attention is paid to the CPD of training staff who work in school-based programs and will be teaching in the new apprenticeship programs (at post-secondary level). The main interest is to make them competent in order to be able to work together with companies and learners.

Trainers attend a program of at least 100 hours on adult training in order to receive the certification by the National Organization for the Certification of Qualifications and the Vocational Guidance (EOPPEP). The certification is renewed every ten years with the participation on specific training programs.

Concerning the in-company trainers, must participate in a training program that aims on pedagogical, competence and on training methods designed for adults. [GR2]

### *Validation of non-formal and informal learning*

Withing the Greek context the National authorities understood the importance of validating non-formal and informal learning. This issue has been addressed by the 2010 law on Lifelong Learning (LLL law). The law introduced a National Committee on Lifelong Learning on which all key stakeholders sit, which was a first for Greece at the time. However, according to experts, validation is not yet high on the agenda of this Committee.

In addition, during 2010 there have been important reforms also in the governance structure in the field of qualifications and certification. A new body new EOPPEP3 was created in 2011 and is the responsible authority for inputs (infrastructures, trainers etc.), guidance, and outputs/certification. EOPPEP implements certification practices regarding graduates of Institutes of Vocational Training (IEKs) and non-regulated professions

The resent developments in the governance structure since 2010 highlight that there is a clear focus towards complying with EU frameworks and Directives, while making the effort to upscale and upgrade the existing local structures. However, it deserves noticing that there is a preference for formal qualifications and traditional assessment methods, an example is the written tests. The lack of validation practices in formal education also underlines this. [GR6]

## 3.5. Country review: Romania

### 3.5.1. Procedures for admission, training and awarding of qualifications

#### *Admission requirements*

The enrolment for all levels of public education is determined each year by a Government Decision based on the proposals from the Ministry of National Education.

For admission to vocational education/dual vocational education (grades 9-10-11), the students who completed lower secondary education (*gimnaziu*) are admitted based on a registration and admission procedure established by the Ministry of National Education. The criterion used for this selection and distribution procedure is the admission average mark. Students may apply for continuing their education using the registration forms specifically designed for high-school or vocational/dual vocational education enrolment and made available by the Ministry of National Education. All the options selected by the applicants and the existing places in schools are registered by the County School Inspectorates in the database of the Ministry of National Education. The applicants are assigned to the existing places in the decreasing order of their admission average mark and according to their options. [RO1]

Applicants may choose one of the following educational paths:

- Lower cycle of high-school (grades 9-10, the first stage of high-school education), organized for the following routes: theoretical, technological and aptitude-based (military, theological, sports, arts and pedagogical).
- Vocational education or dual vocational education (grades 9-10-11), organized for areas of studies and qualifications. [RO1]

#### *Training*

Over a full 3-years program of vocational education, trainees learn the topics of the general knowledge subjects taught in grades 9 and 10 of high-school. Afterwards, they may continue their education, taking up either the technological, or the theoretical route in the grades 11 and 12/13. [RO1]

Since the school year 2012/2013, the practical training of students in vocational and technical education has taken place based on a training agreement and its annexes, approved by the Order of the Education, Research, Youth and Sport Minister no. 3539/ 2012. The practical training agreement is concluded between school, partner economic operator/ public institution where the training takes place and the student's legal tutor. Its main prescriptions determine [RO1]:

- status of the trainee
- traineeship's framework
- remuneration for the trainee
- health and safety policy of the labor
- trainee's responsibilities
- obligations and responsibilities of the organizer of the traineeship
- obligations and responsibilities of the traineeship partner
- assessment of the traineeship.

#### *Qualifications for Initial VET*

Initial VET qualifications (131 qualifications at EQF level 3, 69 at EQF level 4 and 203 at EQF level 5) are based on training standards that describe learning units and are based on occupational standards. [RO1]

## Training standards

Training standards are developed by representatives of companies and VET providers, with the methodological support of the National Center for Technical and Vocational Education and Training Development, endorsed by the National Authority for Qualifications. They are validated by employers and other social partners through sectoral committees. Revisions of these standards are carried out at the request of economic operators, or otherwise at least every five years.

Training standards are crucial for the development of VET curricula, since they define learning contents and outcomes. In addition they describe assessment procedures and awarding of qualifications.

Each training standard includes:

- (a) An introduction that describes qualification and the occupation(s) the standard leads to.
- (b) A list of occupation-related competences, which take into account the recommendations of sectoral committees, company representatives or other interested parties.
- (c) The learning outcomes units (a learning unit is a coherent set of learning outcomes) for the qualification, such as general (e.g. Mathematics, language, sciences) and occupational learning outcomes.
- (d) The minimum equipment requirements for each learning outcome unit.
- (e) The assessment standard for each learning outcome unit.

## Core and local curricula

Curricula for each qualification consists of two main elements: a *core curriculum* designed at national level by education working groups, and a *local (school) curriculum* designed by schools and local businesses to aid adaptation of the students' professional training to the requirements of the local and regional labor market.

The share of core/national and local curricula varies by qualification level.

- EQF level 3: 20% of learning time reserved for local curriculum and 80% for core
- EQF level 4: 30% for the local curriculum and 70% for national.
- EQF level 5: all curricula are national.

## Qualifications for Continuing VET

Continuing VET qualifications are based on *occupational standards*, validated by the sectoral committees and approved by the National Authority for Qualifications. [RO1]

An occupational standard is a national instrument describing professional duties, skills and competences necessary to practise a specific occupation (defined in terms of autonomy and responsibility, and capacity to apply specific knowledge and understanding at the workplace). Occupational standards define two categories of requirements:

- Requirements linked to labor market needs in terms of skills (occupation, identification number from the classification of occupations, qualification level, specific activities to be done at the workplace, skills and competences required to practise the occupation).
- Requirements for provision of professional training (learning content, duration of training and specific requirements for the assessment, entry requirements, necessary resources to organize the training).

## Validation of non-formal and informal learning

Since 2000, national legislation to validate non-formal and informal learning has been gradually developed and applied. The coordination and monitoring of the validation process is carried out by the National Authority for Qualifications, through the National Center for Accreditation.

The National Center for Accreditation is a specialized structure that is responsible for:

- Authorising the assessment centers and staff involved in validating non-formal and informal learning of adults

- Coordinating the activities of the assessment center
- Quality assurance
- Managing the national register of the authorized centers and national register of evaluators (including evaluators of competences, evaluators of evaluators of competences, and external evaluators).

The assessment centers are local private or public bodies authorized to conduct validation procedures for one or more occupations. Although the validation procedures consist of well-defined national standards, criteria and guidelines, nevertheless the centers can develop their own assessment instruments to evaluate the candidates. These centers offer validation services following specific requests by beneficiaries/candidates who can acquire full or partial qualifications at EQF levels 1, 2 and 3. Certificates of competences are nationally and internationally recognized. Also, as part of the validation process, the centers offer information and counselling to the candidates. As of 2019, there are 37 fully functioning local assessment centers that can validate prior learning of candidates mainly in services, construction and agriculture.

The development of a fully functional quality assurance system for validation of non-formal and informal learning is still in progress. Currently, the National Center for Accreditation follows a top-down approach in monitoring and coordinating the assessment centers, which must report their activities regularly, and apply periodically for authorization for the specific qualification/occupation they need to assess. Quality assurance is carried out in practice through three main measures: i) monitoring of the centers (visits, data collection about certified candidates, periodic meetings with centers); ii) national register of evaluators; iii) national assessment instruments for each occupation. [RO1]

### 3.5.2. Organization of the teaching

#### *Teachers and trainers in initial VET*

Two are the teaching positions in initial VET:

- a) teacher
- b) practical training instructor (*maistru instructor*).

Requirements for teachers at upper secondary and post-secondary VET are a master degree in a field related to what they teach, as well as two psycho-pedagogical modules, in total 60 ECTS, that can be obtained either during higher education studies or after graduation, by enrolling for both modules within a Department for Teacher Training.

Practical training instructors (*maistru instructor*) require a post-secondary education diploma in a field related to what they teach and psycho-pedagogical training of 30 ECTS provided by a higher education institution.

Final teaching certification is awarded to new employees following an eliminatory stage (consisting of two class inspections and production of a professional portfolio) and a teacher-confirmation exam (*Definitivat*, on the subject of teaching) that takes place 12 months after their initial employment. To be successful, teachers need a final mark of minimum 8 out of 10. During this period, they are supported by an experienced mentor and enjoy the same rights as other teachers with a labor contract. If they fail to pass the exam after 12 months, they can pursue other two attempts within a five-year period.

Qualified VET teachers and instructors (vocational theoretical subjects or practical training) represent the 98.75% of the total teaching staff in initial VET.

#### *Teachers and trainers in continuing VET*

Continuing VET programs are provided by trainers with profile and specialization relevant to the training program. They should have:

- A national qualifications framework level of education equal to or higher than the level of the training program they undertake.
- A qualification in the training program's field of activity.

- Any form of certificate for the following occupations: instructor/trainer/trainer of trainer or the certificates for the teaching profession

### *Career advancement and professional development*

Continuing professional development is a right regulated in the Law of National Education. Advancement in teaching career can be achieved by acquiring:

- A second level teaching degree, awarded after at least 4 years of service (after succeeding in the *Definitivat* exam), upon completion of at least two school inspections and an exam in methodology and main subject.
- A first level teaching degree, awarded after at least 4 years after the awarding of the second degree, upon completion of at least two school inspections and the oral defense of a written thesis.

Professional development is compulsory, through participation in accredited training courses. Teachers must gather minimum 90 ECTS every five years. The training is provided by public and private education institutions and by NGOs, and can be partially or fully covered by the State budget.

### **3.5.3. Romania's professional and technical education for the year 2020-2021**

Vocational education and training programs are adapted to skills needs and labor market trends.

For the school year 2020-2021 a series of actions were implemented, as following: Implementation of the *Strategy for Romanian Vocational Education and Training 2015-2020*; implementation of the *Master Plan 2015 – 2020*; development of the *National Strategy for the Development of Vocational Training for Students in Dual Education 2021-2025*; implementation of the projects under the call proposals *Traineeships for school students and university students*; implementation of the project *The key to the future is made by you!*

These programs wanted to identify issues, models for good practices, development opportunities; to provide support for on the job training for university and lower secondary, high-school and post-secondary education students; to develop partnerships between education institutions and training partners; to organize traineeships in the EU Member States; to reduce the risk of social exclusion for the students in high-school and post-secondary; to promote the integration in dual education for students; to provide long-term support to communities regarding information, training and counselling for over 450 parents, educational and social specialists and teachers. [RO16]

## **3.6. Country review: Sweden**

### **3.6.1. Procedures for admission, training and awarding of qualifications**

Compulsory education (primary and lower secondary level) goes from the age of 6 to the age of 16.

Students successfully completing compulsory education can choose among *18 national upper-secondary programs* (over 3 years).

- Students passing grades in 8 compulsory subjects (at least) can be enrolled in a national VET program.
- Students passing grades in 12 compulsory subjects are eligible for higher education preparatory programs.

At *post-secondary level*, there are two main paths, depending on their choice of upper-secondary national program.

- Students who have completed upper-secondary school with basic eligibility for higher education can apply to universities (*universitet*), university colleges (*högskola*) and/or higher vocational education (*yrkeshögskola*).

- Students completing upper-secondary VET programs do not acquire an automatic eligibility for higher education. Transition to a higher level education is more difficult.

Students who are not eligible for upper-secondary National Programs can choose among four introductory programs (*introduktionsprogram*) which aim at preparing students, with a wide range of needs, for entering National Programs or the labor market.

The four introductory programs are the following:

- Individual alternative: it provides access to Vocational Introduction Programs or to the labor market. It includes compulsory school subjects and, sometimes, upper-secondary subjects.
- Vocational introduction: it provides access to Vocational National Programs or to the labor market. It includes vocationally-oriented training.
- Program-oriented option: it supports students, who missed the requirements for national VET programs in a few subjects, to cover the gap (thus entering a specific national VET program).
- Language introduction: it mainly provides migrant students with teaching of the Swedish language, which is generally necessary to start on National Programs or continue their education.

The admission requirements and qualifications acquired for each type of program are summarized in **Table 18**.

**Table 18 Summary of admission requirements and qualification for VET in Sweden**

PROGRAM TYPES	ADMISSION REQUIREMENTS	QUALIFICATION ACQUIRED
Individualised programs for learners not eligible for national upper secondary programs (introduktionsprogram) leading to ISCED 244, 341, 351	The maximum age to begin the program is 20. The trainee has to pass grades in Swedish, English, maths and five more subjects from compulsory school.	The headteacher issues an upper secondary school certificate (Gymnasieintyg) with the description of the received education
Programs for SEN learners (Gymnasiesärskolan) leading to EQF 2, ISCED 343 and 353	Devoted to learners with intellectual disability. They are individually assessed and enter in a national program or, if with special demanding needs, individualised program.	The trainee gain a special needs upper secondary school certificate (Gymnasiesärskolebevis). The certificate describes skills and experiences acquired and details: the program, subject areas/courses attended, grades, the learner's work-based learning or placement, the special needs upper secondary school work placement.
Individual modularised pathways for adults (grundläggande nivå/compulsory level and gymnasial komvux/upper secondary level, including sÄrvux/special needs education for adults with learning disabilities) at ISCED 244, 344, 351, 353.	Adults have no right to study a VET program. An adult with a qualification at EQF 4 is not entitled to adult municipal VET education (but they can if the municipality finances it). All adults can access adult municipal VET education to study Swedish and/or English to gain eligibility for higher education.	Municipal adult education at upper secondary level provides adults with knowledge up to the upper secondary leaving certificate, useful to access to tertiary education. Courses are offered based on the needs of the trainee (There are no Nationally determined programs).

<p>VET programs comprising 'school-based education' (skolförlagd utbildning) or 'apprenticeship education' (lärlingsutbildning) leading to EQF level 4, ISCED 353</p>	<p>Trainees must complete compulsory school, and pass grades in Swedish, English, maths and five more subjects before the age of 20.</p>	<p>Trainees receive 'gymnasieexamen' (upper secondary diploma). In VET, the diploma is 'Yrkesexamen' (vocational diploma).</p>
<p>VET programs comprising 'school-based education' (skolförlagd utbildning) or 'apprenticeship education' (lärlingsutbildning) leading to EQF level 4, ISCED 353</p>	<p>Trainees must complete compulsory school, and pass grades in Swedish, English, maths and five more subjects before the age of 20.</p>	<p>Trainees receive 'gymnasieexamen' (upper secondary diploma). In VET, the diploma is 'Yrkesexamen' (vocational diploma).</p>
<p>Higher VET programs at EQF level 5, ISCED 454.</p>	<p>Trainees needs the upper secondary school leaving certificate.  The provider sets specific entry requirements (i.e. credit for specific courses in upper secondary school or work experience in the field) and can use an open assessment of qualifications, to accept a trainee which doesn't match general and/or specific entry requirements (knowledge, skills and competences acquired through training, job experience or otherwise may be assessed).</p>	<p>The VET graduate receives a diploma in higher vocational education (yrkeshögskoleexamen), which allows learners to enter the labor market. This diploma does not provide access to any additional progression pathways.</p>

### Validation of non-formal and informal learning

In Sweden, validation of non-formal and informal learning began as a bottom-up approach in the mid-1990s and has evolved continuously, with increasing state-level commitment and the move to a national framework for validation.

In 2003 the Government agreed on a common definition of Validation, stating that: "*validation is a process which involves a structured assessment, evaluation, documentation and recognition of knowledge and competences possessed by a person independently of how it is acquired.*" This definition was included in the Education Act and subsequently, in 2009, the Swedish National Agency for Higher Vocational Education (Myndigheten för yrkeshögskolan) was established with a coordinating role for cross-sectoral validation work.

In 2015, the second National Validation Delegation was appointed. It was composed of representatives of important actors and stakeholders from across the education and training landscape, relevant public authorities and the labor market. The delegation developed a National Strategy for Validation, which was completed in 2017. In December 2019, it published an annual report on the progress made in meeting the objectives set out in the National Strategy, which provides both guidance and recommendations to the Government on validation issues.

The Swedish National Agency for Higher Vocational Education (*Myndigheten för yrkeshögskolan*) and the Swedish National Agency for Adult Education have the primary role of raising awareness and providing guidance on validation. However, to date there is no standard for the validation of non-formal and informal learning that applies to all educational areas. National standards exist for some areas but are still weak.

Swedish validation practices generally comprise four phases:

- Identification/skills audit: the student, usually guided by a counsellor, proceeds with the skills mapping/audit tasks.
- Documentation: the student collects documents proving that s/he has gained the mapped skills.

- Assessment: an assessor or team of assessors, appointed by relevant institutions or organizations (such as social partners and/or educational or training institutions) assess listed skills and collected documents against specific educational or occupational standards.
- Certification: the assessor(s) define what can be recognized and determine weak areas where further improvement in terms of education/training is required to obtain a qualification.

As there are no formal requirements to carry out a validation, validation methods differ according to the different actors. The most important roles within the initial validation process in adult education and employment services are Career and Guidance Counselors. There is a large margin for these professionals to exercise their own choices on how validation processes are conducted. Nevertheless, the national criteria and guidelines are consistent with the European credit systems used in higher education (ECTS) and vocational education and training (ECVET), but no specific reference exists in the Swedish official documentation on validation.

In 2018, Skolverket (The Swedish National Agency for Education) developed a validation toolbox aimed at guiding counsellors at upper secondary general education and initial vocational training. Up to date, no information is yet available on actual uptake and use. [SW9]

### 3.6.2. Organization of the apprenticeship scheme

Upper secondary apprenticeship education was introduced in 2011 as part of formal IVET (Education Act and in the Upper Secondary School Ordinance). It can start in the first, second or the third year and the school decides whether to activate it: in this scenario, work-based learning (WBL) takes half of time devoted to apprenticeship.

**Figure 12** Work based learning and apprenticeship in Swedish VET summarizes the connection between WBL and Apprenticeship in Swedish VET programs. [SW10]

VET programme		WBL
Introductory programmes	Vocational Introduction	WBL is compulsory but its extent may vary. May be offered as an apprenticeship.
	Programme Oriented Option*	WBL is compulsory in programmes preparing for school-based national VET programmes or apprenticeship (for youth), but its extent may vary. May be offered as an apprenticeship
	Individual Alternative	WBL may be offered and its extent may vary. May be offered as an apprenticeship.
School-based National VET Programmes (3 years)		WBL is mandatory. It covers at least 15 weeks corresponding roughly to 13% of the programme time.
Apprenticeship (for youth) (3 years)		WBL is mandatory. At least 50% of the programme time is spent in the workplace.
School-based VET and apprenticeship for adults		WBL is optional within school-based VET. However, to obtain state grants, schools must provide WBL representing: 15% of the study time in school-based VET and 70% of the study time in apprenticeships.
School-based VET for students with learning disabilities (4 years)		WBL is mandatory. Minimum of 22 weeks of WBL.
Apprenticeship for students with learning disabilities (4 years)		WBL is mandatory. At least 50% of the programme time is spent in the work place.
Higher VET		WBL is mandatory in programmes lasting two years and should represent at least 25% of the programme time. WBL is not mandatory in one-year programmes.

*Note:* \* This programme has recently been reformed. Previously it prepared only for entry to VET-programmes. The new programme will prepare for all National Programmes. Changes are introduced for students who start in the third quarter of 2019.

**Figure 12** Work based learning and apprenticeship in Swedish VET

(Source: OECD)

Every apprentice needs an education contract or learning agreement describing the content and scope of the WBL and appointing a contact person and/or a trainer/supervisor. The contract must be signed by the education organizer and the workplace.

Apprenticeship education at upper secondary school level includes several initiatives such as financial incentives and support to schools and workplaces.

In 2014, an apprenticeship center (*Läringscentrum*) [SW11] was created under the umbrella of the Swedish National Agency for Education to foster apprenticeship; it provides support to VET institutions and employers, it trains supervisors at workplaces, and supports cooperation at regional level between schools and businesses.

The number of upper secondary VET learners enrolled in an apprenticeship program has grown steadily since 2011. In the school year 2018/19, 12.5% of all VET learners were involved in an apprenticeship program. Despite these numbers, apprenticeship participation remains below expectations and completion rates are low.

### 3.6.3. Organization of the teaching

In 2015, there were three categories of teacher and trainer in VET programs:

- Vocational teachers
- General subject teachers
- Trainers (practical training instructors at the workplaces monitoring students' learning) without any formal qualification.

According to the 2010 Education Act, teachers of vocational programs need to have a vocational qualification at least at SeQF level 5 (upper secondary VET programs lead to SeQF level 4)<sup>2</sup>.

The qualification is a vocational basic diploma including teaching and learning methodology, general teaching knowledge and skills, and induction. Teachers of general subjects in VET programs have the same qualification as teachers in higher education preparatory programs.

The Education Act introduced a teacher certification which requires an assessment based on the education and the rules that apply for the awarding of a degree, even if other requirements are applicable today. The certification process is carried out by the National Agency for Education.

Entry requirements for vocational teacher training are:

- Graduation from upper secondary school
- Mastery of the relevant vocation (specified by the Swedish council for higher education).

Non-qualified, non-certified teachers can be employed for a maximum of one year.

A certified teacher with at least four years of experience can be appointed as a “particularly qualified teacher” (*förstelärare*). The teacher is required to spend half of the worktime at the disposal of the school governing board and half worktime teaching (Swedish Ministry of Education, 2013). The time “at disposal” can be used for training teachers and colleagues (i.e. supporting new teachers during their induction period, coaching colleagues and initiating a pedagogical discussion among colleagues).

A particularly qualified teacher with a research degree can also advise and help colleagues in CPD in the subject they teach and disseminate current research in the field [SW12].

#### *Continuous professional development for VET teachers*

According to the 2010 Education Act, the time allocated to CPD for teachers is on average 104 hours, or nearly 6% of the total worktime for teachers in one year.

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<sup>2</sup> SeQF is the Swedish Qualifications Framework

CPD is regulated via agreements set by the labor market's social partners. The head teacher and school founder are in charge and responsible for the CDP, but there is no specific law on its organization.

Many adult education teachers are employed according to the same annual framework but with a different time allocation: the head teacher distributes the CPD time and resources. The allocation of CPD time, resources and focus areas is agreed with the employees.

The National Agency for Education supports with grants all the schools and offers a wide range of CPD for teachers and school staff.

Programs that specifically target VET teachers focus on:

- Increasing the number of VET teachers with a formal teacher qualification,
- Technical subject skills
- The improvement of WBL.

Schools organizing CDP can apply for a State grant for:

- Supporting a non-qualified teacher in getting a degree in VET teaching.
- Supporting a qualified teacher in improving/updating their skills and knowledge in the technical subject related to the field they teach.
- Attending courses leading to certificates, and CPD in health and safety in the work environment.

Finally, the Swedish Council for Higher Education manages State and European grants supporting CPD in the form of participation in international conferences, job shadowing and exchange programs with teachers in another country.

Regarding the organization of WBL (specifically interesting for VET providers), the National Agency for Education has launched a program to support schools, commissioning universities to train VET teachers in this field. Upon the completion of the training, teachers may be appointed as national WBL-developers in order to support VET providers in the development of WBL. Since January 2014 there have been approximately 200 school-supportive actions, leading so far to about twenty teachers trained and appointed by the Agency to support schools all over Sweden. [SW13].

## 4. Policy on VET digitalization with echoes in the Energy sector

In this chapter, we give an overview of the European strategy towards digital education and training, in terms of general action plan and national initiatives, describing:

- First (in Section 4.1), how the EC is calling VET providers for strategic and systemic action in the direction demanded by the industry transition towards digitalization (according to the 2021-2027 Digital Action Plan and to the requirements of Industry 4.0).
- Second (in Section 4.2), the ongoing national strategies set by the five focus countries to align their VET systems to the requirements of Digitalization, also highlighting the impact of these strategies on the Energy sector.

### 4.1. Generalities for Europe

As mentioned in "Section 1 Introduction", the EC has launched a general policy to foster and coordinate the transition of the EU member states (and as a consequence, of the European economy, industry, labor market and society) to Informatization and Digitalization. Although the Digital Transformation and the adoption of IT technology have started already at the beginning of the 3rd millennium, only now they are in full and fast development. This

transition goes in parallel with other changes and developments happening in the member states at the level of system (global), operations, services, offer and demand, in relation to the economic, political and social conditions.

Across Europe, the current focus of vocational education and training is increasingly upon preparing knowledge workers to meet the challenges posed by the transition from the Industrial Age to the Information Age, with its concomitant post-industrial human resource requirements and the changing world of work. In this respect, two defined pathways best express the ongoing European efforts in harmonizing and reshaping the VET system across the member states: one is the EC's *2021-2027 Digital Education Action Plan*, the other is the so-called *Industry 4.0*. These two pathways contain clear and critical elements related to policy, standardization and organization, which makes them paramount references for this deliverable and the development of the entire EDDIE Blueprint strategy.

### *2021-2027 Digital Education Action Plan*

In the recent 2021-2027 Digital Education Action Plan [REF3], the EC has called the EU member states for stronger cooperation to make education and training systems fit for the Digital Age and its labor market, also learning from the COVID-19 crisis (during which ICT technology is being used at a scale never seen before in education and training).

Building upon the lessons learned from the previous 2018-2020 Action Plan, in this new Action Plan the EU aims at playing a more active role in identifying, sharing and scaling up good practices, fostering cooperation between all stakeholders, and supporting EU Member States and the education and training sector with tools, frameworks, guidance, technical expertise and research. Two are the priorities identified by the EC and addressed in the action plan [REF3]:

- 1) *supporting the development of a high-performing digital education ecosystem*, through
  - infrastructure, connectivity and digital equipment
  - effective planning and development of digital capacity and up-to-date organizational capabilities
  - digitally competent and confident education and training staff
  - high-quality learning content, user-friendly tools and secure platforms which meet privacy and ethical standards
- 2) *improving digital skills and competences in alignment with the digital transformation of the different industry sectors*, which requires
  - providing learners with basic digital skills and competences from early age
  - digital literacy, including fighting disinformation
  - education in computing
  - good knowledge and understanding of data-intensive technologies, such as Artificial Intelligence or Cloud Systems
  - advanced digital skills to produce more digital specialists, also ensuring that women are equally represented in digital studies and careers

Referring to these two priorities, the set of actions envisaged and carried on by the EC, will include from beginning of 2021 onwards:

- Preparing a *Council Recommendation on online and distance learning for primary and secondary education*, with the strategic involvement of the EU member states, to focus a EU-wide common set of principles to make distance, online and blended learning effective, inclusive and engaging by the end of 2021. The principles would include using EU tools to invest in teacher professional development, defining and sharing best practices on teaching methods in high-quality computing education, as well as working with industry to identify and update skills needs as they emerge.
- Developing a *European Digital Education Content Framework* that will consider the cultural and creative diversity characterising the EU member states, also creating a possible European exchange platform to share certified online resources and connect with existing education platforms.
- Developing EU-wide common guidelines directed to teaching and training staff, to promote digital literacy and tackle disinformation through education and training. Working in the same direction with civil society,

European technology companies and carriers, broadcasters, journalists, the Media Literacy Expert group, the European Digital Media Observatory, and national authorities.

- Fostering digital transformation plans at all levels of education and training through Erasmus cooperation projects.
- Developing ethical guidelines on Artificial Intelligence and data handling in teaching and learning, supporting EU Horizon research and innovation in this area, and updating the European Digital Competence Framework to include Artificial Intelligence and data-related skills in schools, VET organizations, and other training providers.
- Creating a *European Digital Skills Certificate (EDSC)* that is recognized and accepted by governments, education providers and employers all around Europe.
- Fostering participation in International Computer and Information Literacy Study (ICILS) - which collects cross-national data on student digital skills - and setting an EU target for student digital competence of under 15% by 2030, for 13-14 year old students who underperform in computer and information literacy.
- Addressing the development of advanced digital skills through the extension of the Digital Opportunity traineeships to VET students, and offering professional development opportunities to teachers, trainers and other educational staff.
- Fostering women's participation in STEM (Science, Technology, Engineering and Mathematics) and supporting the EU STEM Coalition (<https://www.stemcoalition.eu/>) to develop higher education curricula that could attract women towards engineering and ICT studies.

### *Industry 4.0 and its impact on vocational education and training*

Industry 4.0 is a paradigm introduced to best describe the broad set of developments and changes that are ongoing in the world of work because of the dominant integration and impact of new technologies (for instance but not limited to, Internet and mobile applications, Cloud services, Robotics and Artificial Intelligence). Today's labor market and workplaces are becoming highly dynamic, especially in the high-tech oriented sectors such as electronics, mechatronics and energy. Digitalization, globalization and internet-working are changing and challenging all sorts of enterprises (from the large ones to the SMEs, although with different characters).

In this context, it is crucial to keep VET sustainable through a revision of the training in a timely manner and with the consensus and close cooperation of all the stakeholders involved in VET. In order to maintain a competitive and innovative economy, it is important that already during VET the basis is provided to face the recent developments properly. Professional tasks and required competences will change Europe-wide as much as world-wide, thus, the instruments to face it should not be national ones but European or international ones.

Issues are well focused by the EU, but the actual status of things is that the challenges faced in VET are manifold: Depending on the subjects offered, the available facilities and technical equipment, across Europe some VET providers can already offer elements of a smart factory or IT-based services, but many others cannot. It is however clear and common to all EU member States that the future development is rather unpredictable and that teachers, trainers, workers and VET students will be challenged to learn and to acquire new competences for a new job market. So far, this development is not yet a topic in curricula although in some companies the digital transformation has become (or started to become) already reality. Nevertheless, the majority of VET providers is not aware of the dimension of change and not prepared to face the innovations. There hardly exists learning material for VET students nor does it for the further education of teachers and trainers.

The photography of the current situation at EU-level shows that overall, the European VET is still behind with respect to the requirements set by Industry 4.0, and it can be anticipated that this situation could dramatically change if the member states cooperate and interrelate to fulfil the guidelines of the Digital Education Action Plan set by the EC, and the requirements set by the labor market and the industry sector. Curriculum guidelines set within the Action Plan will be able to offer education and training providers (including enterprises) a systemic overview of new approaches to organize learning for Industry 4.0., with concepts and good examples that are applicable for both designing innovative programs and enhancing existing curricula.

## 4.2. Germany

As described in Sections 2.2 and 3.2, the vocational training system in Germany is based on the strong cooperation between the State, trade unions, the small and medium companies. This cooperation is regulated by law and – although employers and trade unions can create new training regulations – standardization and certifications across industries, ensure that apprentices receive the same training regardless of region or company.

At present, there is a shared responsibility among the government, employers and trade unions to respond to the changing job markets, in particular for what concerns the digital landscapes. With the rise in digital technology, Germany is going through one of the most dynamic periods of innovation in its history, which provides great opportunities for greater prosperity and jobs, but also presents new challenges, also in the field of vocational and further training. The Study Commission "*Vocational Training in the Digital Work Environment*" established by the German Bundestag in June 2018 is tasked with analyzing the developmental prospects for vocational training in the future world of work, examining the economic and social potential of modernization and deriving specific recommendations for the action of policymakers. The 38 members of the Commission will submit their final report by summer 2021. The Study Commission consists of 19 Members of the Bundestag and 19 experts from relevant practical fields, associations and research institutes.

Vocational education is designed to facilitate employers seeking new employees, by allowing them to test potential candidates as apprentices and create a smoother flow for the hiring process. Good schools and good VET programs are critical factors as they have to prepare candidates for changing job conditions. And as change accelerates in many industries (such as in the energy sector), the skills of apprentices risk to become obsolete faster. In order to contrast this, several initiatives have been launched to expand the role of VET in the workforce, in alignment with the rapid economic and technological change of the modern era. Increasingly, older workers and young professionals are making use of the VET system to gain new skills in the ever-evolving labor market. This is particularly possible in CVET, which gives more scope for advanced training and gain of knowledge and skills.

In the rest of this chapter, we present the initiatives that are rolling out in Germany in order to upgrade the vocational training system in alignment with Energy transition (*Energiewende*) and Digital transformation.

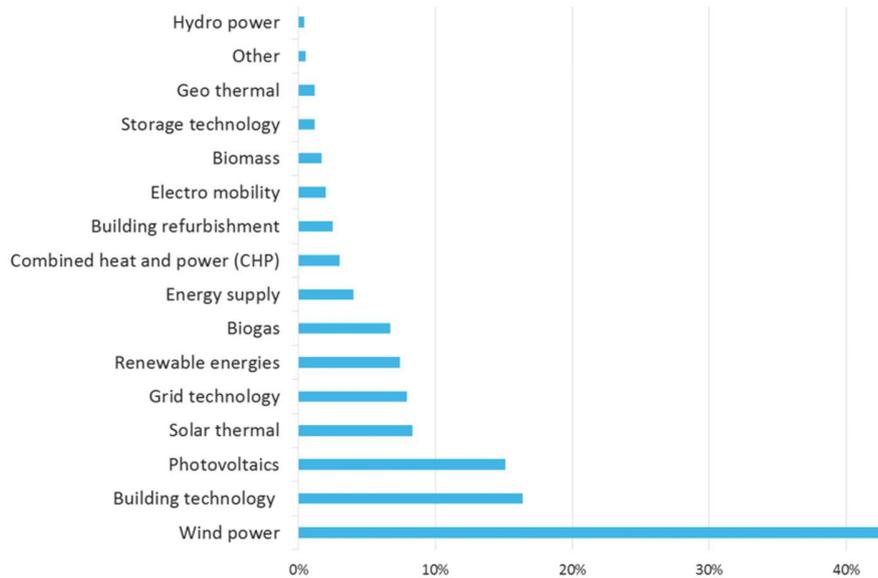
### *Vocational training in relation to the Energiewende*

While worldwide energy systems are entering a phase of transformation, the EU has adopted ambitious goals to move towards a green economy and fully integrated energy markets, with fully decarbonized power systems by 2030. In this transformation process, Germany plays a prominent role, having adopted one of the most ambitious energy transition programs of all industrial nations – the *Energiewende*. With this long-term strategy – started more than a decade ago and invigorated after the Fukushima nuclear accident – the country has decided to fundamentally transform its power sector, phasing out nuclear and coal in favour of renewable energy within the next three decades. [DE24], [DE25]

Germany has already made significant progress on its greenhouse gas emissions reduction target, prior to the introduction of the program, achieving a 27% decrease between 1990 and 2014. However the country would need to maintain an average GHG emissions decrease rate of 3.5% per year to reach its *Energiewende* goal, equal to the maximum historical value thus far.

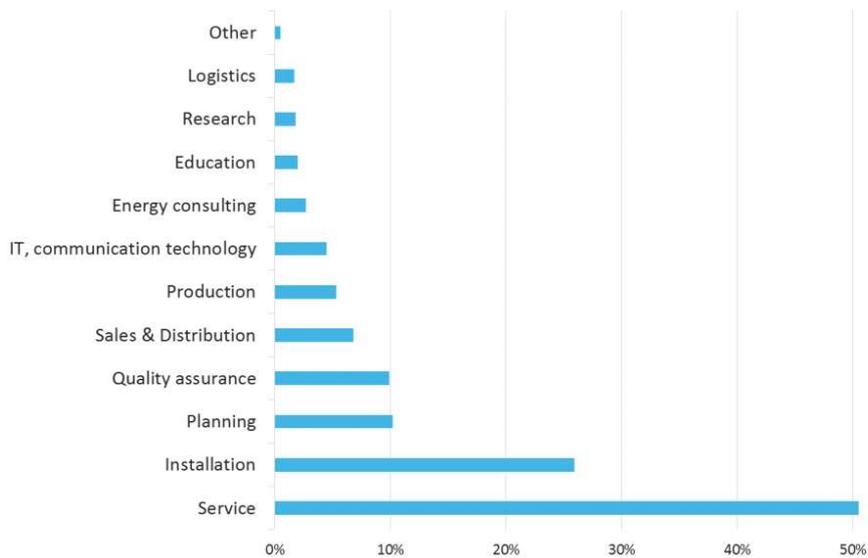
Since the *Energiewende* shifted into gear in the early 2000s, the industry involved in renewable energy and energy efficiency has created over a million jobs, many of them in technical branches, such as renewable energy production, power supply management, smart grid transmission, storage technology, building technology and refurbishment, cogeneration, and e-mobility, among others. Germany's VET system has, since then, made an effort to train enough skilled workers to fill job positions in these fields, which mostly require qualifications and skills specific to new environmental technologies. Initially, the challenge was the lack of job profiles for the *Energiewende*. Existing VET trained workers such as electricians, plumbers, service technicians had to be retrained to work with the new technologies. Nowadays the German VET offers opportunities for both training and retraining of the workforce to handle this complex energy transition, although significant progress is difficult considering that, until recently, much of the *Energiewende* had unfolded without an overall master plan, forcing planners to quickly react to shifts in labor market demand. According to 2016 data on job vacancies requiring dual-system vocational training, the demand stems above all from the wind power industry, which accounts for almost half of the new jobs on the market, followed by building services, solar PV, solar thermal, transmission technology, and bioenergy, respectively

(ref. **Figure 13** Job openings in renewables by field of industry in 2015). Three quarters of the posts were in installation and service (ref. **Figure 14**).



**Figure 13 Job openings in renewables by field of industry in 2015**

(Source CEDEFOP)



**Figure 14 Job openings in renewables by field of activity in 2015**

(Source CEDEFOP)

As for the rapid digitalization that currently the energy system is undergoing, this will - in the near future - significantly increase the demand for professionals with combined expertise in Energy and IT. It seems however that the Energy industry could soon experience staffing problems as have other German industries in the midst of a digital transformation. The *Energiewende's* fields require technical expertise that is currently in such high demand in Germany that labor market shortfalls are common. According to the Cologne Institute for Economic Research (IW) there are over four hundred open positions in skilled professions (most of them in mathematics, computer science, the natural sciences and technology). In vocational school there are instead thousands of unfilled VET

apprenticeships (above all mechanical, automotive, and electrical engineers, as well as IT professionals are in short supply according to the BA, the Employment Agency). The Federal Institute for Vocational Education and Training (BIBB) warns that by 2030 the electrical engineering and supply professions –which are vital to the Energiewende – could be short of 760,000 skilled workers.

Integral to the VET, and to the success of its process of renovation in alignment with the Energiewende, is the dual model with its link between the school-based learning and the on-the-job training. Even before the BIBB began to incorporate specialized knowledge about new clean-energy technologies into classroom curricula, apprentices were getting hands-on training in Energiewende-related jobs in the company. Basic skills, such as the repairing of wind turbines, were already brought into the system before anything was formalised.

Nowadays Energiewende fields call on forty different types of skilled professionals trained through the VET, such as electrical engineers, industrial engineers, systems mechanics, automotive mechanics, automotive engineers, and others. In spite of the boom in jobs associated with the Energiewende, none of the dual-system VET's roughly 330 listed professions specifically name renewable energies or climate protection. This is because the formal categories of professions served by the basic VET have not been expanded to include new job descriptions explicitly associated with decarbonization, although updates in the existing training curricula at the vocational schools (*Berufsschule*) are constantly put in place.

In contrast to the *Berufsschule*, the technical colleges (*Fachschulen*) have created new professional categories reflecting the Energiewende, such as “environmental technician,” “specialist solar technology,” “solar technician,” “technician in wind energy technology“ and “technician for renewable energies.”

### *Digitization of the world of work: the Vocational education and training 4.0*

The effective, reliable and safe use of computers and Information Technology (IT) is becoming more and more important, and in parallel digital and IT skills have now become key in vocational training. For the work of the future, it is important to restructure the vocational school in order to integrate digitalization and impart IT and digital skills.

In the view of this, in the summer of 2016 the Federal Ministry of Education and Research (BMBF) launched - in cooperation with the Federal Institute for Vocational Training (BIBB) - the *Vocational Training 4.0 (Berufsbildung 4.0)* initiative, which aims to design new measures for future-proof, attractive and competitive vocational training, and put them in collaboration with others BMBF initiatives for digitalization. This also supports the Federal Government's digital agenda. [DE26] - [DE28]

#### **Qualifications and skills for the digitized work of tomorrow**

One essential component of VET 4.0 is the research project "Qualifications and skills for the digitized work of tomorrow" (*Fachkräftequalifikation und Kompetenzen für die digitalisierte Arbeit von morgen*). [DE28] In dialogue with the companies, the jobs affected by digitalization in selected professions are examined with regard to work processes, activities and qualification requirements, with the threefold aim of: a) recognizing the changing demands on the qualifications of skilled workers at an early stage; b) recording the quantitative and qualitative outcomes and c) setting up an early detection system for gaps and future requirements. The project also investigates the importance of digital skills of trainees and trainers for the successful completion of vocational training.

#### **Digitalization in inter-company vocational training centers**

Another important element of Vocational Training 4.0 is the BMBF's special program to promote digitalization in inter-company vocational training institutions (*ÜBS*) and competence centers.

As described in Subsection 2.3.5, inter-company vocational training centers were originally set up to supplement in-company training with practical courses, for SMEs. Over the years, inter-company vocational training centers have been further developed into multifunctional centers of education, offering also advanced training and continuing education, as well as occupational guidance and preparation.

The special program promotes selected equipment of the *ÜBS* in digitalization (digital devices, machines, systems and software). In addition, funding is provided for pilot projects in eight competence centers and their networks, where the newest digital technology is applied. The project teams are analyzing the effects of digitalization on inter-company education in various occupations, developing innovative education concepts and disseminating them as multipliers.

The pilot projects focus on:

1. *Crafts*: apprentices learn about applications of digital technologies in their profession, such as smart home technologies.
2. *Digital security*: apprentices familiarize with specializations in building management, locking and safety technology, digital processes and the latest technological developments.
3. *Automation technology and electrical engineering*: efficient tools for collecting and disseminating data are used; training examples include quick response codes (QR codes), chips for identification by means of electromagnetic waves (RFID chips) and touch devices.
4. *Digital qualification offensive in inter-company vocational training centers*: trainees learn about 3D printers in carpentry, mobile work with customers and on construction sites, and online marketing.
5. *Inter-company teaching/learning arrangements for digitalized business fields of e-crafts with integrative trainer qualification*: energy turnaround and technological change in smart buildings lead to major changes in building services engineering, creating new fields of action in craft businesses, which in turn create new demands on the training of skilled workers.
6. *Dental techniques*: in the near future, more and more 'printable' materials will be certified according to the Medical Devices Act. To achieve successful results in the digital work process, technical knowledge and skills are still a prerequisite, but dental technicians must also be able to process complex data sets.
7. *Carpentry*: the evaluation of individual wooden components (for example for roofs or carports) is usually no longer done by traditional methods alone: industry software is used. The building physics requirements for heat, moisture, sound and fire protection have also become considerably more stringent, requiring the ability to process appropriate electronic data.
8. *Construction information modeling*: this refers to a method of optimized planning, execution and management of buildings using software. The basic element is a multidimensional construction model; relevant data are digitally modeled, linked and captured.

### 4.3. Spain

The public administrations of the different Spanish regions have developed different initiatives to promote digitalization in VET. As described also in Subsection 3.3.3, the initiatives usually combine the promotion of digital platforms for the practice of teaching-learning, as well as the provision of the centers with adequate technological equipment.

A case of special interest is that of the Aragon region. The Government of Aragon has worked on the design of a Technological Campus that will turn the Community into the training center for the technological leaders of the future.

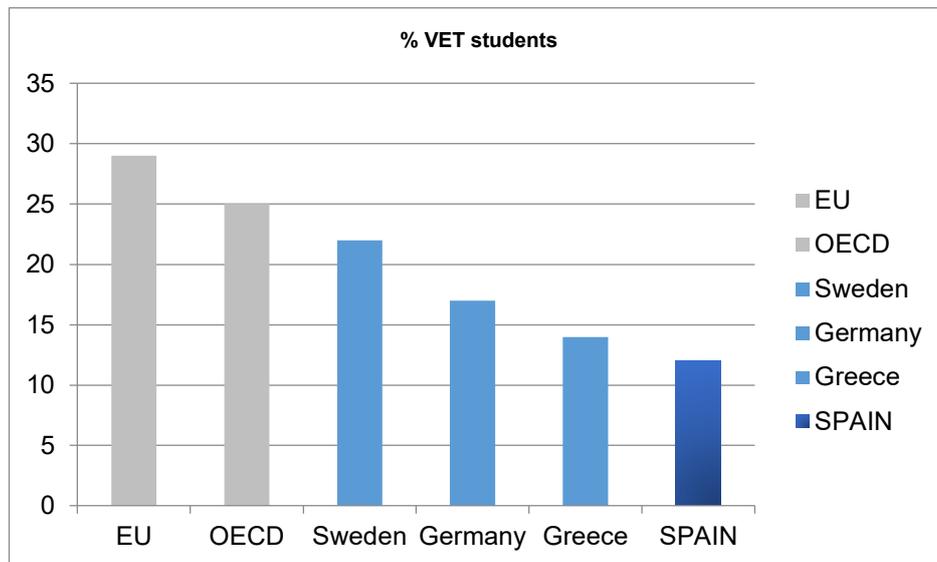
One of the strategic axes of VET in Aragon is the creation of a training nucleus on renewable energies in the Mining Basins. The initiative contemplates the implementation of VET at all levels. The first qualifications are already studied in this course: professional certificates for basic operations and maintenance of renewable energy installations and another for the assembly and maintenance of photovoltaic solar installations.

At national level, within the framework of the School of Computational Thinking, and specifically for upper secondary and IVET, a robotics simulator has been created which will allow students to start programming robots, drones and autonomous cars, while at the same time they learn mechanical and electronic concepts in an attractive way.

Each VET center, in the scope of its autonomy, can incorporate those methodologies and technological solutions that best contribute to the development of its training objectives. It is at this level where teaching methodologies aiming at the development of soft skills demanded by i.4.0 are implemented.

#### *Digitalization of the world of work: the Vocational education and training 4.0*

The analysis of the current situation of VET in Spain indicates that the choice of these teachings is very far from the European average. 3 out of 10 EU students (between 15 and 19 years old) choose vocational training. In the OECD this choice represents 25%. In Spain, the percentage of students who opt for vocational training in this age group is 12% (ref. **Figure 15**). [SP21]



**Figure 15 Percentage of VET students between 15 and 19 years old**

(own elaboration table – reproduction of Source: OECD data)

There are multiple factors that can leverage a better introduction of this training in Spanish students. One of these factors would be the adaptation of VET through digitalization strategies. To this end, the Government of Spain has developed a Plan for the Modernization of VET. This Plan includes the following points:

- 1,500 million investment for VET
- Permanent call for the accreditation of competences
- A unique flexible and easily accessible VET system
- 200,000 new places in the next four years
- New titles on artificial intelligence, Big Data or Cybersecurity
- Entrepreneurship and Innovation in Vocational Training and Dual VET

The Plan identifies 11 areas in which the actions will focus. One of them is the digitalization of VET. To understand the panorama of digitalization in Spain, it will be necessary to review some data taken from a recent study [SP22].

- Only 55% of people between 16 and 74 years old have basic digital skills (57% in the EU as a whole).
- The percentage of ICT specialists represents a lower proportion of the workforce than that of the EU (2.9% compared to 3.7% in the EU).
- Graduates in ICT in Spain represent 3.9% of the total.
- Women ICT specialists only account for 1% of total female employment.

In this situation, in 20% of the companies no digital training is carried out and in 62% of the companies that have offered it, less than 40% of their employees has received a course. Advanced skills such as digital culture (13%), web search optimization (11%) or open innovation (11%) are in the minority. With this situation, it is worth highlighting how the recent crisis has affected the digitalization difficulties of the entire Spanish system. The COVID-19 crisis has demonstrated the urgency of this transition.

In the educational field, it has been necessary to develop virtual classes, videoconferences, electronic commerce, social networks, SEO strategies for positioning and/or optimization in Internet search engines or Web search engines, and also intelligent manufacturing, 3D printing or cybersecurity are issues whose relevance has been demonstrated in recent months.

The Digital Agenda for Spain (2013) (ADpE) [Agenda Digital para España] [SP23], is the road map for fulfilment of the objectives set out by the Digital Agenda for Europe [SP24] in 2015 and 2020, as well as the achievement of specific objectives for the development of the economy and digital society in Spain.

The sixth objective is about promoting digital inclusion and literacy and the training of new ICT professionals. Among its specific measures, the following measures can be highlighted:

- Updating the National Catalogue of Professional Qualifications in terms of ICT skills and training, and include this update in the training offers that accredit professional qualifications;
- Maximizing efficiency in the management and allocation of training funds for continuous training in ICT, both for private and public sector workers with special attention to the use of online virtual training platforms;
- Assigning part of the resources available for CVET to the acquisition and upgrading of digital skills of ICT professionals;
- Readjusting vocational training related to ICT including, among other actions, specialization courses in the education remit;
- Promoting an improvement in the university offer aimed at training ICT professionals through their adaptation to market needs, contemplating new professional profiles in the field of ICT and increasing the efficiency of the system.

### **Digital strategies 4.0 and VET in Spain**

The incorporation of digitalization in the Catalog of VET qualifications already underway acquires, in this new scenario, a determining role. This incorporation arises in two different planes of action: the digitization of the analog economy and the digital economy.

#### **A. Digitalization of the analog economy**

It will focus on training for the automation of some production processes related to the treatment, transport and storage of information in sectors in which these activities are not the heart of the business. In these cases, the objective of digitization is mainly to increase productivity, essential in the process of economic and social growth (ref. **Table 19**).

**Table 19 Actions for the digitalization of the analog economy in the Spanish VET**

<b>Actions for the digitalization of the analog economy</b>	Incorporation of a training module on Digitization applied to the productive sector.
	Training offer of the Digitalization module applied to the productive sector for unemployed and employed people.
	Training plans for the digitization of the workforce of companies

#### **B. Digital economy**

It will include the productive part in which the main product that is exchanged is information (ref. **Table 20**).

**Table 20 Actions for the implementation of the digital economy in the Spanish VET**

<b>Actions for the implementation of the Digital economy</b>	Offer of digital degrees in the next academic year 2020-2021
	Design of new digital degrees.
	Modular offer of these specialization courses to the entire workforce
	Design of a new Vocational Training plan for employment
	Training in specific digitization of VET teachers

### C. VET 4.0 initiatives

#### C.1- Design and development of new Professional Qualifications

The National Institute of Professional Qualifications (INCUAL) is currently carrying out prospective studies to assess the needs of adaptation of existing occupational standards to the requirements derived from Industry 4.0 and, where appropriate, defining new occupational standards [SP25].

The Council of Ministers, in a session of November 24, 2020, at the proposal of the Ministry of Education and Professional Training (MEFP), has approved two Royal Decrees updating the National Catalog of Professional Qualifications (CNCP) with the creation of seven new qualifications and the update of another 20.

The first step has been to establish three new qualifications in the Electricity and Electronics professional family and update another four [SP26].

New qualifications include:

- Electrical operations in traction substations and railway auto-transformation centers,
- Installation and maintenance of control-command and signaling systems in railway infrastructures, and
- Installation and maintenance of telecommunications systems and auxiliary services in railway infrastructures

Updated qualifications are:

- Auxiliary operations for the assembly of electrical networks and outdoor lighting installations
- Installation and maintenance of electronic audio, video and multimedia equipment
- Assembly and maintenance of low voltage electrical installations
- Development of telecommunications infrastructure projects and other voice and data networks in buildings.

In a second step, the same will be done with degrees from the Building and Civil Works family. In the field of Energy, the Government plans to offer new degrees in the 2020-2021 academic year as well as design new ones, such as:

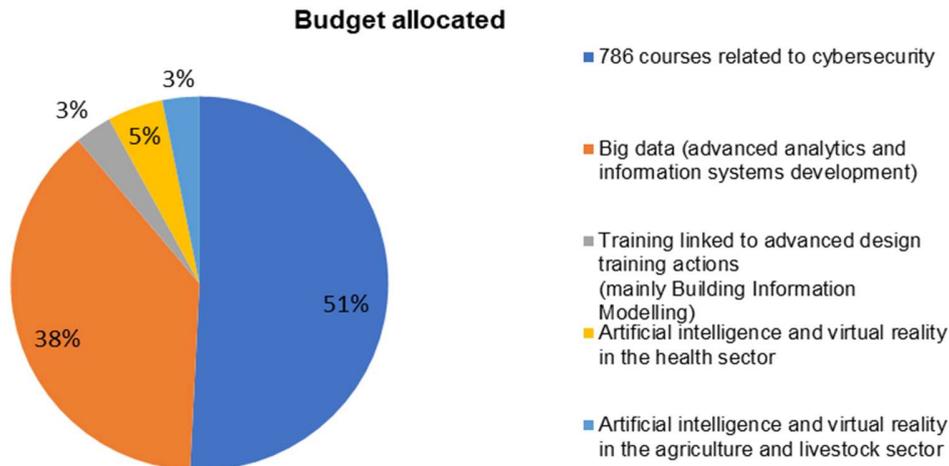
- Digitization of industrial maintenance
- Electric vehicles
- Installation and maintenance of electric vehicles

#### C.2 - Training of workers in digital skills

One of the initiatives that have been raised as important for the development of VET 4.0, has been the implementation of programs that teach digital skills to employed and unemployed people. In a recent document by the European organization Cedefop (Sancha Gonzalo, 2020) on the VET education of the future [SP27], a review of three programs developed in different entities was carried out:

##### ➤ SEPE and Fundae

With a budget of more than 50 million Euros, finances three types of training actions: acquisition of technological or digital competences, crosscutting to the different productive sectors; acquisition of specific technological or digital competences of each productive sector; and professional competences in the key sectors for technological development (telecommunication operators, consultancies and engineering companies). As a summary of the main results from this call of proposals, the following facts can be highlighted (ref. **Figure 16**):



**Figure 16 Budget allocated for training actions related to digital skills for workers**

*(own elaboration table)*

➤ RED.ES

RED.ES is a public entity linked to the Ministry of Economic Affairs and Digital Transformation through the Secretary of State for Digitalization and Artificial Intelligence. It plays an essential role in the execution and deployment of the planned plans for the digitization of Spain with a clear objective: to work for digital convergence with Europe to improve public services and develop the digital economy. They develop programs to promote the digital economy, innovation, entrepreneurship, training for young people and professionals and support for SMEs (Small and Medium Businesses) by promoting an efficient and intensive use of Information and Communication Technologies (ICT) [SP28]. The actions they carry out can be collected in the following points:

- The 'Digital Professionals Youth Employment' scheme
- Funding scheme to promote continuous training and improvement of employability in the field of ICT and the digital economy.
- Support for training programs in the field of the Digital Economy

➤ EOI schemes

The Spanish School of Industrial Organization [Escuela de Organización Industrial] (EOI), and its associated foundation, has as its main goal to improve the competitiveness of Spanish companies (Sancha Gonzalo, 2020):

- National Reference Center (NRC): In collaboration with Red.es, EOI manages the NRC of electronic commerce and digital marketing in the field of professional training. Courses are primarily aimed at employed workers (IVET and CVET teachers and experts), such as digital marketing and search engine; Digital customer experience; Competitive intelligence on the web; and Big Data Analytics;
- National Operational Program on Youth Employment (budget 39 million Euros). As an example, the program includes a Training pathway on Digital Transformation for employment [SP29]. The Project, implemented by EOI with the partnership of Google, is aimed at improving the employability of young people who have dropped out of school from an early age, have lost their jobs or have difficulties to find the first job. It also enables young people with high educational levels to reskill. Their training itinerary includes the need to take a 40 hours MOOC on the Google platform followed by a mentoring phase. EOI helps companies with up to 5 000 Euros to hire them.
- There are also postgraduate & executive Courses on issues related to i.4.0 (for example, Artificial Intelligence & Deep learning; Blockchain; Business Intelligence and Big Data; Cybersecurity).
- Other actions for digital transformation of SMEs are incorporated in the Employment, Training and Education Operational Program, and within the SMEs' Strategic Framework.

### ***Adapting to Artificial Intelligence and Automation***

The Government of Spain has begun to develop different initiatives to implement the European Coordinated Artificial Intelligence Plan COM (2018) 795 (COM 795). The Strategy for AI in Spain establishes a series of priorities and recommendations, which take into account the issues of education and vocational training and lifelong learning in relation to Artificial Intelligence.

The School of Computational Thinking and Artificial Intelligence is one of the main actions promoted by INTEF to address Artificial Intelligence in the educational field as well as some other initiatives for teachers' continuous professional development (CPD).

The Artificial Intelligence Strategic Plan for Vocational Training, approved in November 2019 [SP30], lays down some of these measures (Sancha, 2020):

- Transformation of the national observatory of qualifications into sectoral observatories including one for Industry 4.0, Artificial Intelligence and fifth generation networks (5G);
- Inclusion of new contents associated with key competences when designing the VET diplomas, i.e. Languages, digital competence, internationalization, entrepreneurship, applied creative thinking, innovation in SMEs, etc.;
- Development of new VET degrees associated with the new emerging demands of the productive sectors (at least 15 new diplomas/specialization courses per year);
- Incorporation of a "Digitalization applied to the productive sector" module in all VET diplomas.

## **4.4. Greece**

### *Greece and the digitalization challenges*

The Ministry of Administrative Reform and e-Governance highlighted that during 2012 Greece fell below EU average in 65 out of 84 ICT indicators (77%) included on the European Digital Agenda reflecting low performance. In view of that, according to the country's assessment report, 41.9% of citizens had never used the internet. Despite the fact that Greece has achieved the highest level for seven out of the twenty basic e-Government services in the EU, the performance regarding the provision of integrated electronic services to citizens and businesses in the EU in 2010 placed Greece in the last position. [GR7], [GR8]

The above clearly depict the situation at the beginning of the decade. In this regard, the Greek 'Enhancing Digital Skills & Jobs in Greece-National Action Plan 2017–2020' has been created. The National Action Plan depicts digital penetration in Greece and the actions that will be undertaken by the members of the National Coalition on Digital Skills consisting of ministries, councils and social partners. While developing the action plan Digital skills in education ranks as one of five key objectives that will be prioritized. [GR8]

### *A promising EU funded project*

INNOVET – 'Shaping the future – innovations for excellent vocational education and training' INNOVET is an Erasmus+ project that is implemented by three European partners, the Technological Educational Institute (TEI) of Eastern Macedonia and Thrace, Greece, Forschungsinstitut Betriebliche Bildung GmbH from Germany and the Association for Education and Sustainable Development in Romania. In addition, education and business representatives participate. INNOVET aims to design, implement and adopt an innovative modular VET IT tool. This modular VET IT tool includes modelling and simulations of business processes and real enterprises in the training programs of VET schools [GR9], [GR10]

Such a project could be used a good practice for the further development of the digitalization within the VET sector and as a result the students of VET schools will be profited, including the ones taking courses in Energy related fields.

### *Covid-19 as a catalyst for digitalizing education*

Greece and remote learning during COVID-19 has been an interesting case for further examination. The Hellenic Ministry of Education has adopted a series of measures to enhance education during the COVID-19 pandemic. Distance education platforms and software that extends students' access to all educational levels of formal schooling have been implemented, encompassing 399 vocational upper secondary schools and public institutes of vocational training.

Regarding the public secondary/non-tertiary VET (IEK), the percentage of courses translated into non-synchronous education reached up to 97%, with trainers actively participating in distance education at 81%, and 96.5% of registered students participating. More specifically, three pillars of distance learning have been developed: synchronous teaching methods (live lessons on Webex platforms for all levels of education), non-synchronous teaching methods (educational material on websites and platforms, available to all teachers and students of all educational levels) and educational television programs for elementary school students.

Therefore, remote learning has been made accessible through internet connections offered for free. Digital platforms with educational material were also accessible to all students. Disadvantaged students were able to borrow electronic equipment donated by the private sector or bought by municipalities to help them study at home when schools were closed. When it comes to supportive measures for teachers, daily online training sessions were held to introduce synchronous teaching methods. In addition, the Hellenic Support Service for the eTwinning action offered an online course 'Staying home with eTwinning'. This aimed to train teachers in the use of concurrent and non-concurrent models of online teaching. Such actions could be regarded as the first small steps for digitalizing education, including the VET sector. [GR8], [GR11]

## **4.5. Romania**

Among the main priorities of a strategy for digitalization [RO14] launched by the Ministry of Education and Research, there are investments in the following areas: ICT in education; cyber-security, Cloud Computing, Open Data and Big Data in public sector administration; research, development and innovation in ICT as well as facilitating the access to ICT equipment and infrastructure and broadband for digital services.

One major objective is to increase the digital abilities for achieving e-Inclusion, and in the end a higher adoption of ICT tools into day-to-day life in general and into the educational system in particular, as the improvement of the quality of education and instruction system is seen as a challenge.

The action plan registered 3 stages: Strategic Initiatives (2015-2016), like *Establishing the Framework for Open Educational Resources* (OER); Facilitating Initiatives (2015-2018), like *Supporting the Life-Long-Learning* process or *Introducing 2.0 Platforms in the Learning Process* and Operational Initiatives (2016-2020) like *Education based on ICT Technologies*.

The stakeholders of the Energy sector will also benefit from the implementation of the action named *Network and Computer Systems Security*, which aims at building a national cyber-security infrastructure equally distributed as a responsibility to all institutions and companies who owns such facilities. One entity in charge for development and dissemination of the public policies is National Cyber-Security and Incidents Response Center (CERT-RO) [RO15]. In this case the major objectives are:

- The development of a platform for cooperation and the harmonization of the existing abilities of CERT-RO at national level for encouraging synergies between cyber-security at all levels (also public-private and governmental and non-governmental sectors)
- Establishing minimum security requirements for cyber-security infrastructure
- Development of public-private partnerships
- Development of educational programs for cyber-security and VET for the cyber-security area.

### *ICT in Education*

Considering the priorities established by EC and adopted by Romania, the interventions implemented are organized as below:

- Education through curricular activity based on ICT
- Education through extracurricular activity based on ICT
- VET – Life-Long-Learning with the help of ICT

The former intends to deliver the necessary ICT knowledge and skills to adults. For this a special attention must be paid to the development of a policy in the domain with the public consultation.

Listed action points in increasing ICT in education are addressed further.

- *Provide equipment and infrastructure in schools* – giving ICT equipment and systems will improve the student's digital abilities and the quality of future human resources; it will balance the urban and rural area; will allow a better management of the educational materials and will ease the students access to education.
- *Training for teachers in using ICT* – bring the teachers into the new educational sector assisted by ICT.
- *Shaping specific ICT courses* – by appropriate learning, the students and pupils will acquire digital abilities, a competitive advantage on the labor market.
- *Implementation of OER use* by putting at service an optimal framework and by digitalizing and archiving the educational content – it includes educational content, like lessons for all curricular disciplines, educational evaluation, and specific research.
- *Adding the Web 2.0 platforms into the teaching-learning processes* – the students can do both curricular and extracurricular projects.
- *Stimulating the students in the learning process* – the features of the technological factors will engage the students more in the learning processes and, on the long term, it will decrease the rate of school dropout.
- *ICT for e-Inclusion*
  - In Romania there are certain groups confronting with adapting difficulties to the modern social demand of today, therefore they need support in improving the social inclusion level.
  - In this regard several actions were established and a part of them are: *Increasing the level of digital skills* for the population and especially for the disadvantaged categories; *Promoting Life-Long-Learning*; *Organizing trainings for development of digital abilities*; *Helping the community formators* with materials and training.
- *ICT in Development and Innovation*. Investments in research, development and innovation in ICT as well as applying its results are key factors in improving the competitiveness of Romanian companies and public institutions. Energy and environment are one main development area in this context.
- *ICT for Infrastructure and Broadband for Digital Services*. Focus on the availability of an advanced and modern group of telecommunication networks.

## 4.6. Sweden

Among the 12 VET programs offered in Sweden, the most popular with a high increase in trainees are:

- The vehicle and transportation program;
- The *electricity and energy program* (<https://www.gymnasieguiden.se/gymnasieprogram/ee/>);
- The business and administration program.

Before the 2000s, the Swedish VET system, mainly managed by the State, seemed unable to handle new challenges. The high youth unemployment led to an increased demand for a more apprentice-oriented VET system.

The *Technical College scheme* (*Teknikcollege* in Swedish) was born because of this situation. It is a certification scheme for upper secondary school education in technology, initiated by stakeholders of industry and the trade union of the engineering industry and administered by the Council of Swedish Industries. At the beginning of the 2000s, pilot projects started with the aim to test the scheme: after a short while, other local partnerships and

education programs certified as Technical Colleges were created, and an Association for Technical Colleges was established in 2007 to support the scheme with a more formalized structure.

The aim of the Technical College scheme is to support the supply and quality of industrial and technology-oriented education programs (through public and private schools) at the upper secondary level. The Council supports the cooperation among municipalities, providers of education and companies to build local and regional partnerships, and this improves the industrial relevance and quality of these VET programs.

The criteria for certification in the Technical College scheme include:

- A strong industrial involvement in education
- A demand for high-quality work-based training
- The influence of regional actors on the planning of education.

Any education provider that fulfils these criteria and participates in such regional partnerships can be awarded the certification as a Technical College. [SW8]

### *Digitization of the world of work: the Vocational education and training 4.0*

Sweden has a strong National Coalitions for Digital Skills and Jobs. This is an innovative partnership between digital skills' organizations that work on developing digital skills at national or local level.

Digital skills are an essential part of the Sweden national curriculum in compulsory and upper secondary schools since 2018. [SW9] Digital education aspects are integrated in compulsory subjects such as Biology, Physics, Geography, History, Mathematics, Social Sciences, and Technology.

In February 2016 the Swedish government launched a strategy for new industrialization called "Smart Industry". The strategy has identified four challenges facing the industry and, among them, digitalization. Expertise and innovation are crucial to success. Since then, several projects have been funded by the EC to support the development of skills and competence within the VET context related to digitalization.

For example, the Project VET 4.0 has seen the participation of a Swedish partner (*Kungsbacka kommun Förvaltningen för Gymnasium & Vuxenutbildning*) with the specific focus area of Industrial Skills Boost. The implementation in Sweden was focused on [SW9]:

- Increasing interest in science and engineering and increasing the attractiveness of industrially relevant study programs.
- Improving the matching between the industrial sectors' labor requirements and the education system at all educational levels.
- Ensuring that the education system provides students with not only the right knowledge, but also with the right capabilities and skills required in the knowledge society and for the transition to a digitalized and circular economy.
- Improving the conditions for lifelong learning.
- Promoting career changes and mobility between the higher education sector and the business sector.

Another European project focused on the topic of VET 4.0 and that sees the participation of a Swedish partner is FIT for 4.0. [SW10] This initiative aims at identifying competence and qualification requirements for VET teachers and trainers, and at developing and piloting training modules for both. This should be done in close cooperation with companies and highlights the urgent need for teacher training.

## 5. Conclusions

This final chapter presents some considerations on the information collected and presented in this document:

- a) evaluating the key findings of the reviews of the VET systems in each focus country
- b) giving some conclusive remarks at EU-wide level and with respect to the rationale and targets of the EDDIE project

with the overall objective of identifying the key challenges and policy aspects that should be addressed in the next steps of EDDIE in order to realize the pursued Blueprint.

### 5.1. Evaluation of VET systems across Europe

This document has described in the previous Chapters how across Europe substantial differences exist in the national policy, regulations/standards and organization of the education in vocational schools. Specifically, the lack of European standardization, the heterogeneity of national situations (at political, economic and societal level), and the discrepancies among the national targets and corresponding development paths across the economy and industry, represent major challenges for the digital transformation of the vocational education, for all occupational sectors including the Energy industry.

The EC has set a defined Action Plan for the digitalization of education, and several significant initiatives related to energy and digital transition have been set by the EU member States. Both the EC Action Plan and the national initiatives aim at fostering a coherent integration of the VET curricula in order to include specialized training and professional education also in the areas of IT and Modern Energy systems. Nevertheless, the process of transformation of the education has just started and meaningful results are yet to be seen. It will be important to consider and overcome the different territorial situations of the EU member States, in order to facilitate a harmonic and homogeneous development of the respective VET systems in the direction demanded by the transformation of the industry and the labor market.

In the following subsections, we go over the information collected in the country reviews with the specific intent of evaluating the main findings and identifying the key aspects that should be taken into account in relation to the potential of transforming VET education in alignment with the ongoing changes in the world of work. This step is of particular importance, not only because these countries represent illustrative samples of the European VET systems but also because they will be used as demonstrators of the EDDIE products

#### 5.1.1. Germany

The dual model represents the pillar of the VET system in Germany, and it can be framed in the context of efforts to create a qualified workforce for different industry sectors, with the threefold aim of a) supporting workforce mobility; b) improving qualifications for young people in a globalised world; and c) reduce unemployment, especially among the most vulnerable groups.

The change of policy direction towards the promotion of dual VET is a relatively recent development, partly in conflict with other longstanding objectives of European educational policy. In fact, although until now most policy efforts have promoted workforce mobility and transferrable skills, German apprenticeships have traditionally been used to deliver more specific occupational skills. Ensuring the quality and comparability of training in a system where a large part of education is devolved to individual companies, requires high levels of coordination and collaboration among the businesses, as well as between the businesses, the states and the trade unions. Many European countries do not have the institutional prerequisites, the demographics or the labor market conditions for this form of collective skill formation. This is the main reason why the German dual VET model is not easily reproducible across all Europe.

Although the dual VET model can be exemplary to reform national vocational systems in Europe, it should not happen that governments worried about the employment prospects of young people opt for dual VET as a quick way to achieve employability, perhaps at the expense of education. In fact high educational and administrative requirements of apprenticeships can discourage companies from training, and this is a problem for most VET

systems that have only recently introduced a dual training component (such as the Italian, the Spanish or the Romanian).

Another important aspect of the dual German system - that also constitute a big limitation to its transferability - is related to the fact that it gives companies the autonomy to decide on the training content. Although this could make the training more attractive for the industry to take on apprentices, it will also make the comparability of qualifications anywhere outside Germany more difficult and the quality of training less reliable, which in the long run can only undermine the value of vocational training as an educational option. Above all, the focus on easing the labor market transition for the young people should not come at the expense of employment standards overall, and the standards formulated for European vocational education should be upheld to prevent the use of apprentices as substitute for cheap labor.

As for the alignment of the German VET system to the EU pathway towards Digitalization in the Energy sector and all other sectors of the industry, it has been described in Subsection 4.2 how the Federal Institute for Vocational Education and Training (BIBB) is intervening in this regard, and what the current situation and the newest developments are. In terms of projections until 2035, three are the key trends for the labor market and VET in general:

1. *Digitalization will enforce structural changes of the labor market.* Projections show that 4 million jobs will be lost due to digitalization while 3.3 million new jobs will be created through the same, with a substantial shift in the kind of jobs which gain or lose importance. So, in future, the German labor market will have particular need for more highly qualified skilled professional specialists and not so much less qualified or only narrowly trained staff on jobs with returning routines.
2. *The job-fit-problem (i.e., the mismatch between job/skills offer and job/skills demand) is continually rising.* This will particularly affect also the IT sector as the demand for skilled workers in IT-related jobs is growing constantly but is currently not met. In some other occupations, more people are trained than actually needed by the industry. Moreover, as Germany is an ageing society, the overall number of young people taking up VET is declining constantly, which implies that an increasing demand for skilled workers, especially at the medium skills level, contrasts with a decreasing number of trainees. An aggravation of the job-fit-problem is related to the fact that the demand for workforce and availability of young people varies significantly from region to region: in economically strong regions of Germany having many companies that offer VET, often there are too few young people taking up a vocational training; vice versa, in some regions that have a lower number of companies providing VET, there might be an oversupply of young people interested in the vocational path.
3. *The trend towards academization continues to grow in parallel to a decrease of the number of people opting for vocational education.* Since 2000, the number of university graduates has been rising steadily, from 200,000 in 2000 to 490,000 in 2016, whereas a contrary - decreasing – trend has been experienced for the number of VET trainees. It is projected that by 2035, only around half of all people in the workforce will have undergone any sort of VET training, which is instead a pillar for the German industry.

These trends significantly highlight the necessity to improve the preparation of the working population for the challenges set by the digital transformation through initial and continuing VET, with a coordinated effort of all the stakeholders involved in VET. The German VET system offers a wide set of creative instruments to tackle the transformation, although all of them are still at an early stage. Examples are – as described in Subsection 4.2 – the development of new occupational profiles based on the industry demand (e.g., "Management Assistant for E-Commerce") or the modernization of training standards through the introduction of digital skills into optional VET curricula. This also includes the (further) qualification of teaching and training personnel to ensure the quality of VET, as well as the supply of the necessary digital infrastructure in vocational schools and training centres. Furthermore, innovative digital methods and tools are appearing now in the context of initial and continued vocational training (for example computer-based tests to measure the competencies of trainees and trainee candidates, app-based learning modules or digital learning concepts with virtual and augmented reality technologies).

In this context, three elements are crucial to transform the German VET as demanded by the future world of world:

- The role played by the VET providers

- The cooperation between government bodies (including federal states) and the social partners (employee and employer associations)
- A solid data-driven VET research informing policy, which is the hallmark of the German VET model.

### 5.1.2. Spain

The first thing that surprises of the Spanish VET system is the little training offer. At the post-secondary level, VET degrees are not offered. This could be the consequence of various factors. On the one hand, historically in Spain little attention has been paid to the VET system. Thus, government investment in these studies has been very precarious. Spanish spending in this educational stage is one of the lowest compared to the average of the 35 countries that make up the OECD. Moreover, until very recently, policies have not been developed that allow the design of a more attractive VET training offer for students. In this sense, we must highlight two fundamental aspects:

- The status of dual VET in Spain
- The modernization of VET in Spain.

Dual VET is one of the most valued training systems internationally due to its socioeconomic benefits (such as low unemployment rates, greater insertion of the young group or an improvement in the professional skills of the workforce). In Spain, pilot programs began to be developed around the country in 2011. The journey of this country with this model is very short, compared to that of other reference countries such as Germany. We can highlight some of the difficulties that Spain has for the efficient implementation of this model:

- An incentive system has not yet been implemented for companies to decide to hire under the training and learning model.
- Generalized consensus on educational matters has not been implemented among social agents (government, employers and unions).
- Investment in education and salaries for apprentices is lower than in other European countries.

On the other hand, the VET system in Spain has tried to modernize itself since the 2000s following the guidelines established by the EU. Currently VET is undergoing some modifications due to the possibility that a new law (LOMLOE) will regulate these studies from 2021. As of the year 2020, the Government has approved allocating funds for the acquisition or lease of machinery and/or advanced equipment, directed to the implementation of technologies in the field of 4.0 environments.

The VET Modernization Plan establishes 11 areas of action, among which are the recognition and accreditation of basic and professional competencies acquired through work experience; the flexibility and accessibility of training for a single system of Vocational Training; digitalization, innovation and entrepreneurship or the promotion of dual vocational training, among others.

Spain has the challenge of overcoming different difficulties. On the one hand the Spanish society is one of the least digitalized in Europe and, as a consequence, its VET education as well. Nevertheless, based on government plans, the different Spanish regions have developed initiatives to promote the digitalization of VET studies adapting them to the characteristics of each region. In that sense and following the new Government strategy (The Digital Agenda for Spain), the Spanish government has designed different action plans such as the creation of new professional qualifications related to digitalization, training of workers in digital skills or the inclusion of artificial intelligence in VET. On the other hand, Spain must meet the demands of the changing market by adjusting its VET supply to try to reduce the gap between the demands of the economy and the training of the Spanish population. The crisis situation has increased the educational imbalance: a large number of unemployed with very low qualifications, which the labor market cannot absorb because the profiles it requires are higher or are located in another sector. For this reason, it is necessary to promote VET, where learning in the company becomes very important.

### 5.1.3. Greece

In the current socioeconomic state of Greece, where the recent recession has affected not only economic growth and unemployment rates, but core social values and beliefs too, there is a risk greater than that of a skills mismatch,

a risk that skills may lose their acquired value. Unskilled and older workers are at greater risk, as are the long – term unemployed, especially young people without any work experience. There are clear signs that in Greece there is a disharmony between skills needed and their availability. It should be noted, though, that the country's major problem is creating the suitable growth conditions that will lead to job creation that would in turn contribute to direct, or at least faster, matching between skills offer and demand. This is quite crucial for the Energy sector as well, as it will be one of the driving forces of Greece's economy.

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VET courses and specializations offered should reflect the needs of the economy, in order to be more attractive to young people and actually contribute to the country's progress. They should, also, be consistent with recommendations of relevant policy makers. Except for the overall need of upgrading VET to meet the needs of the market, a wider change in society's perceptions about VET should be pursued. VET should not be considered an option for underachievers, but to do so it has to be appealing for other students too. Providing the necessary skills and competences to access the labor market, especially in accelerating sectors such as the energy one, can be a key criterion for students' choices.

Following the above, it becomes apparent that it is quite crucial for Greece to progress accordingly in issues related to the digitalization of the VET education in order not only to provide to the students the necessary qualification but to also fill the gap that has been created in terms related to the use of ICTs a crucial point in the digital era. Therefore, digital skills in the energy sector should be further promoted, enhanced and finally become an integral part of it.

#### 5.1.4. Romania

Skills stimulate competitiveness, innovation but also the well-being of people and their personal and professional fulfillment. They are acquired throughout life, starting from family learning, early education, compulsory education, higher education, vocational training, and adult learning in all its forms. This is one main pillar for the strategy of Romania in its approach for defining a new guide for the digitalization of every sector and the energy sector in particular.

VET is not an independent system, but a constituent part of the Romanian education system. From this perspective, the quality of VET depends not only on the specific measures taken, but also the quality of the human resource that feeds the VET system (graduates of primary and secondary education). In turn, the successful reform of VET will have an effect beneficial to stimulate performance in education, starting from the understanding that education must keep up with the demands of a changing economy.

National statistics show a growing concern over the last decade for professional training. Thus, according to national data, the number of adult learners who have participated in authorized training programs has increased in the last decade. The report also highlights an increasing trend in adult participation training courses provided by their employers (since 2015, participation in continuing education in enterprises has increased by 27% for the male population and by 40% for the female population).

Although the number of apprenticeship contracts is increasing, employers often perceive training as an additional cost, rather than an investment. The Youth Guarantee Program did not lead to the expected results in the field of promoting apprenticeships and initiatives to create the appropriate framework for youth employment and to support their integration into the labor market.

The National Employment Agency offers training programs based on the analysis of job vacancy data and job applications, which are formulated in the Annual National Vocational Training Plan. Thus, there are training opportunities for adults who have left education early or for other reasons. However, participation in lifelong learning is the lowest in the EU, with a slightly downward trend compared to the upward trend in the EU.

Another relevant mention that can be added here is the confirmation from the *Strategy for digitalization of education for the years 2021-2027* that the development of digital competences at all levels in cross-curricular education, through specialty disciplines, formal and non-formal activities is one of the directions and initiatives for new opportunities in education and VET for a digital society. Momentarily, this document is a draft and no details about the strategy are provided.

### 5.1.5. Sweden

In the last years, Sweden has achieved great results in the development of its vocational education and training (VET) system. In particular, “Work-based learning is better integrated, social partners are more engaged and the VET offer for adults has been developed”. [SW20] This results in a very strong VET system supported by effective policies regarding study allowances and student aid which ensure that all the individuals are given the possibility to study.

VET in Sweden is characterized by a modular and flexible structure of upper secondary education. Trainees can easily change study path, and the flexible system permit students to continue working while studying and adults to even restart their studies to upgrade their competences.

Validation in adult education is one of the key characteristics of the VET Swedish System. Education providers are in charge for the validation process. Validation of Knowledge, skills and competences acquired through different experiences is possible in all municipal adult education courses at upper secondary level and in higher vocational education.

The direct effect is that participation in lifelong learning experiences is above 30% in 2017, the highest rate in the EU.

Validation of non-formal and informal learning is defined by a National Strategy for Validation (2017). In 2018, Skolverket (The Swedish National Agency for Education) developed a toolbox for guidance counsellors at upper secondary general education and initial vocational training for use in validation. In December 2019, the National Validation Delegation (appointed in 2015) published an annual report, providing both guidance and recommendations to the Government on validation issues. At the moment, there are no formal requirements to carry out a validation and validation methods differ according to the different actors.

Different actions have been put in place to foster cooperation between education and the world of work. National program councils include social partners for each of the national vocational programs in upper secondary schools and guarantee the discussion about content, organization and quality of VET between national agencies and stakeholders.

Upper secondary apprenticeship education is part of the reform created in the last years. The number of upper secondary VET learners enrolled in an apprenticeship program has grown steadily but apprenticeship participation remains below expectations.

Thought the involvement of social partners involved in the design and delivery of apprenticeships has increased in Sweden in the recent years, its rate is lower than in many apprenticeship countries. While offering apprenticeships, Swedish employers have fewer responsibilities and less influence.

## 5.2. Final considerations

The analysis presented in this deliverable prepares the ground for the development - later in the project - of a platform of recommendations, best practices, criteria and tools (the *EDDIE Blueprint*) for the delivery of the skills and professional knowledge that are necessary to work in the modern Energy sector. This sector is fully evolving and follows the changes that are necessarily happening worldwide in the society, as a consequence of general historical progress, high impact events (i.e., the Covid-19 pandemic) and in the environment (i.e., the climate change).

The EDDIE Blueprint has been defined with specific reference to a consistent part of the European continent, covered by different focus countries that are also considered case studies and pilots for the implementation of the Blueprint. This group of countries already offers sound education and training systems, but these are still tied to a traditional configuration of contents and methods, which makes them not yet adequate to sustain the education and

training requirements imposed by the changes of the labor market in consequence of the digital transformation and the energy transition.

The COVID-19 pandemic has posed major challenges for the education and training systems of the EU member states, showing clearly that digital participation, education mobility and the digital transformation of VET are critical issues that need to be resolved. VET plays a crucial role in an age characterized by digital technology, changing requirements in the world of work, demographic change and climate change. Skill requirements have become more demanding in many sectors (including IT and Energy), and education and training must open career opportunities equitably for all people, preparing them for the future job, and offering them appropriate initial and continuing education as well as lifelong learning. In order to modernize the European VET, a strong cross-border collaboration is necessary among the member States and the institutions responsible for the national education and training systems. The modernization should tackle several aspects such as improving employability, developing a strong VET system at university level (ensuring equivalence between vocational and academic education and facilitating the transfer from one system to another), harmonizing standards and functions at European level.

As for the specifics of the Energy sector, it demands new models for the education and training. These models must integrate new contents and cover new areas of professional knowledge and training (ICT, Artificial Intelligence, Smart Grids, Renewable Energy, Machine Learning, Data Analytics, Programming), but also be so flexible to open up international opportunities. Students from academia and vocational school should experience Europe as a place of cross-border learning and working.

These aspects are the basis of the design of the EDDIE Blueprint, which aims at providing a logical and applicative platform of different contents (concepts, examples, methodologies, learning material, tools, education/training curricula. This platform will be open in the sense that:

- It will be flexible, updatable and adaptable.
- It will serve a wide continental area, considering a differentiation of education/training strategies in relation to the territorial conditions.

The methodological rationale proposed in this document represents a contribute to the reference policy for and within the EDDIE project. It builds upon previous steps of work carried out in WP2 and WP3 - which have provided a framework for the analysis of, respectively, the current/future demand and offer of professional skills in the IT and Energy industry (WP2) and the mapping of stakeholders for the creation of an EDDIE Sector Skills Alliance (WP3) – and defines systemically the technical and practical model that is needed to establish the future European education and training system. This model sees the EU policy and the national situations as dominant reference factors for the upgrading and reshaping of the education and training systems across Europe. In fact, the review presented in this report has shown that, in order to be successful in its pursuit, an education and training system must provide updated instruments to meet the demand of the labor market, through a specific policy and model oriented to satisfying the industry and occupational sector (e.g., Energy and IT) at regional, national, continental level; hence, this must be done in alignment with the EU policy and economic roadmap, but at the same time has to include specific criteria of flexibility, modularity and replicability of models depending on the territorial situation.

The findings derived from the reviews presented in this document allow the definition of a methodological scheme to systemically tackle the redefinition of education and training systems at territorial level (regional, national and continental). This methodological scheme can be flexibly applied, considering the general and specific heterogeneity of both the EU member states and their labor markets (also in relation to the vastity of topics and areas inherent to the Energy sector). The reference model of this scheme is based on the modular definition of the education and training process as well as of the configuration and operating procedures of the education and training system, and it has been conceived as programmable, manageable for implementation, controllable in its effectiveness, comparable with other models, and changeable over time in order to fulfil the evolution of any education and training requirements. In this regard, the presented review encompasses elements of analysis and segmentation of the entire education and training system, which will be crucial and necessary to keep into consideration in the next steps of the project, for three main reasons and aims:

- The integration of the (theoretical and applicative) education and training contents.
- The control and management of the entire education and training process.
- The specific digitalization of the entire education and training program



This deliverable has also defined the “beyond” referred to the outcomes of the review presented here and the work carried out in WP2 and WP3. The focus countries provide samples of education and training systems that are already well structured and organized, with both synergies and differences. These countries have also a well-established Energy industry that is undergoing a dramatic transformation due to the EU policy, the green economy and the digitalization. These elements make them ideal demonstrators for the implementation and validation of the EDDIE concepts and outcomes, although these concepts and outcomes will maintain – based on what has been said before - all the necessary criteria to be flexibly applicable to other EU territories.

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