Education and Culture DG

Lifelong Learning Programme

technische universität dortmund

GT VET

Greening Technical VET – Sustainable Training Module for the European Steel Industry

Work Package 3

Analysis of VET Systems Reflecting Anticipated Future Requirements

National Report

Germany

D7.2.1

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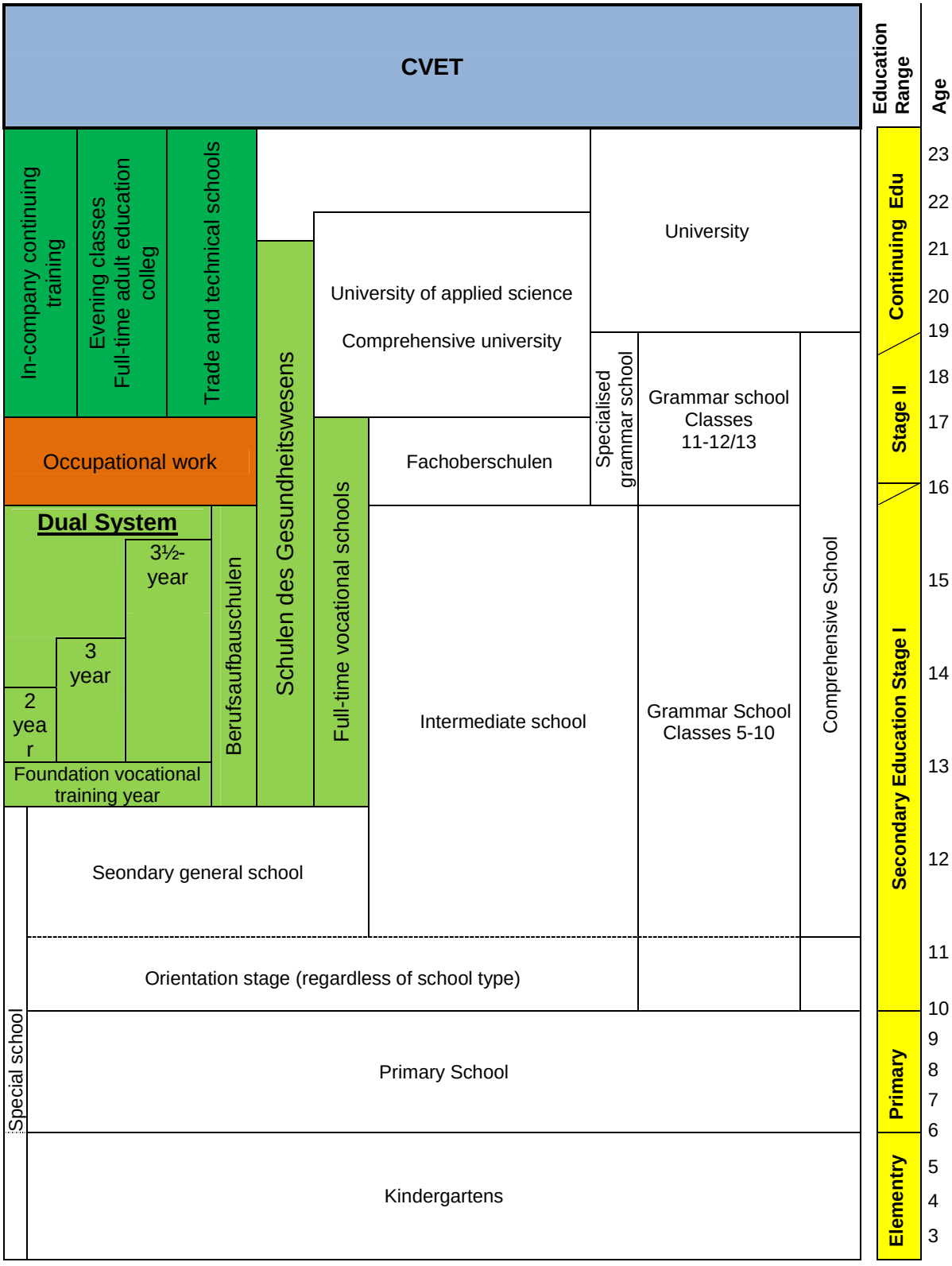
1. The German Vocational Education and Training System

1.1. Initial vocational education and training (IVET)

Figure 1: Education in Germany: basic structure



(Source: Cedefop, VET in Germany (2007), p. 21, own representation)

In Germany pupils who finished the Secondary education (Stage I) can apply for a vocational training if they have finished their full-time compulsory education.[1] They can choose between in-company training (*dual system*), vocational schooling or full-time vocational schooling.

The aim of training in the *dual system* is to provide, in a well-ordered training programme, broadly based basic vocational training and the qualifications and competences required to practice an occupation as a skilled worker in a changing world of work. Successful completion of the programme entitles the trainee to practice an occupation as a qualified skilled worker in one of the 349 currently recognized training occupations.[2]

The system is described as *dual* because training is conducted in two places of learning – companies and vocational schools.[3]
It normally lasts two to three years and is supplemented by internships.[4] Trainees sign an apprenticeship contract with their company. Learning targets and examination guidelines are fixed in Federal training directive which is concretised in an individual training plan by the companies (s. chapter 1.2 and 1.3).

Concerning the financing of the dual system the Länder are accountable for school system while the companies finance the in-company training. Moreover the trainees get monthly paid but the amount differs by region, occupation and training year within 300 and 900 Euro. If the trainees pass the final examination of the competent chamber, they receive a Craft Certificate. With the latter they have either the opportunity to work or to acquire the vocational extension certificate or do the Master Craftsman's Certificate.

Table 1: Apprenticeship and school leavers in the course of time

Year	New Apprenticeship contracts	School leavers[5]	Relation New contract / school in %
2002	572.323	918.997	62,3%
2003	557.634	929.806	60,0%
2004	572.980	945.381	60,6%
2005	550.180	939.279	58,6%
2006	576.153	946.766	60,9%
2007	625.885	942.129	66,4%
2008	626.342	907.083	67,7%
2009	566.004	873.104	64,8%
2010	558.100	849.327	65,7%

(Source: BMBF 2010, school leavers from the general school system, p. 21)

Furthermore there is not only the opportunity to attend the dual system but also full-time vocational schools.[6] The duration of training lasts between one and two years and leads to a basic VET degree which corresponds to a secondary school certificate

[1] Earliest date to apply is at the age of 15.
[2] Cedefop. VET in Germany (2007), p. 25.
[3] The trainees spend three to four days a week in the company and the other days at their vocational school.
[4] In addition to training occupations requiring only two years' training, there are also statutory regulations facilitating a reduction in the training period with enterprises' agreement, e.g. for trainees with the Abitur (Final school-leaving certificate entitling holders to enter any institution of higher education).
[5] School leavers from the general school system.
[6] Especially for occupations of the health and social service sector.

(intermediate school). If a trainee attends a training course (*Bildungsgang*) which lasts two or three years it corresponds to a vocational training degree.

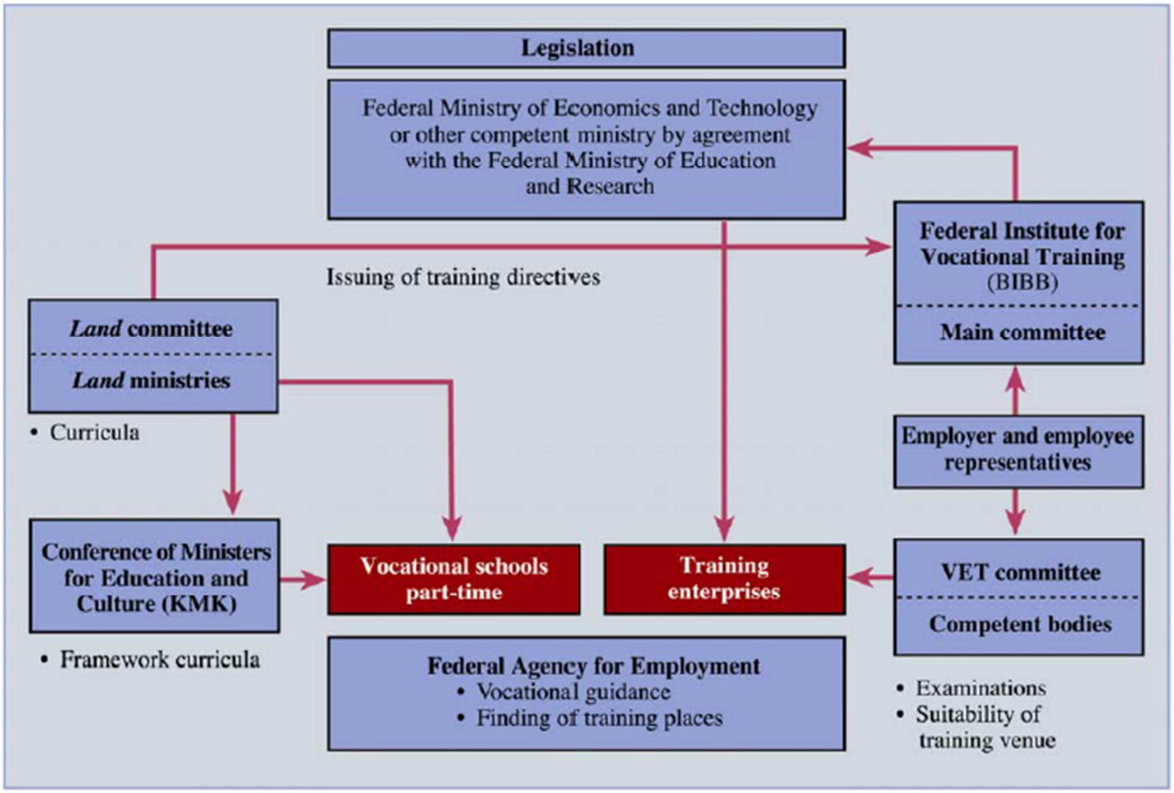
In 2004 the Federal Government and companies renewed the 'National Pact for Career Training and Skilled Manpower Development in Germany' (*Nationaler Ausbildungspakt für Ausbildung und Fachkräfteentwicklung*) to create more traineeships and apprenticeships opportunities for school leavers improve the training rate and sufficiency. In 2010 the pact has been extended again until 2014 with a focus to implement new priorities and guidelines for the VET in Germany.[7]

1.2. The institutions and actors within the *dual system*

The German state's functions are shared out between the Federal Government and the 16 Länder. As long the Basic Law does not provide or permit otherwise (Art. 30), the fulfillment of these functions is a matter for the Länder. So the latter are also responsible for public-sector schools and education as well for the vocational schools. All legislation on schools, including that on vocational schools, is Land legislation. In harmonizing the different education policies of the Länder, the Standing Conference of Ministers for Education and Cultural Affairs[8] is an important institution.
On the national level the Federal Ministry of Education and Research (BMBF) has general responsibility for coordination, policy and legislation in case of the following: in-company and non-school VET,[9] training assistance and the general principles of the higher education system. Moreover it has the responsibility for the expansion and construction of institutions of higher education. In agreement with the BMBF the Federal Ministry of Economics and Technology (BMWi) recognize training occupations via statutory instrument and may issue training directives for training occupations.[10]

[7] Federal Employment Agency: http://www.arbeitsagentur.de/Navigation/zentral/Buerger/Ausbildung/Nationaler-Pakt-fuer-Ausbildung/Nationaler-Pakt-fuer-Ausbildung-Nav.html.
[8] German: Ständige Konferenz der Kultusminister der Länder (KMK).
[9] CEDEFOP. VET in Germany (2007), p. 26-27.
[10] CEDEFOP: VET in Germany (2007), p. 39.

Fig. 1: Responsibilities in the field of vocational training



Source: Federal Institute for Vocational Education and Training, 2006.

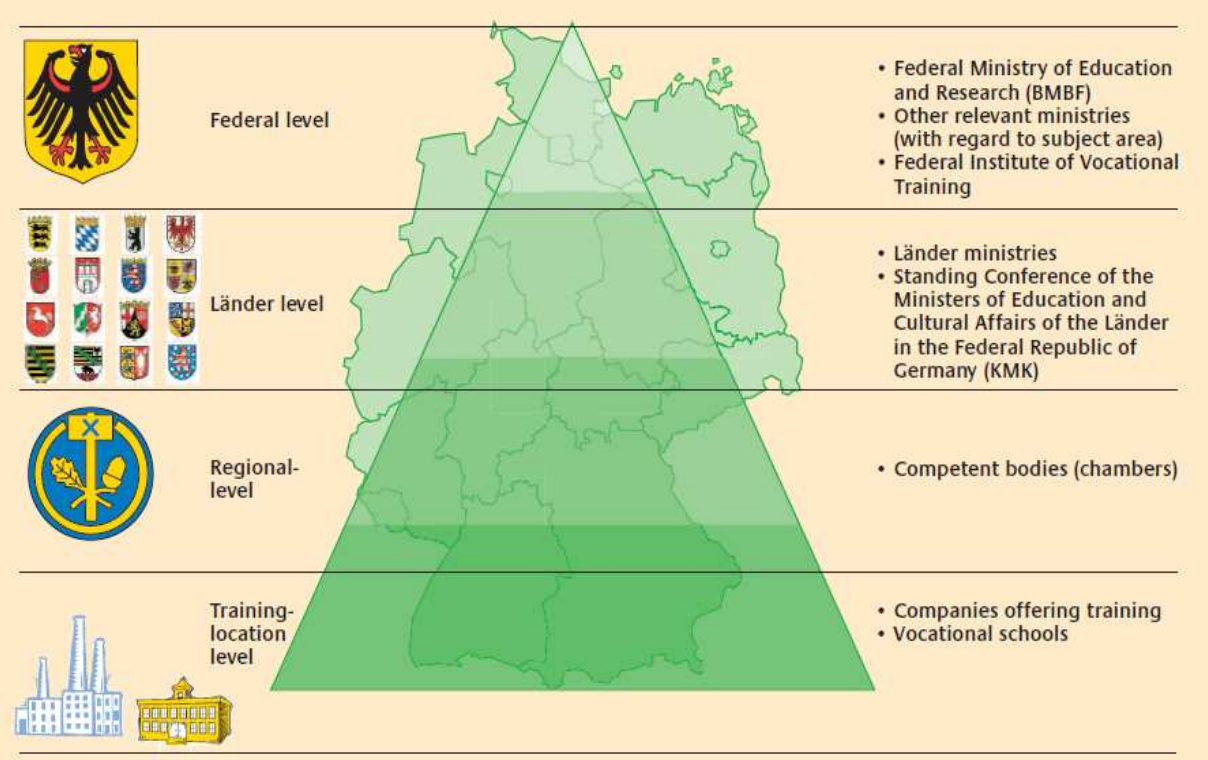
(Source: Cedefop VET in Germany (2007), p. 19)

Another important core actor at the national level is the Federal Institute for Vocational Education and Training (BiBB). It fulfils service, consultancy and research functions to the national government and vocational training provider. In addition it supports the consensus building between all parties involved in VET. Beyond, the four-party Main Board advises the Federal Government on fundamental issues of in-company vocational training.[11]

An essential part for the German VET system is also the social dialogue between the different levels of the government and the regional and local level. The responsibilities of the social partners[12] on the national level are the participation in developing training programmes and standards, recommendations in all areas and aspects of VET. On the regional level they formulate recommendations in all areas of VET in respect of coordination between school and enterprise on the *Land* level while the competent bodies give advice, a supervision of training provision in enterprises, assume the implementation of examinations as well as awarding of qualifications. On the sectoral level they lead negotiations on provision of training places and collective agreements on remuneration of training. Finally they plan and implement in-company training on the enterprise level.[13]

[11] CEDEFOP. VET in Germany (2007), p. 39.
[12] Include the chambers of industry and commerce for the industrial sector, the chambers of crafts, the appropriate professional boards for the liberal professions, agriculture, public administrations, health services, and over 900 inter-company training venues and various federal and Land authorities.
[13] S. Cedefop, VET in Germany (2007), p. 20.

Fig. 2: Responsibilities within the German dual system



(Source: Federal Ministry of Education and Research (BMBF): Germany's Vocational Education at a glance 2003, p.19)

1.2.1. Legislation for IVET

The system of German IVET is founded on a legal system with differing levels and specifications of regulations. The important basis is the free choice and practice of an occupation as provided for in the Constitution[14] and the Federal Government competence for legislation for out-of-school vocational training.[15]
The Vocational Education and Training Act (*Berufsbildungsgesetz (BBiG, 1969*) is of crucial importance and was reformed in 2005 (*Berufsbildungsreformgesetz*) to improve training opportunities. Further important legislation for the organization of the VET system is the Regulation of Craft Trade (*Handwerksordnung* (*HwO*)), the Ordinance on Trainer Aptitude (*Ausbilder-Eignungsverordnung* (*AEVO*)), the Protection of young people in employment Act (*Jugendarbeitsschutzgesetz* (*JArbSchG*)) as well as the Work Council Constitution Act (*Bertriebsverfassungsgesetz* (*BetrVG*)).[16]

1.3. The federal training directives and the framework curricula

1.3.1. The federal training directive[17]

For in-company training, the acquired vocational competences are laid down in a training directive. For teaching in vocational schools, for every recognized training occupation a framework curriculum is drawn up in line with the training directive.

[14] Grundgesetz: Art. 12 (1).
[15] Art. 72 (1), (2) and Art. 74 (1).
[16] Cedefop. VET in Germany (2007), p. 38-39.
[17] For further reading see BiBB report: Vocational Training regulations and the process behind them, 2011.

The legal bases for the promulgation of training directives are Section 25 (1) (BBiG) and Section 25 (1) (HwO). These sections provide that the Federal Ministry of Economics and Technology (BMWi) or the otherwise competent ministry, by agreement with the Federal Ministry of Education and Research (BMBF), may publicly recognize training occupations via statutory instrument and may issue training directives for training occupations. The training directives are prepared by the BIBB and discussed with the Länder.[18]

1.3.2. The framework curricula and Länder curricula

The framework curricula are decided by the Standing Conference of Ministers of Education and Cultural Affairs (s. Fig. 1). Along with the federal training directives the curriculum governs objectives and contents for each profession of the vocational education at vocational schools. One curriculum of an apprenticeship programme includes different learning fields with different job specific content. A learning field consists of time allocations, target setting and contents but it contains no methodological guidelines for teaching. The decisions of the KMK are recommendations and only become legally binding when passed by individual Länder parliaments. Each Land has a committee for vocational training with an equal representation of employers, employees and the highest Land authority which advise the Land government on vocational training issues in school. So the curricula for general education at vocational schools are essentially developed by the individual Länder.

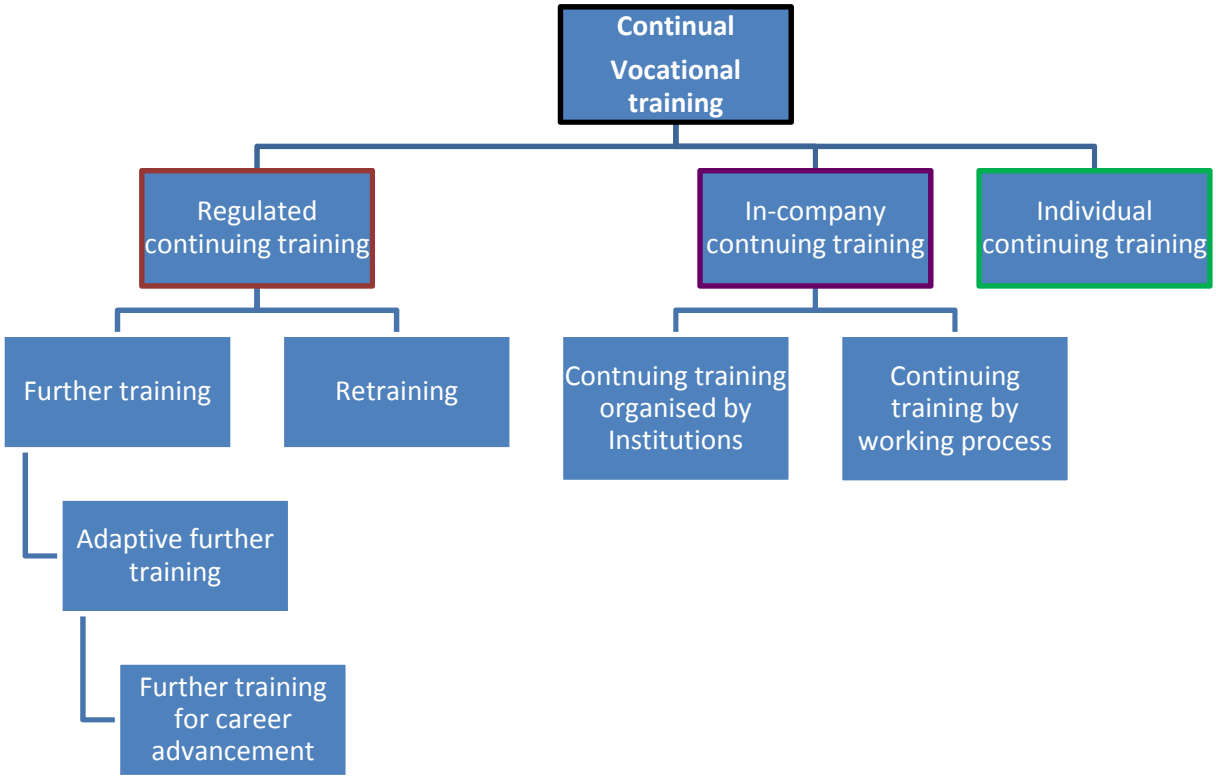
1.4. CVET

1.1.1 Legislation and Institutions

The Federal Employment Agency (*Bundesagentur für Arbeit*) holds the responsibility for the promotion of vocational further education under the Federal Social Security Code (*SGB III*).[19] Important legislation besides the mentioned in IVET is the Career Advancement Training Promotion Act (*Aufstiegsfortbildungsförderungsgesetz* (*AFBG*) which provides a comprehensive nationwide means for financing CVET. Further legislation is the Distance Learning Courses Act (*Fernunterrichtsschutzgesetz* (*FernUSG*)) and the Directive on Recognition and Licensing of Continuing Training (*Anerkennungs- und Zulassungsordnung – Weiterbildung* (*AZWV*)). In general the CVET is an independent education sector whose legislation guarantees a diverse range of institutions maintained by a variety of organisations and lays down a state approval procedure for them.[20]

[18] Cedefop. VET in Germany (2007), p. 19.
[19] German Employment Promotion Law.
[20] Hippach-Schneider, Ute/Toth, Bernadette: VET in Europa. Country report Germany, ReferNet, October 2010, p. 42.

Fig. 3: Continuing VET in Germany



(Source: Cedefop. VET in Germany (2007), p. 34)

A completed course of vocational training or appropriate vocational experience, or both, is normally required for further vocational training. In the context of further vocational training, a distinction must be made between further training making advancement in the occupation possible (further training for advancement) and further training aimed at maintaining or extending vocational knowledge, skills and competences, or updating them in line with technical or economic developments (adaptive further training). Well-ordered further vocational training and retraining that is standardised across Germany is based on statutory regulations. In these, the content, objective, examination requirements, conducting of examinations, conditions for authorisation and designation of the qualification (master, business administrator, graduate in business administration, skilled worker) are regulated by the Federal Ministry of Education and Research by agreement with the competent ministries and following consultation with the Standing Committee of the Federal Institute for Vocational Education and Training (BIBB). Many bodies undertake further vocational training measures, including enterprises, Chambers, employers' and trade associations, employee organisations and vocational schools. At Federal level there are currently some 200 such qualifications, approximately 170 of them being 'master' qualifications.[21]

[21] Cedefop. VET in Germany (2007), p. 35.

2. National apprenticeship system for industrial mechanic and electronic technician

2.1. The training directives and framework curricula

In general, the structure of a training directive is nearly equal for every apprenticeship. The industrial mechanic belongs to the industrial metal sector. The latest version of the associated training directive was published in the Federal Law Gazette No. 35 (*Bundesgesetzblatt*) in July 23th in 2007. The directive contains guidelines for four other apprenticeships in this field. In general it consists of three parts. The first part contains the common rules for every occupation (e.g. duration of training, training plan, exam conditions[22]) while the second part includes specific requirements for the respective apprenticeship (e.g. qualifications, examination structure and content). In the appendix the training plan for each apprenticeship of this field is given which contains the job related professional qualifications as well as the time schedule with specific content for the whole vocational training. The electronic technician belongs to the industrial electrical sector. The structure of the training directive (Federal Law Gazette No. 36, July 23th 2007) is equal, but it contains rules for even five other occupations in the respective field.

The framework curriculum for the industrial mechanic consists of 15 fields of learning which are as follows: Crafting and maintenance of components; installation of control systems; planning, realisation and maintenance of technical systems and equipment; monitoring of product and production quality. The framework curriculum of the electronic technician consists of 13 fields and covers the following topics: Planning, realisation, analysis, functional check and maintenance of electronic and electrical systems and equipment.

2.2. Green skills in the training directive and framework curricula

In general, the training directive (*Ausbildungsordnung*) provides for basic qualifications in environmental education to be incorporated into every dual education. Even though environmental issues are often only discussed to a limited extent, informative course units on waste/recycling, working safely with hazardous materials and energy issues have been added. Additionally, special elements are included such as environment days, excursions or projects to raise environmental awareness. Due to new environmental legislation and environmental technologies, a greater range of environmental issues besides those covered in basic qualifications are now required within initial vocational training. Existing initial trainings have therefore either been extended or new occupations developed, to cover these emerging environmental themes. However, mostly existing occupations are being modified and refined to incorporate new environmental training requirements, rather than completely new occupations being established.[23]

Concerning the industrial mechanic and electronic technician, both curricula include no concrete formulated learning fields with a focus of environmental protection or occupational health and safety. Both issues are incorporated to the relevant job-specific topics. There are more general instructions and an educational commitment with vocational schools. They have to advising the apprentices of environmental threats, accident risks in occupational and private life and that possibilities exist to

[22] Consists of a theoretical and practical part.
[23] CEDEFOP. Skills for green jobs. Country report Germany 2010, p. 25.

avoid, prevent and minimise such risks. In addition there are preliminary remarks concerning the observation of rules and regulations for environmental protection and health and safety as well as negative effects related to work.

2.3. Green Skills in CVET

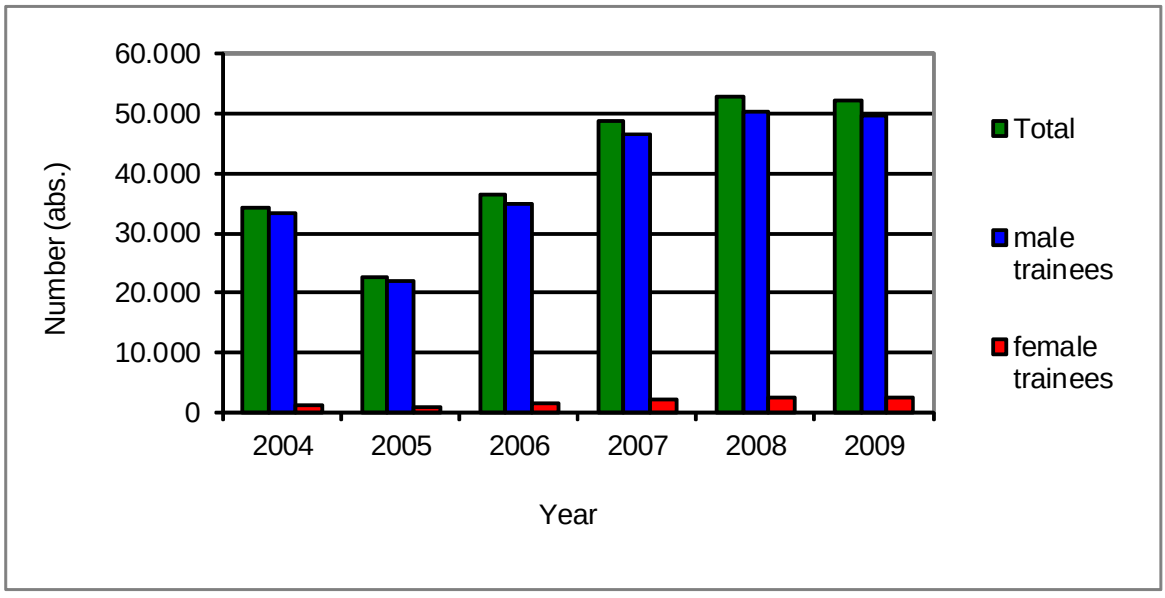
Environmental protection has been included in existing continuing vocational training over the last ten to 15 years, mostly due to the continuing vocational training directive (*Fortbildungsordnung*) being renewed. This has lead to a huge proportion of qualifications integrating environmental protection issues. Integrated updates comprise environmental legislation, knowledge on the consequences of environmental protection measures for firms, recycling possibilities, and ways to control air and water pollution. Pursuing a continuing vocational training course provides trainees with the opportunity to gradually build up their training competencies and receive additional specialist certificates or higher degrees which will enable them to develop in their chosen vocation.[24]

2.4. Statistics

2.4.1. Industrial mechanic

Figure 3 shows that the number of trainees has increased steadily since 2005 with the end of the economic crisis.

Fig. 4: Number of trainees in the course of training by gender

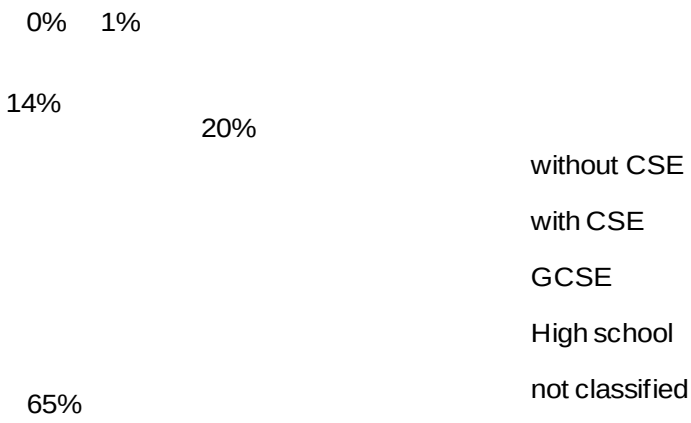


(Source: BiBB, own representation)

In 2008 the number of 50,000 trainees has been exceeded for the first time. Among 2004 and 2009 an increase of 34.2% is to be stated. During this time the proportion of female trainees has doubled (+52%).
Figure 4 shows that well over half of the trainees have a secondary school degree, while 22% have a CSE degree. Furthermore 12% have attained an university or a technical college entrance qualification.

[24] CEDEFOP. Skills for green jobs. Country report Germany 2010, p. 26.

Fig. 5: Apprentices with newly concluded training contract in 2010 after leaving school

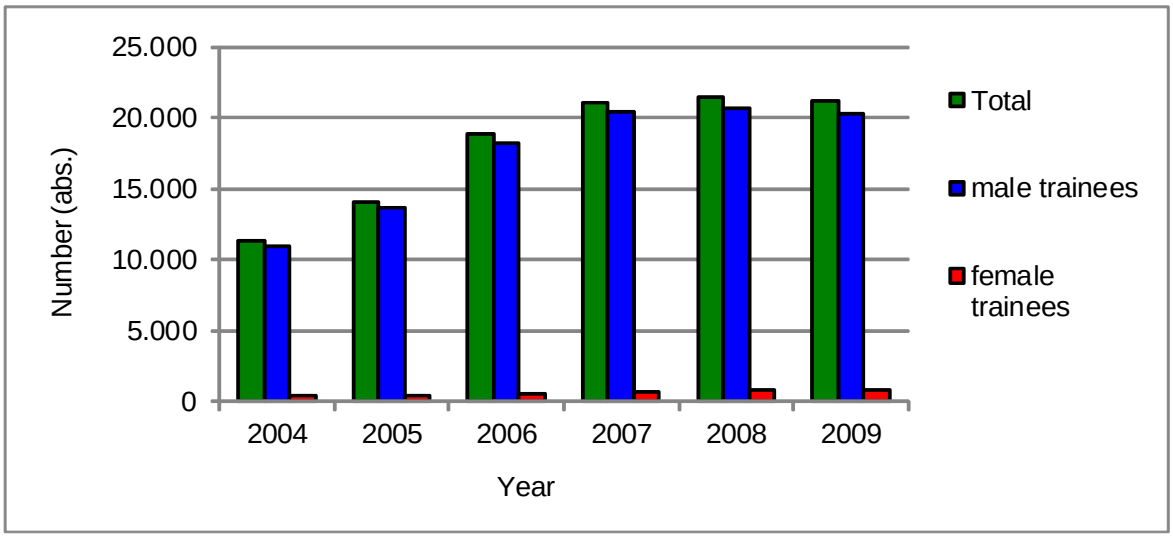


(Source: BiBB, own representation)

2.4.2. Electronic for industrial engineering

In Germany electronics of industrial engineering are made considerably less than industrial mechanics (s. **Fehler! Verweisquelle konnte nicht gefunden werden.**). But overall the number of electronic trainees increased in contrast to the industrial mechanics during the last five years (+12,1%, in total +46,3%).

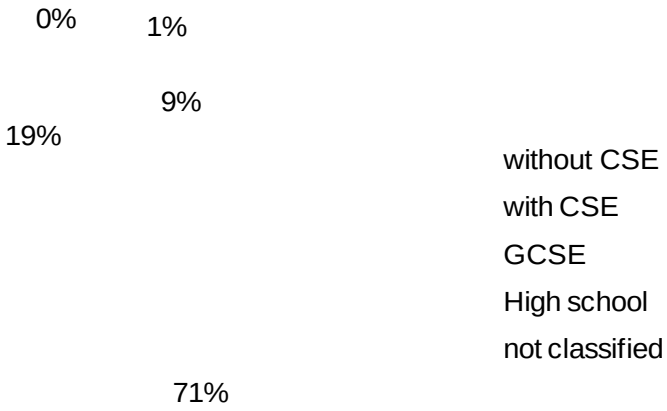
Fig. 6: Number of trainees 2004 to 2009 in the course of training by gender



(Source: BiBB, own representation)

It is true that the growth of female trainees is somewhat lower in the last five years (+49.7%), but this is to be assessed as very positive development for the training course. Regarding to the qualifications of trainees most are predominantly students with secondary school certificate (71%), followed by high school graduates (A-Levels, 18%). Thus in this course trainees have significantly less a CSE certificate (9%) than the industrial mechanics (22%).

Fig. 7: Apprentices with newly concluded training contract in 2010 after leaving school



(Source: BiBB, own representation)

3. National ‚green skills' and policy initiatives - influence on VET

3.1. General Overview

In the past five years different developments (e.g. shortage of skilled workers, demographic changes, scarcity of resources) led to a upcoming sensitization in German politics concerning environmental and health issues. Since 2006 the Federal Environment Ministry has put the most important questions about education and training in renewable energy sources in a series of expert meetings (Do Germany need a renewable own training career? What content should be taught to those who want to make a "renewable teaching"? And how will they be anchored in the training directives and - even more important - inside the minds of educators and trainers?).[25]

3.2. Policy and Programmes

In 2004 the BiBB published the report 'Environmental education for sustainable development in vocational education and training. Supply structures of German qualification services and concepts for international markets'. It provides an overview of present concepts in the country as well as experiences and offers. Moreover it deliver a framework for the transfer.

In 2006 the Federal Environment Ministry started an educational initiative entitled 'Environment creates perspectives' in association with firms from the environmental technologies/renewable energy sectors. The Federal Ministry of Education and Research (BMBF), the Federal Institute for Vocational Training (BIBB) and the German Chamber of Commerce (DIHK) are also participating in the initiative. As a result 6,000 additional apprenticeships were created in 2009. The initiative aims to identify the required apprenticeship trades, skills and competencies required by the environmental sector. One part of the initiative is the JOBSTARTER programme

[25] BMU: Qualification in the field of renewable energies, Link: http://www.bmu.de/erneuerbare_energien/arbeit_und_ausbildung/doc/42760.php.

which aims to attract firms which are interested in training staff. Such firms could therefore offer apprenticeships to young people.[26]

Fig. 8: Summary of policy initiated programmes

Programme	Initiator	Targets
Environment creates perspectives	BMU, BMBF, DIHK, BIBB	In 2009, 6.000 additional apprenticeships were created in the field of environmental technologies/ renewable engery
Pilot project for CVT	BMU, DGB	Increase employees' and work councils' awareness of resource efficiency in optional and production processes
Information brochure, IVT – environmental technicians	BMU, DIHK	Improvement of occupations' image, larger number of apprentices
CVT in forestry	BIBB	Promotion of young scientists and engineers in the field of bionics
DAAD – studying and researching sustainability	BMBF	Promotion of education and research to create solutions and competences for sustainable production of biogenetic resources
Powerado and Powerado Plus	BMU	Promotion of new ways to communicate renewable energy within education
German Centre for Biomass Research	Fed. Government	Promotion of research in bio energy
Research in Lithium Ion Batteries	Fed. Government	Promotion of research in energy storage

(Source: KIBB, Skills for green jobs. Country report Germany 2010, p. 24-25)

4. WP3 – Results of the workshops

4.1. School and company perspective

For the vocational schools and companies the training directives and the framework curricula build the basis for the vocational training. The schools are organized systematically through learning fields (s. chapter 2.1). The principle of integrated action forms the basis for teaching and learning by creating concrete learning situations. Concerning the professional competences, trainees of both apprenticeship programmes have to have a gift for manual work, should be talented in sciences and have a verbal ability. Concerning the soft skills they have to be team players, willing to learn (e.g. additional qualifications), have to be clever and punctual. But overall true potential can only be recognized over time.

Regarding to environmental policies, the first attempts to integrate training initiatives on environmental issues took already place in 1982. But these had no major effect on

[26] CEDEFOP: Skills for green jobs. Country report Germany (2010), p. 23.

the staff or company structures at TKSE. From the school's perspective the relevance of green skills and the general awareness of daily and occupational life should be shown to the trainees. Especially with a scope to sustainability and further thinking to answer the central questions how trainees can improve their working actions. This could be accomplished by different tasks like evaluating a life cycle assessment (LCA) and so on. As important topics for trainees emissions, resources, water and waste were mentioned. Further, the exercises in schools and learning process should be action-orientated and with an environmental context. The trainees should ask themselves what they can do about different environmental issues in a practical way. Therefore, trainees need to be sensitized and empowered. Thus, the rise of learning motivation needs reputation and a context of personal benefits (e.g. monetary effects by saving energy). Referring to the VET exams there are five questions concerning environment and sustainability obligatory.

4.2. Trainees

From the trainee perspective applied learning is more effective by far. In general there are hardly any environmental issues taught at school. Moreover they criticize the worse or even not existing cooperation between school and company. The main problem is that they are confronted with "too many empty phrases" while concrete examples are missing. The trainees demand for more 'learning by doing' and that they have the possibility to learn from mistakes. In addition a lot of issues are treated superficially.

On the topic side especially hazardous materials, particulates and waste are essential for daily work while energy, emissions and resources are of less importance. The electronic technicians want to have more focus on frequency converter, control engineering, the treatment of oils and hydraulic systems. The industrial mechanics would like to have a deeper insight into gear box and clutches. In their opinion environmental awareness is mainly dependent on personal background and secondary school. On the whole nearly every trainee wants to have such additional qualifications (e.g. master degree).

4.3. Results for WP4 and the training module

The focus of the workshops was primarily the question what exactly environmental consciousness is and how it can be produced at best. Therefore basic criteria are necessary and need to be formulated. The same applies to Green skills to have reliable guidelines. Overall the prior education is crucial, but the training requires a practical placement at the school and creating a personal reference for the trainees. The latter have therefore called for intensified practical learning methods to achieve a measureable learning effect. So this is an important starting point for the construction of the module. Therefore already existing exercises and projects on environment should be collected of the actors involved (including teachers, trainers) and if necessary to create new exercises. This not only enables better learning opportunities, but may also promote the rather weak cooperation between vocational schools and companies. It should be remembered that the important issues for the respective occupations are less emissions, resources or energy, but hazardous materials, particulates and waste.