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Implementation – Germany

With the ET-2020 strategy the European Union aims at increasing energy efficiency and reducing CO₂-emissions. Therefore, building technology has to consider buildings to be complex, interconnected, technical systems. During construction, installation, customization and operation systemic aspects have to be considered that have only partly been covered by qualifications or training occupations in the field metal technology, electrical and constructional engineering and installation technology so far. In Germany the qualification Building Service Engineering is allocated in the field of further vocational training at Technical Colleges. It aims at the integrated application of building technology, energy management and business and personnel management.

Further vocational training at technical colleges in Germany: The term further training is used comprehensively in the whole area of further vocational training (updating and further career training). It also encompasses career training measures that are defined as vocational training measures (according to Vocational Training Act and Craftscodes) in Germany. Technical colleges are schools that require the completion of a vocational training or corresponding job experience. They aim at profound vocational training and support the acquisition of general knowledge. Full-time courses last regularly at least one year, part-time courses respectively longer. To some extent there is the opportunity to gain the university for applied sciences entrance qualification and/or an advanced technical certificate. Technical colleges (together with vocational colleges, technical schools and technical secondary schools) are commonly referred to under the general term of college of further education. The students learn to manage complex tasks independently, to make decisions, to plan their realisation, to conduct and to reflect them, to be responsibly active in task and project oriented teams and to take executive functions. The world of work is characterized by frequent changes in the fields of production, management and service. Therefore, the technical colleges have to react fast and flexibly to new qualification requirements. This is possible with the help of curricular basics that enable work process oriented training.²⁵

The qualifications of technical colleges are acknowledged as a requirement for an entry in the register of crafts and enable the graduates to establish their own company. (Decision of the State-Federal-Committee for Craft Law for the execution of the Crafts Ordinance, November 21, 2000 and the modification of the act of acknowledging examinations for the entry in the register of craft and for master craftsman examination, November 2, 1982, §1)

Qualification requirements of Building Service Engineering: On the basis of the framework agreement for technical colleges in Germany (2011) a curriculum has been developed. It relies on the experience of teachers in North Rhine-Westphalia and analysed study programs of universities and universities for applied sciences and evaluated job vacancies on the labour market. The learning fields of the curriculum encompass energy efficient building technology, electrical operating technology, safety technology, building automation, company organisation and energy management. Against this background goals and contents have been formulated:

State certified technicians in the occupational field of Building Service Engineering are professionally and personally qualified to design, organise and implement customer acquisition, service and advice. Besides products and services they also consider technological, economical and ecological selection criteria. They are involved in the processes of human resource management via internal training measures.

During the stages of planning and development of installations of Building Service Engineering the technicians identify the planning basics, make a system and component selection, define the dimensioning and submit quotations and contract specifications. They make technological decisions according to customer requirements and in compliance with national and European legal requirements, particularly with regard to realize sustainable measures for a considerate handling of energy and resources. They

project, plan and calculate installations and systems of electrical, mechanical and IT building technology

supervise and control the construction, the assembling and the operation of the installations

are responsible for technical customer service, sales and training measures

advise customers (particularly architects), investors, public and private building owners and provide advisory services in the field of Facility Management

work in planning and engineering companies, installation companies, local and national administrations or as service provider, consulting expert or advisor. They can also be employed in public utility companies, at operators of technical building systems and at manufacturers of Building Service Engineering

State certified technicians in the occupational field of Building Service Engineering are actively involved in operational business processes. Furthermore, they are involved in the development and realisation of quality management systems and carry out tasks of Facility Management.

Adjustment requirement of the curricula: In the IT:BSE project work process oriented competences in the respective occupational fields on the basis of the VQTS model were described by a consortium of multinational partners. Herewith a basis to review and revise existing national and school-specific curricula was established. European norms for energy management and associated services (EN 16001-2008) and essentials of business and human resources management have been taken into consideration.

Building systems encompass the entirety of all technical components and processes of building systems during the stages of planning, construction, operation and dismantling of a building. The deducing vocational work processes read as follows (see 2.1.3):

assembling and dismantling building systems or their components

maintaining (according to EN 13306) building systems or their components,

taking building systems or their components into operation

supervising and optimising processes of building systems with the help of automated systems

designing (processes of) building systems or their (sub-)components

identifying, realizing and checking legal requirements for the operation of a building system (operator responsibility)

cost monitoring and controlling,

marketing,

human resource management.26

In the future it has to be considered on a national level, whether the occupational field Building Service Engineering should be extended with respect to the occupational field of Energy Management or whether it should be renamed. A new occupational field that is comparable all over Europe could be initiated by the IT:BSE Matrix.

It is very difficult to compare the understanding and the comparability of occupational qualifications in Europe on the basis of qualification descriptions, training periods, learning venues and entry qualifications. By using ECVET-instruments for both training companies and trainees the mobility and the recognition of required qualifications are significantly facilitated. During the preliminary stages of a mobility the partner institutions face the task to agree on a common language and common terms. The IT:BSE Matrix facilitates this communication agreement and creates the prerequisite for the conduction and the evaluation of the internship abroad.