



Mechatronics on the move

Learning outcomes approaches in Europe:
Framework conditions and selected practice



Content of the brochure

Edition notice

Mechatronics on the move

Learning outcomes approaches in Europe:
Framework conditions and selected practice

Editor (V.i.S.d.P): Prof. Dr. Eckart Severing
Forschungsinstitut Betriebliche Bildung (f-bb) gGmbH/
Research Institute for Vocational Education and Training
gGmbH
Rollnerstraße 14, D-90408 Nürnberg
www.f-bb.de
September 2014

Project consortium:

3s research laboratory GmbH, Vienna, Austria
CIBC (Centre Interinstitutionnel de Bilan de Compétences)
Bourgogne Sud, Chalon-sur-Saône, France
Institute for Employment Research, University of Warwick,
Coventry, UK/England
Towarzystwo Naukowe Organizacji i Kierownictwa Oddział w
Gdańsku, Gdańsk Poland
Ecap Consulenze srl, Zurich, Switzerland

Funding:

The brochure was developed in the project “Quality by Units”, which has been funded with support from the European Commission within the framework of the Leonardo da Vinci Programme. This publication reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

All rights to this brochure including all or any of its parts are reserved. Any unauthorised use outside the narrow limits laid down by the Urheberrechtsgesetz (Law on copyright) without approval by f-bb is unlawful and liable for prosecution. This applies in particular to reproduction, processing and dissemination in any form (in electronic systems, print, photo copy or other means of dissemination) without prior written consent by the editor.

Quality assurance in ECVET mobility 3

I. Learning outcomes approaches in Europe: Framework conditions and selected practice

- Curriculum design and description (of units) of learning outcomes 6
 - Are learning outcomes structured in units? 6
 - How are learning outcomes described? 8
 - Who updates or develops learning outcomes? 10
- Assessment (of units) of learning outcomes 12
 - What is defined in the curricula? 12
 - When and how are learning outcomes assessed? 14
 - Which tasks are applied? 16
 - Where do exams take place? 18
 - Who are the examiners? 20

II. Quality standards and recommendations

 22

Glossary 24

Dates and Information 25

Partner 26

Quality assurance in ECVET mobility

Learners, who spend part of their training abroad, acquire valuable skills and competences for their future profession. Prior to the mobility is the decision, in which country and in which partner institution the mobility stay will be held and what learning achievements will be acquired. Given the variety of training programmes and associated qualifications in Europe in vocational training in mechatronics, this decision requires a thorough preparation.

In order to facilitate mobility in initial vocational education and training, ECVET (European Credit System for Vocational Education and Training) was introduced in 2009. ECVET makes it easier to describe the parts of a qualification that the learner will acquire during her/his mobility period in a comprehensible way. ECVET foresees the description and structure of qualifications in terms of learning outcomes or units of learning outcomes consisting of a coherent set of knowledge, skills and competence. Thereby, the use of the (units of) learning outcomes as an organizational principle in vocational education and training can contribute to a higher quality in VET.

Even though the development of ECVET instruments and their implementation in European countries has reached an advanced stage, the practical application of ECVET is at different stages. This brochure provides an insight for teachers and trainers in school or companies, learners and pedagogical staff into learning outcomes approaches in the field of mechatronics in different vocational training systems, exemplarily in Austria, Germany, France, Poland and the United Kingdom/England. Furthermore in this brochure standards are defined that have been identified to enhance the quality in the implementation of ECVET.



This brochure consists of two parts:

1. Overview of the status quo:

The preparation of a mobility stay could start with the research about VET systems, programmes and associated qualifications. This helps to understand the framework conditions in which the stay abroad will be held. To better understand the framework, it is also important to know the national competent bodies that define learning outcomes and assessment modalities. Are learning outcomes already structured in units? Where will the assessment be held? Which tasks are applied? The information regarding your questions is answered in the tables on the left-hand side. It provides an overview of the status quo of the implementation of ECVET in vocational training in mechatronics in the different countries.

2. Selected practice, quality standards and recommendations:

Quality standards are suggested to support the definition of learning outcomes to be used in the mechatronics sector for the training abroad and the organization of assessment, if guiding principles are not already in place in the partner countries. They describe principles that have been identified to enhance the quality in the implementation of ECVET and are often already part of the national regulations in at least one educational system focused in this brochure. Selected examples that illustrate these standards in practice are presented on the right-hand side of the brochure.

How to use this brochure:

1. Choose a question you would like answered or a country you seek information about. The questions are structured along two main elements:

- Curriculum design and description (of units) of learning outcomes: Are learning outcomes structured in units? How are learning outcomes described? Who updates existing or develops new learning outcomes?
- Assessment (of units) of learning outcomes: What is defined in the curricula? When and how are learning outcomes assessed? Which tasks are applied? Where do exams take place? Who are the examiners?

2. The information regarding your question is answered for countries representing different educational approaches (Austria, Germany, France, Poland, and UK/England) in the table on the left-hand side. It provides an insight into the framework conditions of future mobility stays.

3. To get a closer look at the approaches, selected practices in the countries are presented on the right-hand side. They refer to a set of standards and recommendations to support the design of learning outcomes to be used in the mechatronics sector for the training abroad and the organization of assessment.

I. Learning outcomes approaches in Europe: Framework conditions and selected practice

Vocational education and training in the mechatronics sector covers several qualification pathways which are organized in different learning venues. Depending on the degree of the responsibility of company and school in vocational training four types are distinguished for the mechatronics sector:

Type I – dual training (Germany and Austria):

Training takes place in a company (three or four days per week) and part-time in vocational schools (one or two days a week). Company-based training is particularly practice-oriented i.e. it provides apprentices with job-specific skills and competences. The apprentice is contractually linked to the employer and receives remuneration (wage or allowance). The employer assumes responsibility for providing the trainee with training leading to a specific occupation (source: Cedefop 2004).

Type II – alternating training (Poland):

Education or training can take place in alternating periods in a school or training centre and in the workplace. Learning in the mechatronics sector is mainly school-based, however, the Polish system of education is currently under re-construction and there are planned efforts to re-enter a dual system with practice-oriented learning in companies.

Type III – school-based training (France):

Learning is mainly school-based, however the level of practical training provided in a company is in occupations in the mechatronics field relatively high for the French context. Learners usually gain practical experience during internships. Their duration can vary from 3 to 12 months during the courses of study.

Type IV – sub-degree higher education with a much stronger practical orientation than most undergraduate degree programmes (United Kingdom/England):

Entry to mechatronics fields in the UK is just starting to be delivered through higher level technician apprenticeships (EQF level 4), but until now the more usual route was through sub-degree higher education provision (EQF level 5), which was intended to develop practical engineering skills through projects and enrichment activities, as well as the requisite underpinning knowledge in order to operate as an advanced practitioner.

Development: Are learning outcomes structured in units?



Learning outcomes are formulated in a holistic way and are laid down as knowledge, skills and competence in the training regulation. Here, they are not unitized. In Germany curricula for the school-based element of dual training are defined in units of learning outcomes (so-called fields of learning). In Austria school curricula are defined in terms of subjects.



Vocational qualifications are unitized. Units of learning outcomes are structured as chunks of knowledge, skills and competence. They are grouped in general and transversal skills that are often called capacities. They are then subdivided into categories of specific professional competences (e.g. *realizing the maintenance interventions*). A holistic approach is preferred, integrating different types of knowledge, skills and sometimes attitudes/personal competences.



Within an occupation from one to three qualifications are singled out. A single qualification can be a component of more than one occupation. Each qualification contains learning outcomes that are common for all occupations (including personal and social competences), learning outcomes common for the occupations within the educational area and learning outcomes specific of the qualifications singled out within the occupation. That way it is possible to avoid repeating the same units when retraining or gaining additional qualifications in the occupations falling into a common area.



Nearly all vocational qualifications are unitized, with learning outcomes and assessment criteria specified for each unit. The qualifications are designed to assess occupational competence and learning outcomes provide an outline of what will be assessed. Units of learning outcomes comprise a set of criteria, which confirms what a learner must demonstrate to achieve a unit.

Selected Practice: A model description of the “mechatronic assembler” in units



Dividing occupations into **qualifications** makes the educational path flexible and allows the learner to supplement her/his qualifications so as to meet the market demand or her/his own ambitions. For instance, for the mechatronic assembler the following two **qualifications** have been identified:

- E.3. Assembling mechatronic devices and systems
- E.4. Operation of mechatronic devices and systems

A unit of learning outcomes is a component of a qualification for the mechatronic assembler, being a set of knowledge, professional skills, social and personal competences. The learning outcomes common for the occupations within an educational area, being the foundation for training in the occupation or a group of occupations, have been marked using a three-letter PKZ code, a capital letter indicating the assignment to the area of education and a lower-case letter differentiating particular outcomes within the area of education (see Fig. 1). That means that the E3 qualification provides the foundation for training in the occupations mechatronic assembler and mechatronic technician:

The connection between areas of vocational education and specific occupations within occupational groups allows for greater training flexibility, thus making it possible to adapt the education to the dynamic changes of the labour market needs. It is also possible to avoid repeating the same contents in the training process, a factor most important when it comes to retraining or gaining additional qualifications in the occupations falling into a common area.



Qualification		Occupation	Common outcomes
E.3.	Assembling mechatronic devices and systems	Mechatronic assembler	PKZ(E.a)
		Mechatronic technician	PKZ(M.a) PKZ(M.b)

Fig. 1: Common outcomes of an occupational area

This selected practice refers to standard 3: Ensure learning outcomes are user-friendly for different target groups – also in the matter of importance of teaching and learning. Detailed information on standards and recommendations can be found from page 22.

Development: How are learning outcomes described?



In Germany training in the training occupation “mechatronic fitter” is to impart the professional ability to act responsibly in private, social and vocational situations. Training regulations determine the competences which learners need to acquire. A recent recommendation by the board of the Federal Institute for Vocational Education and Training (BIBB) foresees that from 2015 competences are described in terms of learning outcomes and are structured according to typical working and business processes.

In Austria it is distinguished between general, occupation-related, social and personal competences.



Units of learning outcomes specify activities carried out (“*repository of professional activities*”) and observable actions evaluated on the basis of predefined performance indicators. Observable actions (e. g. realize maintenance intervention) are concretized in associated tasks (e. g. diagnose failures). For every task, the unit provides details on the assessment procedure: It defines a specific situation (e. g. equipment in failure), the actions necessary to solve the situation (e. g. locate the problem) and performance indicators (e. g. time of diagnosis).



Learning outcomes are a precise description of what the learner participating in the learning process knows, understands and is capable of doing not later than towards the end of a specific stage of education, having acquired the knowledge, professional skills and personal/social competences relevant for a given qualification.



Units of learning outcomes describe the skills and knowledge that a learner must be able to demonstrate to achieve the relevant unit or be awarded a qualification. Learning outcomes provide clear guidance of what will be assessed. In the UK’s VET system, learning outcomes are written in line with National Occupational Standards and in a way that is clear to all stakeholders, including training providers and their staff, students, examiners and employers. Each unit is assigned a level and credit value in order to facilitate transferability of learning.

Selected Practice: General training plan

Training in a recognized training occupation – such as mechatronic fitter – is to impart vocational competence (“Berufliche Handlungsfähigkeit”), which is the professional ability to act responsibly in private, social and vocational situations. This is mainly achieved by company-based training (three or four days per week) and part-time teaching in vocational schools (one or two days a week). The vocational skills, knowledge and competences are laid down in a training regulation the Federal Government issues for each recognized training occupation. They are summarized in a training occupation profile and – in more detail – in the general training plan (Fig. 2).

The training regulation contains as well the name of the occupation, duration of training and examination requirements. It is within the sphere of the Standing Conference of the Ministers of Education and Cultural Affairs (KMK) to issue framework curricula for the school-based element in accordance to each training regulation, structured along learning fields. Training regulations and curricula are the basis for training in the dual system.

Part of the training occupation profile	1. year	2. year	3./4. year
3: Health and safety at work	e. g. Ascertain health and safety risk in the workplace and adopt measures for the avoidance of this		
6: Plan and control work processes, check and evaluate work results	e. g. Stipulate stages of work in accordance with functional, technical production and business criteria	e. g. Make tools, machine tools, testing and measuring equipment and technical equipment ready for operational use, check and maintain such tools and equipment and initiate measures for the rectification of errors	
18: Test and adjust the functioning of mechatronic systems		e. g. Select measuring and test procedures and diagnostic systems, check electrical values and signals at interfaces	e. g. Evaluate and adjust actuators in accordance with technical safety aspects

Fig. 2: Extract of a general training plan (source: www2.bibb.de/tools/aab/ao/mechatroniker_ao_rlp_engl.pdf)

This selected practice refers to standard 1: Refer learning outcomes to typical occupational working and business processes. Detailed information on standards and recommendations can be found from page 22.

Development: Who updates or develops learning outcomes?



The adjustment of existing or introduction of new training regulations is a multi-stage process in which employers, social partners, federal and state authorities are involved. This involvement applies to the entire procedure, beginning with the joint development of a framework until the adoption of the training regulation. The composition of curricula development groups is regulated by law to ensure a balanced representation of different interests.



Units of learning outcomes are prepared by the professional consulting committees (CPC) composed of representatives from the central administration (state representatives from respective ministries), employers, trade unions and experts from the field of education and training. The technical work is done in smaller work groups, who are in charge of creating two documents: A list of professional activities and a certification repository with units of learning outcomes. Both parts form a qualification standard.



Stakeholders involved are

- directly related to vocational education: governing authorities, the National Centre of Support to Vocational and Continuing Education (*“Krajowy Ośrodek Wspierania Edukacji Zawodowej i Ustawicznej, KOWEziU”*), school headmasters, heads of practical training centres and continuing education centres (Polish abbr. CKP and CKU), teachers, students, participants/listeners and
- indirectly related to vocational education: employers, representatives of enterprises and representatives of labour market institutions.



Employers play a predominant role in the development of learning outcomes. Employer-defined National Occupational Standards (NOS) provide statements of outputs which are then translated into learning outcomes. Sector Skills Councils, in consultation with employers' representatives, are responsible for overseeing the development, review and approval of National Occupational Standards. Awarding organisations are registered by the Office of the Qualifications and Examinations Regulator (Ofqual) for the assessment, quality assurance and certification of vocational qualifications.

Selected Practice: Professional consulting committees



The adaption of existing and development of new curricula is done in professional consulting committees, which are established for every branch. They are responsible for the design and update of all qualification standards and thus learning outcomes. The composition of these committees is clearly regulated to ensure a balanced representation of different interests. VET diplomas in the field of mechatronics are created by the committee number 3 (sub-committee “Electrical engineering, electronics, automation and informatics”). A committee includes 40 members.

The technical work is done in work groups of about ten members. The work group reports regularly to the consulting committee about its progress and is responsible for the design or update of two documents that form a qualification standard:

- A list of professional activities with associated tasks and expected results, based on the outcomes expected from a professional in mechatronics and a
- certification repository with assessment details for each unit of learning outcome (data to be used and performance indicators). The presence of pedagogical experts is very important in the development process of the certification repository.

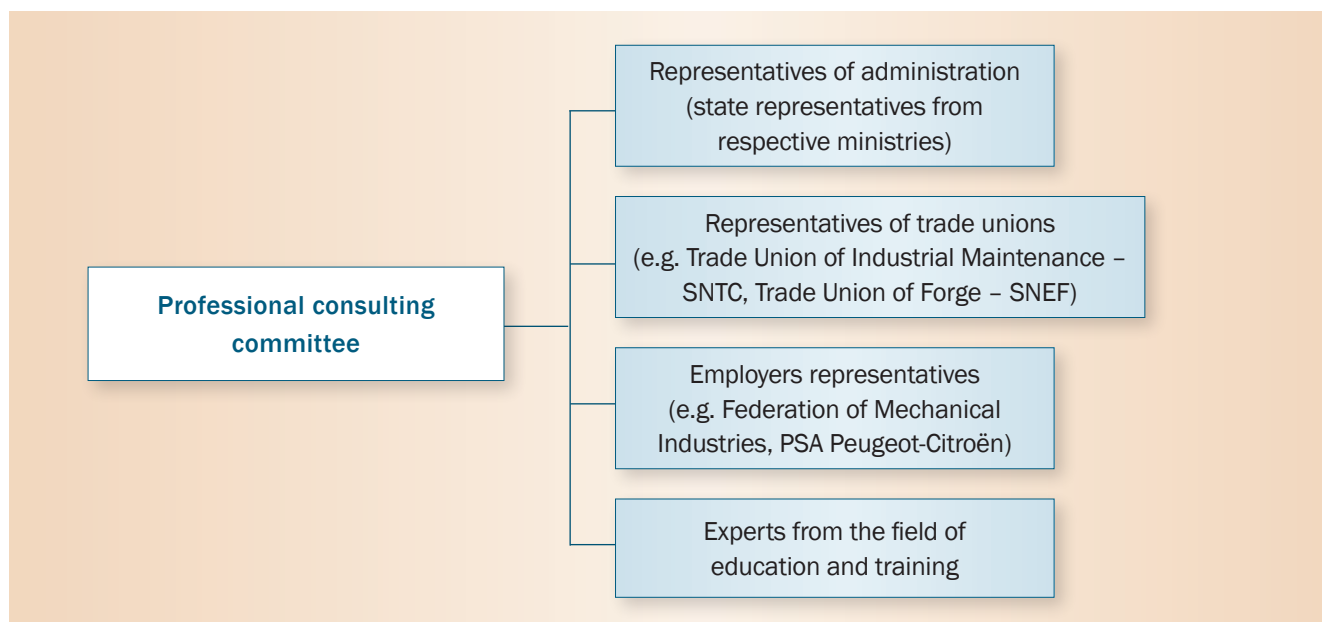


Fig. 3: Members of a professional consulting committee

This selected practice refers to standard 2: Define learning outcomes involving all relevant stakeholders. Detailed information on standards and recommendations can be found from page 22.

Assessment: What is defined in the curricula?



The training regulation contains the content, structure and duration of the apprenticeship-leave exam, defines the contribution of individual assessment areas to the overall result and the knowledge, skills and competences to be acquired by the trainee. The latter are summarized in an occupational competence profile (“Berufsprofil”), and – in more detail – in the general training plan. The school-based element of dual training focuses on theoretical and practical knowledge related to the occupation, general subjects such as economic and social studies and foreign languages.



A certification repository provides assessment details for each unit of learning outcome (“référentiel du diplôme”), certification modalities and organizational directives for the assessment process (e. g. timespan of assessment). General subjects are still very prevalent in assessment procedures, as the French VET system focuses on a holistic approach and stresses three aspects of formation – forming a human being, a citizen and an economic actor.



The conditions for education in mechatronics have been specified in the occupational core curriculum. The practical vocational training ends with the exams confirming vocational qualifications, held by District Examination Committee (OKE). Mandatory examination procedures are the structure of the exam (the written part, the practical part), dates of the exams and organization of the latter. Additional guidelines for effective implementation of a competence-based assessment approach in mechatronics are, however, non-existent.



A curriculum for a specific vocational education and training path is not prescribed. It is defined based on the learning path (initial VET, apprenticeships, etc.) and its aims. Once the curriculum has been outlined, awarding organisations seek to get qualifications approved by the Office of the Qualifications and Examinations Regulator (Ofqual).

Selected Practice: Examination principles in the core curriculum



The exam confirming occupational qualifications is a form of evaluation of the level in which the learner has mastered the knowledge, skills and competences regarding a specific qualification distinguished within the occupation. That means that each qualification (occupations within EQF levels 2 and 3 consist of mostly of one qualification only, occupations within EQF level 4 contain mostly of two or three qualifications) is evaluated separately. The condition to get a certificate/diploma is to pass all qualifications which form the occupation. The following **examination principles** are defined in the core curriculum:

- Each qualification is confirmed separately.
- Exams are held throughout the year.
- The written part of the exam can be held electronically (online) or using a hard copy document. This part is not standardized though there are detailed restrictions in regard to the supervising team.
- Vocational exams are made uniform regardless of the type of training. The practical part of the exam must be held at a District Examination Commission (OKE) accredited centre. This can be a school, an education centre or a work establishment. Responsible for the organization and performance of the exam is the Head of the Examination Centre (KOE). KOE appoints practical part supervising teams (ZNPC). The practical task is evaluated by the examiner immediately after completion of the practical part.
- According to the core curriculum personal and social competences as well as work organization in small teams are part of the assessment of each subject/module.



This selected practice refers to standard 4: Assessment and assessment results are comparable, independent from place of learning and assessment. Detailed information on standards and recommendations can be found from page 22.

Assessment: When and how are learning outcomes assessed?



Assessment procedures are not unit-related.

In Germany the so-called extended final examination in the mechatronics sector (“*Gestreckte Abschlussprüfung*”) consists of two parts: Part 1 (18 months into training) and part 2 (after 3,5 years at the end of training). The results of both parts count into the final grade.

In Austria results are assessed in one final exam. The methods used are similar: The exam in both countries consists of a practical part, expert discussions (“*Fachgespräch*”) and written assignments.



Formative assessment (“*contrôle en cours de formation*”) occurs mostly during work-based learning. It can take place at any time agreed between the teacher and the learner, for example when the latter is well enough prepared. The final exam is comprehensive and covers theoretical and practical knowledge and skills. Methods used range from simulated in-class situations to the evaluation of an activity report or of project assignments conducted in a company.



A vocational exam confirms a qualification singled out from the occupation. It can be held throughout the year on a date fixed by the head of the District Examination Committee (OKE) in agreement with the head of the Central Examination Committee (CKE). The exam includes a written part – a test composed of 40 multiple-choice tasks (60 minutes) and a practical part – a practical test including a single practical task (120 – 240 minutes).



Assessment procedures are unit-related and the results are continuously recorded. The decision of when and how to assess units of learning outcomes depends on the kind of learning outcomes (theoretical or practical), the qualification and the approach to assessment adopted. There is also flexibility in the choice of the assessment methods that will be most appropriate for the course and although these may include written examinations a range of options is available.

Selected Practice: Multiple methods for assessment in mechatronics training



Different assessment methods are used as formative (once or several times during the training) and summative (obtaining of the unit) evaluation.

- Specifically designed to evaluate the knowledge of the learner, **written exams** are traditionally an important part of the examination procedures.
- In an **oral examination** the learner is given a question with the supporting material (e. g. assembly drawing, technical instructions) and has between one or two hours in order to prepare the solution to the presented problem. Here are some fields of evaluation situations that can be used for this type of examination:
 - Identify indicators of availability and/or reliability and/or maintainability.
 - Identify the equipment and/or subassemblies or most penalizing components.
 - Propose areas for improvement.
 - Determine the costs of maintenance.
- Activities of learners in company during internships and their **activity report** are subject to an assessment by the company tutor and teaching staff.
- **Management and execution of a project** followed by an **oral form of thesis** allows for the evaluation of competences in the field of communication, project management, ability to work in a team, as well as in conception, implementation and testing of a mechatronic system. To evaluate personal and social competences of a learner evaluative sheets are filled in by the company tutor and teaching staff. They serve as a basis for the final grade:

Competences		- Evaluation +			
C3 Organize a work meeting	Prepare a meeting				
	Lead a meeting				
	Close a meeting				
C5 Present own work, the work of the team and transfer a knowledge	Prepare a presentation				
	Describe and explain own work				
	Advise others in the phase of the conception or realization				
C20 Use project management tools	Use the project management tools for the organization of group work				
	Fill in the project management tools and follow the progress				
	Ensure that milestones and deadlines are met				

Fig. 4: Example of an evaluation sheet

This selected practice refers to standard 5: Assess learning outcomes through multiple assessment methods. Detailed information on standards and recommendations can be found from page 22.

Assessment: Which tasks are applied?



In a performance check (AT) or a company assignment or work task (DE) the learner proves whether she/he is able to analyze and plan work tasks, obtain, evaluate alternative solutions taking into account operational procedures and responsibilities on site etc. The task includes expert discussions, where the learner proves her/his understanding of the process. The areas organization of work, functional analysis and – in Germany – economic and social studies are assessed in written assignments.



The emphasis is on written tasks (simulation of a situation) and on oral assessment in front of a jury composed by teachers and professionals from the field of mechatronics (defense of a project or work results). It is essential that the learner can demonstrate the ability to express and explain tasks. The learner's personal and social skills are evaluated on the basis of management and execution of a project ("*projet pluridisciplinaire à caractère professionnel*") that is defined in accordance with the requirements of the school and the resources of the employer.



The written test consists of tasks evaluating the knowledge and skills defined for the qualification in a given occupation and of tasks verifying broader knowledge and skills related to employment and economic activity. In a practical part the learner implements a project to develop specific work or, additionally, perform a job at an equipped examination station in accordance with the standards of the occupation. The District Examination Committees (OKEs) propose examination tasks, but the Central Examination Committee (CKE) selects and approves the examination tasks.



Exams are part of the assessment process, particularly in relation to evaluating academic competence and knowledge. Vocational competences are assessed against set criteria using methods and tasks such as observations, portfolios, interviews, written examinations, reports from experts and peers, videos, etc. These methods are chosen depending on the learning outcomes to be assessed and taking into account other factors such as time, funding and the human resources available.

Selected Practice: Company assignment



The final assessment part 2 in the end of training consists of a written assignment and a practical part. Within the practical part the training company can choose between a company assignment (set by the company and approved by the Audit Committee) or a work task (nationwide standardised task set by Chamber of Commerce and Industry).

Company assignments (option 1) are derived from real tasks from a specific area of work of the learner and are implemented during the regular operations flow in the company. They follow the principle of the **self-contained activity**, including the following steps:

1. Inform and plan:

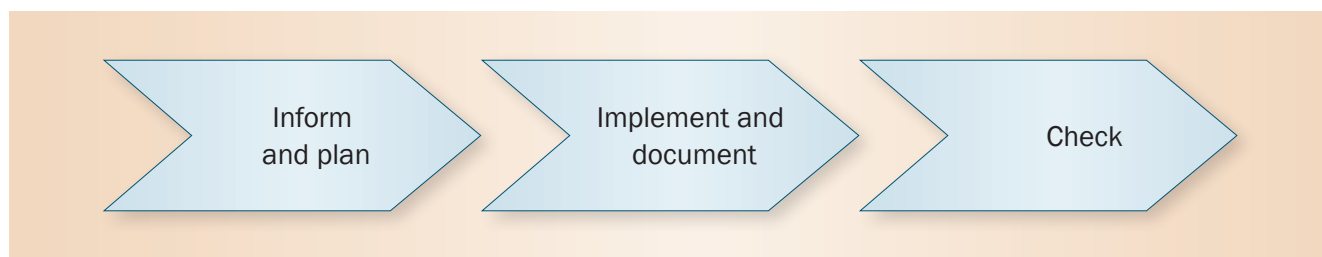
After the assignment has been introduced, the planned steps, time frames, materials and tools are laid down by the learner in a detailed work plan incl. time frames, material plan and tool plan.

2. Implement and document:

The assignment is then implemented according to the plan. In addition, all changes, problems and their solutions are documented. The documentation comprises the work plan, material and tool plan, a detailed description of the task (including economic, technical, organizational and time constraints), technical documents (e.g. functional description) and a progress report. The assignment includes an expert discussion between the learner and the audit committee.

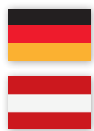
3. Check:

The assignment ends with the mechanical and electrical testing, commissioning and/or handover to the client. The results are documented in an inspection, testing and/or handover protocol.



This selected practice refers to standard 5: Assess learning outcomes through multiple assessment methods. Detailed information on standards and recommendations can be found from page 22.

Assessment: Where do exams take place?



In Germany, depending on which examination task is chosen (company assignment or work task), exams take place in the company or chamber. For the mechatronics sector learning outcomes are confirmed in the so-called extended final examination (“*Gestreckte Abschlussprüfung*”). It consists of two parts. The results of both parts count into the final grade. In Austria, exams are organized by the apprenticeship offices and take place at the chamber. The valuation is done in points and marks ranging from very well to insufficient.



Written exams take place at school. The oral exams are held in front of a jury composed by teachers and if possible one employer’s representative. It includes the presentation of a project conducted at the company. The estimations of company tutors are taken into account by the jury, but the jury has the decisive role in determining the final grade. Credit points are not used in French VET system. However, the relative importance of different units of learning outcomes is expressed in the system of coefficients and notes.



The exam confirming vocational qualifications can take place at schools, education centres or at the company, provided that the exam standards set by the relevant Examination Committee are met. The results of the written and practical exam are determined by the District Examination Committee (OKE). The cooperation of schools with employers is still considered unsatisfactory in training and assessment and in capital expenditures on the technical training facilities of the schools to the extent that would, as a result, satisfy the employers’ expectations.



Assessments may include written and/or oral examinations but also other assessment tasks depending on the kind of the learning outcomes, the qualification and the approach to assessment adopted. The context in which assessment takes place therefore depends on the assessment approach chosen as well as other factors such as time, funding and the human resources available. Ultimately, the learning outcomes (which are in turn based on National Occupational Standards) provide clear guidance of what will be assessed.

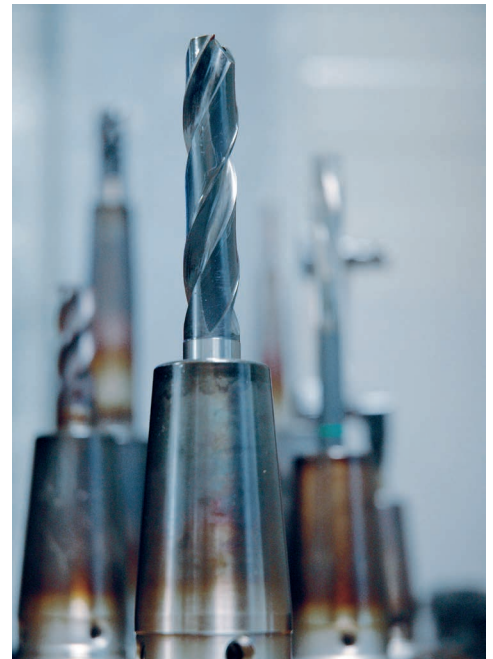
Selected Practice: Chambers assessing qualifications



In Austria, regional apprenticeship offices, located at the economic chambers, are responsible for the organization of the apprenticeship leave exam (LAP). LAP takes place in front of an examination committee, made up of a chairperson and stakeholders (employer and employee representatives). They have to be professional experts in the respective apprenticeship occupations and at least the chairperson has to be an authorized apprenticeship trainer. Persons involved in the training of the learner (e. g. the trainer in the company) are not allowed to be members of the committee.

In 2012 the “LAP-Clearingstelle” was established under the Federal Ministry of Science, Research and Economy (bmfwf). Some of its specific tasks include:

- check existing exam questions and examples for their relevance towards day-to-day job practice and their suitability for verifying the knowledge and skills necessary for exercising an occupation and to draw up new or updated questions and examples.
- design a training programme in order to prepare assessors for the conduct of examinations and to develop a special certificate (“certified LAP = final apprenticeship examination examiner”).
- examine the suitability and quality of current terms and conditions for conducting apprenticeship-leave examinations and to provide suggestions on how they could better be adapted to the relevant target groups, if required.



This selected practice refers to standard 6. Ensure the qualification of experts in charge of assessing learning outcomes. Detailed information on standards and recommendations can be found from page 22.

Assessment: Who are the examiners?



The final examination is taken by examination boards of the competent authorities (chambers), consisting of at least three members (representatives of employers, employees and part-time vocational schools). The members must be knowledgeable about the examination areas and demonstrate a strong sense of responsibility, fair judgment and pedagogical skills.



The evaluation is conducted by an independent jury (“*commissions d'interrogation*”) composed by teachers and professionals from the field of mechatronics. Employers and in-company trainers have mostly a co-evaluating role, their comments and evaluations count into the final grade. The general recommendation states that at least one representative of the employees should be present.



The exams are held by Examination Committees, established by the District Examination Committee (OKE) under the legal regulations on conditions and ways of evaluation, classification and promotion of students and trainees at public schools and the examination. Depending where the exam is held the supervising team includes a minimum of two (practical part of the exam) or three (written part of the exam) teachers or employees authorized by the employer. The supervising team shall not include teachers or employees involved in training activities.



The assessment process includes two internal and one external assessor. Assessors regularly undergo training and development to ensure they are competent to carry out assessment in various learning settings. The Level 3 and 4 Awards and Certificates in Assessment and Quality Assurance are available to assessors to certify their skills and competences.

Selected Practice: Qualification of examiners



Performance evidence must be the main form of evidence gathered. In order to demonstrate consistent, competent performance for a unit, a minimum of three different examples of performance must be provided. The assessor and learner need to devise an assessment plan to ensure that performance evidence is sufficient to cover all the specified assessment criteria.

Assessors must make sure that the evidence provided reflects the learner's competence and not just the achievement of a training programme. Performance evidence must be a combination of

- outputs of the learner's work, such as items that have been manufactured, installed, maintained, designed, planned or quality assured, and documents produced as part of a work activity and
- evidence of the way the learner carried out the activities such as witness testimonies, assessor observations or authenticated learner reports, records or photographs of the work/activity carried out etc.

SEMTA (also responsible for reviewing and setting the National Occupational Standards) defines the following assessor requirements:

- ✓ Assessors must hold the QCF Level 3 Award in Assessing Competence in the Work Environment. They will also be expected to regularly review their skills, knowledge and understanding and where applicable undertake continuing professional development.
- ✓ Assessors must be able to demonstrate that they have sufficient technical competence to evaluate and judge. This will be demonstrated either by holding a relevant technical qualification or by proven industrial experience.
- ✓ Assessors must also be fully conversant with the Awarding Organisation's assessment recording documentation.



This selected practice refers to standard 6: Ensure the qualification of experts in charge of assessing learning outcomes. Detailed information on standards and recommendations can be found from page 22.

Quality standards and recommendations

The key aspects which can support quality assurance in the preparation phase of ECVET mobilities are summarized below. These standards and recommendations can support the sending and the hosting institution when developing (units of) learning outcomes and define outcomes oriented assessment procedures. Both partners should read them carefully and review their application in their mobility partnership, e. g. when they agree on learning achievements that the learner will acquire during her/his mobility period and determine adequate assessment methods and procedures.

1. Refer learning outcomes to typical occupational working and business processes.

- A Refer learning outcomes to a comprehensive professional action in relation to the standards expected of a professional worker (i.e. the ability to plan, execute and evaluate a work task independently).
- B Learning outcomes cover the professional action that will be assessed and may be mapped against agreed (national) occupational standards.

2. Define learning outcomes involving all relevant stakeholders.

- A All relevant stakeholders ought to be involved in designing or revising learning outcomes, which especially means that organisations providing training (depending on national contexts companies, vocational schools, universities or colleges), bodies representing the interests of employers and employees (e. g. social partners), bodies implementing assessment (e. g. chambers), state authorities on different levels and research institutes are engaged.
- B In the context of mobility learning outcomes can be suggested by the hosting or sending institution or jointly agreed upon prior to the mobility. This can be arranged in focus groups or educational boards that consist of the involved partners, even including learners and the stakeholders above.

3. Ensure learning outcomes are user-friendly for different target groups – also in the matter of the importance given to teaching and learning.

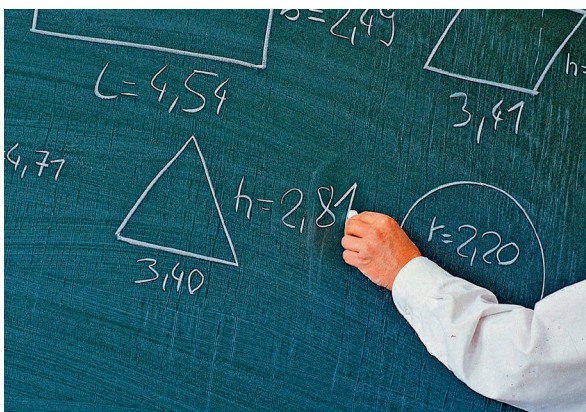
- A Make sure learning outcomes are clearly understandable and clearly structured, in order to enhance their usability by students, teachers, trainers, schools and companies. At the same time, broad and transparent access to learning outcomes must be ensured.
- B Ensure that material and guidance is provided to support learning and teaching (how to learn/teach and what to learn/teach).

4. Assessment and assessment results are comparable, independent from place of learning and assessment.

- A Evaluation criteria and evaluation principles are defined and assessment results are documented systematically, e. g. in standardized evaluation sheets.
- B Assessment also includes documents and papers of the everyday work procedures, for instance a study diary, a portfolio created by the learner or short reports about the overall educational progress of the learner.

5. Assess learning outcomes through multiple assessment methods.

- A** Personal and social outcomes are part of the assessment.
- B** Assessment takes place during a learning process (formative) and after a learning phase has been completed (summative).
- C** Different assessment methods – in oral and written form – (e. g. discussion, declarative methods, interview, observation, portfolio, presentation, simulation) are combined. Especially interactive assessment methods can be used to gather evidence for observable as well as indications on non-observable outcomes.
- D** Real work assignments in the work context (or contexts designed close to the real work situation) are the core of assessment procedures. The ability to plan, execute and evaluate independently, as well as the ability to perform in unexpected situations is part of the assessment. This includes those cross-occupational/interdisciplinary questions about security, ecological and safe behaviours which should be part of the assessment.



6. Ensure the qualification of experts in charge of assessing learning outcomes.

- A** Assessors – whether they are involved in actual training or not – have the necessary knowledge, skills and competence in order to assess learners for their competences. That includes methodological and pedagogical skills.
- B** Assessors are given the opportunity to acquire these competences, e. g. in certified training courses, e-Learning modules or Peer Review. Requirements for the appointment of assessors are defined.



Glossary

Apprenticeship

Definition: Systematic, long-term training alternating periods at the workplace and in an educational institution or training centre. The apprentice is contractually linked to the employer and receives remuneration (wage or allowance). The employer assumes responsibility for providing the trainee with training leading to a specific occupation.

Source: CEDEFOP

Assessment of learning outcomes

Definition: Methods and processes used to establish the extent to which a learner has in fact attained particular knowledge, skills and competence.

Source: European Parliament and Council

Competence

Definition: The ability to apply learning outcomes adequately in a defined context (education, work, personal or professional development).

Source: CEDEFOP

Curriculum

Definition: The inventory of activities implemented to design, organize and plan an education or training action, including the definition of learning objectives, content, methods (including assessment) and material, as well as arrangements for training teachers and trainers.

Source: CEDEFOP

Learning outcomes

Definition: “Learning outcomes” are statements of what a learner knows, understands and is able to do on completion of a learning process and which are defined in terms of knowledge, skills and competence.

Source: European Parliament and Council

Qualification

Definition: A formal outcome of an assessment and validation process which is obtained when a competent institution determines that an individual has achieved learning outcomes to given standards.

Source: European Parliament and Council

Quality standard

Definition: Norms, specifications or expectations that provide the basis for the quality assurance and development. Here they describe aspects that have been identified to enhance the quality in the implementation of ECVET. They are often already part of the national regulations in at least one educational system.

Source: own definition

Unit of learning outcomes

Definition: A component of a qualification, consisting of a coherent set of knowledge, skills and competence, that can be assessed and validated.

Source: European Parliament and Council

Sources

European Centre for the Development of Vocational Training (CEDEFOP) (Philippe Tissot):
Terminology of vocational training policy. A multilingual glossary for an enlarged Europe,
Luxembourg 2004

European Parliament and Council of the European Union:
Recommendation of the European Parliament and of the Council of 18 June 2009 on the
establishment of a European Credit System for Vocational Education and Training (ECVET),
Brussels 2009

Partner

The project is led by **Forschungsinstitut Betriebliche Bildung (f bb)/ Research Institute for Vocational Training** which has strong experiences in research activities concerning European Transparency Instruments.

The consortium consists of six core partners including the coordinator f-bb.

3s research laboratory

3s research laboratory from Austria has developed the VQTS model and is also experienced in the mechatronic sector.

www.3s.co.at



CIBC (Centres Interinstitutionnels de Bilan de Compétences) Bourgogne Sud

The French partner CIBC (Centres Interinstitutionnels de Bilan de Compétences) is an expert for the assessment of competences and can give valuable input in terms of documentation and validation of competences.

www.cibc-bourgogne.fr



ECAP Foundation

The Swiss partner ECAP is very experienced in quality assurance and evaluation.

www.ecap.ch



The Institute for Employment Research (IER)

The Institute for Employment Research (IER) of the University of Warwick (UK) has worked closely with companies and skills councils on a number of projects over the last 15 years in mechanical engineering, automotive and aerospace supply chains; also it has strong links with trade unions, colleges and the UK Commission for Employment and Skills.

www2.warwick.ac.uk/fac/soc/ier/aboutier



Towarzystwo Naukowe Organizacji i Kierownictwa

The Polish partner TNOiK is in close contact with the Polish industry and the Polish state. They are both experienced in ECVET projects and in projects with regards to mapping competences at the workplace.

www.tnoik.org





www.quality-by-units.de

