D2.1. Definition of the learning outcomes

Project:

Boosting a novel and innovative tRAining approaCh of Key Enabling Technologies BRACKET

Project partners:

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1. Introduction

The Erasmus+ project "Boosting a novel and innovative training approach of Key Enabling Technologies – BRACKET" aims in transferring Key Enabling Technologies, concretely nanotechnology, biotechnology and advanced materials, to Vocational Education and Training (VET) through the development of innovative and open learning content.

It will comprise a Joint Curriculum, didactic materials and a collaborative platform in line with the needs of the different target users identified.

As Vocational Education and Training (VET) online course, BRACKET will follow the recommendations of the European Commission to establish a European Credit System for VET (ECVET) to facilitate transnational mobility and the recognition of learning outcomes in VET and borderless lifelong learning.

The current document defines the European Framework and Consortium partners' countries frameworks, specifications of each training module and units, including duration, learning outcomes or guidelines of the training content, and weight of the learning units as a stage of preparation for future acquisition of ECVET credit points. Once the training path is defined, the content will be carefully reviewed and improved to make transition between consecutive modules in the smoothest way.

The objective is to be ready for a future implementation of the ECVET system in all European countries that will facilitate transnational recognition, transference of the training course to other countries or organisations, and also be ready for a validation at a European level of the developed training course.

2. European Framework

Over the past years, European Commission has fostered common policies in education and training, particularly in higher education with the Bologna process and VET with the Copenhagen process that have raised public awareness of the importance of quality for modern, relevant, attractive and permeable training paths.

The Copenhagen Declaration, approved on 2002, agreed on priorities and strategies for the promotion of mutual trust, transparency and recognition of competences and qualifications in order to increase mobility and facilitate access to lifelong learning.

2.1. European Credit System for Vocational Education and Training

The European Credit System for Vocational Education and Training, often referred to as ECVET, is a technical framework for the transfer, recognition and (where appropriate) accumulation of individuals' learning outcomes with a view to achieving a qualification. Guided by a European-level Recommendation, ECVET relies on the description of qualifications in units of learning outcomes, on transfer, recognition and accumulation processes and on a series of complementary documents such as a Memorandum of Understanding and Learning Agreement.

ECVET is intended to facilitate the recognition of learning outcomes in accordance with national legislation, in the framework of mobility, for the purpose of achieving a qualification.

ECVET aims to support the mobility of European citizens, facilitating lifelong learning - achieved in formal, non-formal and informal settings - and providing greater transparency in relation to individual learning experiences, making it more attractive to move between different countries and different learning environments.

At a systems level, ECVET aims towards greater compatibility between the different vocational education and training (VET) systems in place across Europe, and their qualifications.

From a geographical mobility perspective, ECVET aims at facilitating the validation, recognition and accumulation of knowledge and skills acquired during a stay in another country, with a view to ensuring that such achievements can contribute to the achievement of vocational qualifications.[1]

The aim of ECVET is to[2]:

- Make it easier for people to get validation and recognition of work-related skills and knowledge acquired in different systems and countries- so that they can count towards vocational qualifications.

- Make it more attractive to move between different countries and learning environments.

- Increase the compatibility between the different vocational education and training (VET) systems in place across Europe, and the qualifications they offer.

- Increase the employability of VET graduates and the confidence of employers that each VET qualification requires specific skills and knowledge.

Thus, ECVET should be applied in accordance with national legislation. In this way, the ECVET recommendation invited all European countries to create the necessary conditions and adopt measures to make it possible.

The table 1 shows the level of implementation of ECVET at 2015, last monitoring report on ECVET develop by the European Centre for the Development of Vocational Training, CEDEFOP.

Table 1. Credit systems for transfer and accumulation of learning outcomes and ECVET development in 2015.

Country	Direction of ECVET development	Do the answers apply to CVET?
Countries with a credit system in IVET that allows accumulating and/or transferring learning outcomes of individuals		
Belgium-French Community	The system is ECVET-compatible.	No
Denmark	Some ECVET technical components are tested	Yes
Estonia	The system is ECVET-compatible.	Yes
Finland	The system is ECVET-compatible.	Yes
France	The system is ECVET-compatible.	Yes
Iceland	The system is ECVET-compatible.	No
Ireland	It may be possible to map elements of the well-established credit system to ECVET principles.	Yes
Luxembourg	The system is ECVET-compatible.	Yes
Malta	The system is ECVET-compatible.	Yes
Romania	Some ECVET technical components are tested.	No
Slovenia	The system is ECVET-compatible.	No
Spain	The system is ECVET-compatible.	No
Sweden	The system is ECVET-compatible.	No
UK-England	The system is ECVET-compatible.	Yes
UK-Northern Ireland	The system is ECVET-compatible.	Yes
UK-Scotland	The system is ECVET-compatible.	Yes
UK-Wales	The system is ECVET-compatible.	Yes
Countries where credits are used in some qualifications		
Austria	Some ECVET technical components are tested.	Yes
Bulgaria	A credit system compatible with ECVET is being developed.	Yes
Croatia	A credit system compatible with ECVET is being developed.	Yes
Czech Republic	A credit system compatible with ECVET is being developed.	No
Italy	Some ECVET technical components are tested.	Yes
Lithuania	Some ECVET technical components are tested.	Yes
Norway	Some ECVET technical components are tested.	Yes
Countries with no credit system		
Belgium-Flemish Community	Any initiative on ECVET implementation at system level is on hold.	Yes
Cyprus	A credit system compatible with ECVET is being developed.	No
Germany (*)	Some ECVET technical components are tested.	Yes
Greece	Any initiative on ECVET implementation at system level is on hold.	Yes
Hungary	Any initiative on ECVET implementation at system level is on hold.	Yes
Latvia	Some ECVET technical components are tested.	Yes
Liechtenstein	Any initiative on ECVET implementation at system level is on hold.	Yes
Netherlands	Some ECVET technical components are tested.	No

Country	Direction of ECVET development	Do the answers apply to CVET?
Poland	Some ECVET technical components are tested.	No
Portugal	Some ECVET technical components are tested.	Yes
Slovakia	Any initiative on ECVET implementation at system level is on hold.	Yes
Switzerland	Any initiative on ECVET implementation at system level is on hold.	Yes

(*)   In Germany, there is no initiative related to ECVET at system level; however, technical components have been tested both in IVET and CVET at provider level (see also Box 4 and country summary in Annex 1).

Source: Cedefop.

European countries could be classified in three different categories, as it is shown in table 1. Thus, as conclusion it is possible to declare that not all countries are ready to ECVET implementation at the same level and there is still work for a complete integration, mainly with those countries without a credit system. In this way the monitoring report highlights that "the key challenge remains with ECVET points. The need for ECVET points as a precondition for ECVET and applicability requires further reflection."[3]

2.2.   European Qualifications Framework

The European Qualifications Framework (EQF) is a European-wide qualifications framework which joins the qualifications of different EU members together. In a way, it is a translation of different national qualifications which makes qualifications in different EU countries easier to understand. The EQF aims to facilitate mobility of students and workers within the EU in order to encourage development mobile and flexible workforce throughout Europe and to help develop lifelong learning.

The EQF was formally adopted by the European Parliament and the Council in April 2008. The UK has completed the cross reference of its frameworks – the Qualifications and Credit Framework (QCF) and the Scottish Credit and Qualifications Framework (SCQF) but so far, only a minority of the EU member countries decided to do the same. The EQF is voluntary and the member countries are not obliged to cross reference their frameworks but the number of completed cross references is expected to increase in the near future.

The QCF system is based on units which have credit value and levels (from Entry Level to Level 8). One credit roughly equals 10 learning hours which allows the learners to evaluate how much time they will need to gain the desired qualification. According to the QCF system, the learners can gain three types of qualifications:

- Awards
- Certificates
- Diplomas

In addition to developing units, developing and accrediting qualifications, and awarding credits and qualifications, the regulators of the QCF are also responsible for maintaining a unit databank and monitoring the organisations that operate within the QCF in order to ensure that all awarded qualifications meet the regulatory requirements. These are specified in the Regulatory

arrangements for the Qualifications and Credit Framework that has been developed jointly by the regulators in England, Wales and Northern Ireland.

Qualifications are knowledge (what we know), skills (what we can do) and social competences (how we can use these elements for the benefit of ourselves and society). Their rank cannot be overestimated:

- allow you to signal to the employees what the employers expect from them, allow you to evaluate the results of teaching,
- help education and authorities conducting training - assess the level and content of material assimilated by a person,
- they express the achievements of a given unit.

European education and training systems are diverse and reflect national traditions. The differences between them are difficult to assess. The value of qualifications awarded in one country may not be understood in other countries. This is primarily about the qualifications acquired as part of formal education and training systems and in international organizations. This lack of trust can lead to: limiting professional development, taking advantage of the opportunity to change employment and continuing education, creating barriers to mobility within the EU.

The creation of the European Qualifications Framework allows qualifications in different countries to be comparable. This will facilitate the crossing of borders both for learners and employees, and will promote lifelong learning and professional development in Europe.

Table 2. Descriptors defining levels in the European Qualifications Framework

Level	Knowledge	Skills	Responsibility and autonomy
	In the context of EQF, knowledge is described as theoretical and/or factual.	In the context of EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) and practical (involving manual dexterity and the use of methods, materials, tools and instruments).	In the context of the EQF responsibility and autonomy is described as the ability of the learner to apply knowledge and skills autonomously and with responsibility
1	Basic general knowledge	Basic skills required to carry out simple tasks	Work or study under direct supervision in a structured context
2	Basic factual knowledge of a field of work or study	Basic cognitive and practical skills required to use relevant information in order to carry out tasks and to solve routine problems using simple rules and tools	Work or study under supervision with some autonomy
3	Knowledge of facts, principles, processes and general concepts, in a field of work or study	A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic	Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems

		methods, tools, materials and information	
4	Factual and theoretical knowledge in broad contexts within a field of work or study	A range of cognitive and practical skills required to generate solutions to specific problems in a field of work or study	Exercise self-management within the guidelines of work or study contexts that are usually predictable, but are subject to change; supervise the routine work of others, taking some responsibility for the evaluation and improvement of work or study activities
5	Comprehensive, specialised, factual and theoretical knowledge within a field of work or study and an awareness of the boundaries of that knowledge	A comprehensive range of cognitive and practical skills required to develop creative solutions to abstract problems	Exercise management and supervision in contexts of work or study activities where there is unpredictable change; review and develop performance of self and others
6	Advanced knowledge of a field of work or study, involving a critical understanding of theories and principles	Advanced skills, demonstrating mastery and innovation, required to solve complex and unpredictable problems in a specialised field of work or study	Manage complex technical or professional activities or projects, taking responsibility for decision-making in unpredictable work or study contexts; take responsibility for managing professional development of individuals and groups
7	Highly specialised knowledge, some of which is at the forefront of knowledge in a field of work or study, as the basis for original thinking and/or research Critical awareness of knowledge issues in a field and at the interface between different fields	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to integrate knowledge from different fields	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams
8	Knowledge at the most advanced frontier of a field of work or study and at the interface between fields	The most advanced and specialised skills and techniques, including synthesis and evaluation, required to solve critical problems in research and/or innovation and to extend and redefine existing knowledge or professional practice	Demonstrate substantial authority, innovation, autonomy, scholarly and professional integrity and sustained commitment to the development of new ideas or processes at the forefront of work or study contexts including research

The core of the EQF is its eight reference levels detailed before in terms of learning outcomes, that express what individuals know, understand and are able to do at the end of a learning process. Each of the 8 levels is defined by a set of descriptors indicating the learning outcomes

relevant to qualifications at that level in any system of qualifications, described in terms of knowledge, skills and competences.
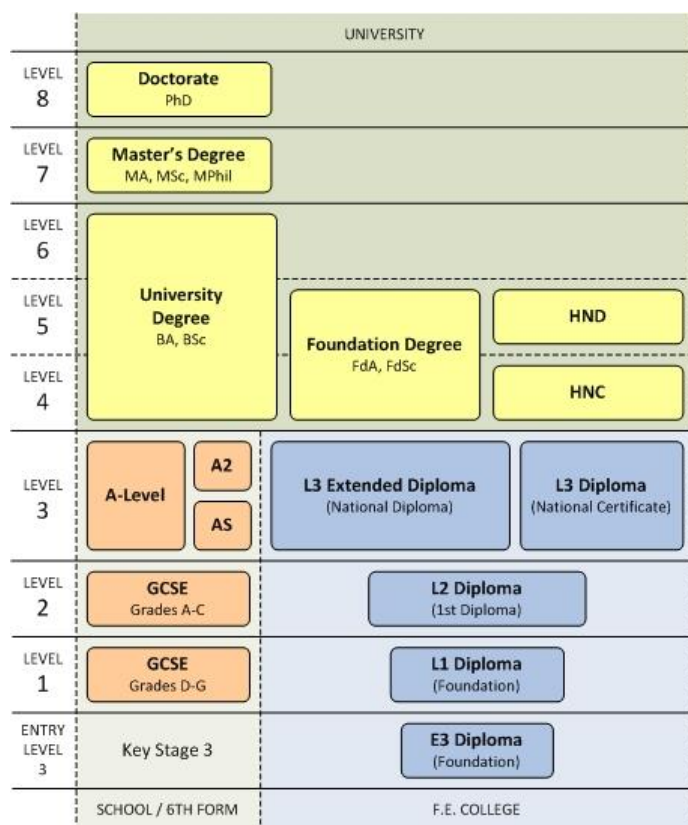

Figure 1. Summary figure of the eight-level detailed before

Countries has to develop or adapt their national qualifications frameworks (NQFs) to implement the EQF. CEDEFOP monitors the developments and progress in each European country. The last analysis published this year[4] shows that "*most European countries have completed the (initial) conceptual and technical development of their frameworks. The majority of them have formally adopted their NQFs, most recently in Luxembourg, Austria, Poland, Slovenia, Italy and Finland. Of the EU countries, only Spain have yet to finalize developments and/or adoption*".

In addition, four areas have been defined as areas of limited impact where it will be necessary to foster future works:

1. The limited visibility and use of NQFs by labour market actors.

2. The articulation between institutions and education and training subsystems.

3. Institutional reform to achieve more integrated qualification systems in some countries.

4. Little evidence of the effect of qualification frameworks on mobility of learners and workers

During the development of the different activities integrated in the second output of BRACKET project, Consortium will create a Joint Curriculum which will be classified according to EQF. This information will be detailed in the following documents.

2.3. European Quality Assurance Reference Framework

Parallel to the European Credit System for VET and within the EQF, it has been developed the European Quality Assurance Reference Framework (EQAVET), based on the 2009 Recommendation[5], as a voluntary system to be used by public authorities and other bodies involved in quality assurance.

EQAVET provides a European-wide system to help Member States and stakeholders to document, develop, monitor, evaluate and improve the effectiveness of their VET provision and quality management practices.

EQAVET is based on the four-stage cycle of planning, implementation, evaluation and review which is at the heart of many other quality assurance approaches.
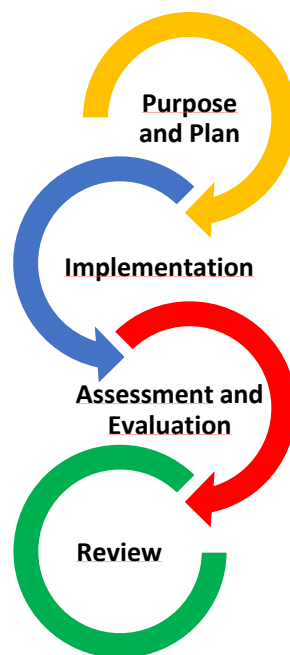
Figure 2. EQAVET cycle

Concretely the first phase of Purpose and Plan has the aim to set up clear, appropriate and measurable goals and objectives in terms of policies procedures, tasks and human resources.

The second phase, Implementation is focused in establishing procedures to ensure the achievement of goals and objectives.

The third phase, assessment and evaluation have the objective of design mechanisms for the evaluation of achievement and outcomes by collecting and processing data in order to make informed assessment.

The last phase is the review, which develops procedures in order to achieve the targeted outcomes and/or new objectives, after processing feedback, key stakeholders conduct discussion and analysis in order to devise procedures for change.

The Commission launched the EQAVET Work Programme 2016-2017. The Work Programme has been devised on the basis of its members' experiences of developing their national approaches

to the implementation of the Recommendation on the establishment of the EQAVET Framework. It also builds on the experience of implementing the EQAVET Work Programme 2013-2015 and EQAVET Work Programme 2010-2012.

3. National Framework

Frameworks help to make qualifications easier to understand and compare. They can also encourage countries to rethink and reform national policy and practice on education, training and lifelong learning.

National qualifications frameworks (NQFs) classify qualifications by level, based on learning outcomes. This classification reflects the content and profile of qualifications- that is, what the holder of a certificate or diploma is expected to know, understand, and be able to do. The learning outcomes approach also ensures that education and training sub-system are open to one another. Thus, it allows people to move more easily between education and training institutions and sectors.

The main catalyst for the development of comprehensive national qualification frameworks in Europe has been the European Qualifications Framework (EQF). All countries committed to the EQF are developing or implementing national frameworks mostly covering all levels and types of qualifications: the 28 Member States, Iceland, Liechtenstein, Norway, Switzerland, Albania, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Montenegro, Serbia and Turkey.

Taking into account this general description, hereafter there are a wide description of each of the National Qualifications Framework of Consortium partners.

3.1. National Framework Qualifications system in Spain

Introduction to the Spanish Education System and Professional Training

In a global market with a high degree of competition and uncertainty, with a changing global regulations, with constant demographic movements, with technological changes, with the continuous demand for new capabilities and skills for the companies adaptation and the emergence of new sources of employment, we should not miss a continuous update of Vocational Education and Training, being an increasingly attractive, innovative and dynamic professional training.[6]

Nowadays, Vocational Education and Training is the most professional studies. It refers to the reality of the labour market and responds to the need for qualified personnel specialized in the different professional sectors to respond to the current labour demand.

VET in the Spanish education system is organised on three levels[7]:

a) Basic, in lower-secondary education (international standard classification of education (ISCED) 351)
b) Intermediate in upper-secondary education (ISCED 354)
c) Higher in higher education (ISCED 554)

The duration of each level is of two years. Basic VET (FP Básica), a new level introduced by the 2013 education reform, was piloted from 2014 to 2016. It is particularly target at students at risk of leaving education without qualifications.

All training leading to a VET qualification in the education system includes a workplace training module offered typically in the second year of studies, within a company. Educations institutions cooperate with companies to find placements for VET students to carry out the workplace training module.

Spanish Qualifications Framework[8]

Spain is struggling to finance an effective and equitable skills system. In 2009, the Spanish Government entrusted the Ministry of Education with the drawing up of the Spanish Qualifications Framework. In 2011, the Sustainable Economy Act demanded the creation of this framework in order to encourage and increase the mobility of students and workers.

The Spanish Qualifications Framework is a national qualifications framework that includes lifelong learning. It organises qualifications according to levels and comprises from the most basic to the most complex learning.

It includes:

- Qualifications obtained outside the education system through in-service training, work activity, collaboration with NGOs, etc.
- Qualifications obtained in the education system.

The proposed framework has eight levels and the level descriptors, defined in terms of knowledge, skills and competences, and are inspired by the level of descriptors of the European Qualifications Framework for Lifelong Learning, but adapted to the national context.

The Spanish Qualifications Framework aims to correlate and coordinate the different subsystems of education and training and include the qualifications obtained in compulsory, post-secondary and higher education, as well as integrate the validation of non-formal and informal learning.

In relation to VET, there are different levels of political and administrative responsibilities and activities within each territory level. The Ministry of Education, Culture and Sport (hereinafter Ministry of Education or MECD) is responsible for developing and implementing government policy in VET programmes in the education system whereas the Ministry of Employment and Social Security (hereinafter Ministry of Employment or MEYSS) is mainly concerned with VET programmes in the National Employment System and continuous vocational education and training (CVET). Spain has introduced important advances to change its teaching models and learning concept from a traditional into a competence-based model, but improvement in the implementation process (from the practical point of view) is still needed.

National Catalogue of Professional Qualifications (CNCP)

The National Catalogue of Professional Qualifications (CNCP) is the instrument of the National System of Qualifications and Vocational Training (SNCFP) that orders the professional qualifications susceptible of recognition and accreditation, identified in the productive system, in function of the appropriate competences for the professional exercise.

It is applicable to the entire national territory and allows adapting the different training offers to the needs of the labour market making their accreditations to the business fabric transparent. The CNCP includes the most significant professional qualifications of the Spanish productive as

well as the content of the professional training associated with each qualification, with a structure of training modules articulated in a Modular Catalog of Vocational Traning (CMFP).

The National Institute of Qualifications (INCUAL) is responsible for defining, preparing and keeping updated the CNCP and the corresponding CMFP.

<u>Links between the Spanish Qualification Framework and the European Framework</u>

The correlation of the Spanish model with the EQF is made from the Spanish Qualifications Framework (Marco Español de Cualificaciones - MECU) or National Qualification Framework (NQF), which includes qualifications obtained in compulsory, post-secondary and higher education, and will integrate validation of non-formal and informal learning processes. It is based on learning outcomes and aims to link and coordinate the different education and training subsystems.[9]

The MECU is therefore the product of the sum of the National Catalogue of Professional Qualifications (CNCP) and the Spanish Framework of Qualifications for Higher Education (MECES).

These specifications are superimposed on level 3 of the CNCP, which would correspond to level 1 of the MECES and level 5 of the EQF, establishing as higher education the corresponding to the title of Higher Vocational Training Technician. (Table 1)

The higher four levels of MECU will be linked to the qualification's framework of higher education (Marco Español de Cualificaciones para la Educación Superior – MECES). This framework has been self-certified against the framework for qualifications of the European higher education area (FQ-EHEA) as part of Spain's continuing commitment to the Bologna process. The self-certification followed the procedures and criteria set down for such work within the Bologna process, and involved a committee of senior Spanish and international experts and stakeholders.

Table 3. Comparative between Spanish National Framework and European Qualification Framework[10]

EQF	MECES			CNCP		MECU (not finalised yet)
Level	Level	Current qualifications		Level	Current qualifications	Level
1				1	Operators	1
2						2
3				2	Middle-level technician	3
4						4
5	1	- Higher Technician of VET - Superior Technician of Plastic Arts - Superior Sports technician		3	High-level technician	5
6	2	- Graduate Degree - Higher Artistic Education Diploma Degree		4	Degree	6
7	3	- University Master's degree - Bachelor's degree in 300 ECTS (60 with Master level) - Master's Degree in Artistic Education		5	Master	7
8	4	Doctor		6	Doctor	8

For the effective correlation between the national framework and the European Qualifications Framework, references must be established in the different domains of responsibility, coordination, legal administrative, methodological and quality assurance.

The national qualifications will be assigned to MECU levels based on three criteria[11]:

a) Comparability of qualifications type descriptors defined in learning outcomes and the MECU level descriptors
b) Implementation of the common quality assurance in higher education and in VET, in line with EQF recommendations
c) Public consultation with bodies involved in design, award and use of qualifications in a respective field

Validating non-formal and informal learning and links to the NQF

Spain does not have a comprehensive national strategy for validation due the different laws frame validation and the targeting different education sectors. The Organic Law of Education and the Organic Law of Universities incorporate actions to validate non-formal and informal learning, such as access exams to VET and university studies aimed at those people who do not have the required qualifications.

Nevertheless, Spain has started to develop the Spanish qualifications framework for lifelong learning (Marco Español de Cualificaciones, MECU). However, framework development is not concluded at the moment, and MECU is not yet operational.

The future framework aims to include, in a first stage, all diplomas and certificates from the education system, while remaining open for inclusion of official qualifications issued by other administrative sectors. The Ministry of Education, Culture and Sport is working on aligning qualifications in the education system to the EQF levels, in accordance with the EQF recommendation.

3.2. National Framework Qualifications system in Croatia

Introduction to the Croatian education system and professional training

The challenges of the rapid development of new knowledge and technologies, frequent changes in the labour market and the growing demand for highly skilled labour, the aging of the population and the process of globalization imply the development of a knowledge-based society and a lifelong learning process. In the Republic of Croatia, as in other countries of the European Union, most of the citizens are educated in the vocational education system. Therefore, the vocational education system is crucial in accumulating human capital as a prerequisite for achieving economic growth, better quality of employment and social goals. Initial vocational education should ensure the acquisition of knowledge, skills and competences important for the labour market, as well as provide opportunities for further progress in higher education. Continuing vocational education should provide opportunities for gaining competencies important for further professional development of the individual, as well as an increase in the knowledge and innovativeness of the society.

Vocational education and professional training in the Croatian education system is divided into secondary education provided by secondary vocational schools and the education of adults,

which includes life-long learning vocational education and acquiring of a new qualification. The system of regular vocational education for the acquisition of lower and secondary vocational education by educational programs is:

- One-year and two-year programs of lower qualifications in 23 educational programs
- Three-year programs for occupations in industry and crafts in 93 educational programs
- Four-year programs of technical and similar orientations in 83 educational programs[12]

Croatian Qualification Framework

The Croatian Qualifications Framework (HKO) is a reform instrument that regulates the overall qualifications system at all levels of education in Croatia through the standards of learning-based qualifications and in line with the needs of the labour market, the individual and the society as a whole.

The HKO is the framework in which each qualification acquired in Croatia has its place. At the heart of the HKO are the learning outcomes – the competences that a person acquired by learning and proved after the learning process, whereby the learning process is not crucial since the learning outcome is verified. Each qualification acquired in Croatia is determined according to the level of learning outcomes that belong to that qualification. Setting up qualifications to a certain level allows qualifications to be compared and linked.

Apart from the interrelationships of qualifications gained in Croatia, qualification at a certain level of HKO enables linking the level of qualifications acquired in Croatia to the levels of the European Qualifications Framework (EQF) and the Qualification Framework of the European Higher Education Area (QF-EHEA), which enables the recognition of qualifications acquired in Croatia in Croatian and European labour markets.

Since learning outcomes are in the centre of the HKO, and not the process by which these outcomes are acquired, HKO provides the basis for developing the evaluation of previous learning – the recognition and evaluation of the outcomes of non-formal and informal learning, with the mandatory introduction of the system quality assurance and clearly prescribed quality control procedures.

HKO introduces qualification standards. While the same qualification can be obtained from different educational institutions and through different educational programs, there are certain standards in terms of the prescribed learning outcomes that qualifications must have. Educational programs should be in line with the standards of qualifications, which means that they lead to learning outcomes as prescribed by the appropriate standard of qualification. Apart from qualification standards, HKO introduces occupational standard. This document clearly outlines the competencies needed for a particular occupation. The standard of qualification is made based on a clearly prescribed methodology and collected data, which have determined and analyzed the competencies required for a particular profession.[13]

Register of the Croatian Qualification Framework

Ministry of Science, Education and Sports, with the agreement of the Ministry of Labour and Pension System, the Ministry of Economy, the Ministry of Entrepreneurship and Crafts and the Ministry of Regional Development and European Union Funds, has adopted the Regulation on the Register of the Croatian Qualifications Framework published in the Official Gazette No. 62/2014, May 22, 2014.

The Regulation on the Register of the Croatian Qualifications Framework regulates the content and the manner of keeping the Register of the Croatian Qualifications Framework, submitting a request for registration in the Register, the content and form of submitting a request, evaluating the application for registration, Sector Names, Sectoral Council Names, Selection Method and Criteria for the Selection of Sectoral Council Members, Descriptions of Sectoral Council Affairs and Internal and External Quality Assurance Systems.

In short, the HKO Register is a system in which they are enrolled and through which the standards of occupations are linked to the standards of qualifications through competence and learning outcomes sets. All standards from the HKO Register are publicly available and serve to develop new learning curricula based on learning outcomes, that is, sets of competencies that are proven to be necessary for the labour market.

Currently, there are 11 occupational standards and 135 sets of competences in the HKO Register.[14]

<u>Links between the Croatian Qualification Framework and the European Framework</u>

The Croatian Qualification Framework has eight levels in accordance with the European Qualification Framework (EQF). Skills and knowledge required for all levels of HKO are fully in line with EQF, but there are slight differences in the level of education required by levels 3 to 7. In EQF, level 3 represents equivalent to high school diploma, while in HKO it requires one-year and two-year secondary vocational education. Level 4 in EQF is equivalent to Year one of Degree, while in HKO this level is divided in two parts where level 4.1 means three-year vocational education and level 4.2 high school education, four-year and five-year vocational education. Level 5 in HKO represents Professional studies at the end of which less than 180 ECTS credits are obtained, vocational specialist, programs for masters with at least two years of valued work experience and in EQF it is equivalent to Associate Degree. While in EQF Level 6 means equivalent to Graduate Degree, in HKO it stands for Undergraduate Degree, Professional Undergraduate Degree, while Level 7 presents both Graduate and Postgraduate levels of education. Level 8 in HKO is also divided into two parts, where 8.1 means Postgraduate Scientific Master's Degree and 8.2 – Postgraduate University (Doctoral) Degree which is in line with level 8 of EQF.

Table 4. Links between European Qualification Framework and Croatian Qualification Framework

EQF		HKO	
Level	Education	Level	Education
1	Equivalent to Basic Skills/Introductory	1	Elementary education
2	Equivalent to Technician/Apprentice	2	Vocational training
3	Equivalent to High School Diploma	3	One-year and two-year secondary vocational education
4	Equivalent to Year one of Degree	4.1 4.2	Three-year vocational education High school education, four-year and five-year vocational education
5	Equivalent to Associate Degree	5	Professional studies at the end of which less than 180 ECTS credits are obtained, vocational specialist, programs for masters with at least two years of valued work experience
6	Equivalent to Graduate Degree	6	Undergraduate Degree, Professional Undergraduate Degree
7	Equivalent to Post Graduate Degree	7	University Graduate degree, Specialist Graduate Professional Degree, Postgraduate Specialist Degree

| 8 | Equivalent to Doctorate Degree | 8.1 | Postgraduate Scientific Master's Degree |
| | | 8.2 | Postgraduate University (Doctoral) Degree |

Sources: European Qualification Framework and Croatian Qualification Framework Register (2009)- Introduction to Qualifications.

<u>Validating non-formal and informal learning and links to the NQF</u>

Taking into account the quantity and relevance of the knowledge and skills that persons often acquire outside the formal education system or who have not received an appropriate qualification due to the termination of formal education, which may be important for continuing education or competitiveness in the labour market, one of the long-term challenges of HKO is the establishment of a system of recognition of previously acquired knowledge and skills, especially those derived from non-formal and informal forms of learning. The Law on the Croatian Qualifications Framework[15] envisages the adoption of the Regulation on the recognition and evaluation of non-formal and informal learning, which will prescribe the procedures for evaluating and recognizing the already acquired learning outcomes in accordance with the approved program / procedure for evaluating the learning outcome set out in the HKO Register, in accordance with Article 15 of the Law.

3.3. National Framework Qualifications system in Poland

<u>Introduction</u>

In Poland, the introduction of frameworks has led to the identification of areas where learning outcomes had not been previously applied or had not been used to their full potential. Moreover, Poland has opened up to qualifications awarded outside formal education and training, i.e. non-formal and informal learning, thus for the benefit of learners. Another important matter is the compliance of the National Qualification System in Poland with the European Qualification System, making it easier to transfer credits and validate qualifications obtained in other European countries.[16]

<u>Polish Qualification Framework</u>

Poland started developing a comprehensive PQF (Polish Qualifications Framework) in year 2006. The PQF was formally adopted through the Act of 22 December 2015 on the integrated qualifications system, which entered into force in January 2016.

The PQF consists of eight learning-outcome-based levels, covering all types of qualifications, from general education, VET and higher education. This means it is organised in the same way as the EQF (European Qualification Framework) with eight levels, and Poland has formally linked its PQF to the EQF in year 2013.[17]

Table 5. Graphic presentation of the PQF corresponding to the EQF (Source Cedefop (2018). National qualifications framework developments in Europe 2017)

PQF levels	Qualifications from the formal system	Regulated and non-statutory qualifications	EQF levels
8	Third cycle of higher education (PhD)		8
7	Second cycle of higher education Integrated first and second cycle Partial qualification for post-diploma studies		7
6	First cycle of higher education Partial qualification for post-diploma studies		6
5	Vocational qualifications Partial occupational qualifications		5

4	Upper secondary school leaving certificate (Matura) Vocational qualifications Partial occupational qualifications		4
3	Vocational qualifications Partial occupational qualifications	Assembly of construction woodwork (Montowanie stolarki budowlanej)	3
2	Lower secondary school leaving certificate Vocational qualifications Partial occupational qualifications		2
1	Primary school leaving certificate		1

However, what differs is that the PQF additionally includes three degrees of learning outcome descriptors:

- Universal descriptors, applying to all types of education
- Specific descriptors, applying for VET and/or higher education
- Subject area/discipline descriptors

The PQF recognizes full qualifications (completed level of education) and partial qualifications (confirmed by certificates). In year 2012, changes were introduced, implying that the journeyman's and master's examinations are to be conducted by the examination boards of craft chambers. In November 2017, the first non-statutory qualification was added to the integrated qualifications register: Assembly of construction woodwork at EQF level 3 for VET formal qualification.[18]

Additionally, the vocational education core curriculum, required as of the 2012–2013 school year, introduced a new way of describing and acquiring qualifications, i.e. learning outcomes were introduced. The core curriculum distinguishes coherent sets of learning outcomes that can be validated within the framework of out-of-school learning, as well as accumulated and recognised to attain successive qualifications. The concept of having learning outcomes distinguished in a qualification is consistent with the ECVET system developed in Europe (European Credit System for Vocational Education and Training).

In Poland, accumulating and transferring credits within the higher education system functions in the form of ECTS (European Credit Transfer and Accumulation System). The ECTS has been fully adopted by Polish higher education institutions – its implementation was required by legislation (Act of 27 July 2005 on the Law on higher education (Journal of Laws 2012, item 572 with later amendments)).

Table 6. Graphic presentation of higher education system qualifications (Source: Educational Research Institute (2014). Referencing the Polish qualifications framework for lifelong learning to the European Qualification Framework)

Type of studies	Name of qualification	ECTS credits	Planned qualification level in the PQF
First cycle studies (Bologna first cycle)	Diploma certifying the professional title of licencjat / inżynier or an equivalent title	At least 180	6
Second cycle studies (Bologna second cycle) or Long cycle studies	Diploma certifying the professional title of Magister / magister inżynier or an equivalent title (for example, physician)	Second cycle studies – at least 90 Long cycle master's degree studies: at least 300 (five-year studies), 360 (six-year studies)	7
Third cycle studies (Bologna third cycle)	Diploma certifying the academic degree of *doktor* in a specific discipline	45–60	8
Additionally:			
Postgraduate non-degree studies	Certificates of completion of postgraduate non-degree studies	At least 60; (the duration of the studies should not be less than two semesters)	Depending on the programme

Links between the Polish Qualification Framework and the European Framework

The Polish model of credit accumulation and transfer is to be compatible with European procedures (ECTS – European Credit Transfer and Accumulation System – used today in higher education, ECVET – European Credit System for Vocational Education and Training). A system based on ECTS credits operates in the Polish higher education system under the Polish National Agency of Erasmus+ Programme.[19]

It is important that the PQF is aligned ECVET and EQF since it enables the accreditation of acquired learning outcomes regardless of the EU country they have been obtained in, the learner benefiting from their qualification to better fit for the labour market requirements. It can therefore be concluded that the preservation and improvement of this road will be conducive to increasing the employability of Polish citizens, including within the European Union.

Validating non-formal and informal learning and links to the NQF

The PQF includes the validation of learning outcomes at all levels: formal education, non-formal and informal learning. Most recently, under the law of 22 December 2015, Articles 9.1, 15,1 and 38.1., the non-formal sector was included in the PQF.

Regardless the level or type of learning to be validated, in Poland the Ministry of Education is responsible for the accreditation of institutions for the validation of qualifications. They can be represented by the National Chamber of Commerce, their advisory body, but also the Educational Research Institute, working closely on the topics of national frameworks.

3.4. National Framework Qualifications system in Greece

<u>Introduction to the Greek Education System and Professional Training</u>

Lifelong Learning in Greece is a national political priority, as its strong link with employment, economic prosperity and full participation of the individual in society is clear. Especially in the context of the current economic crisis, Lifelong Learning is a crucial factor for growth and social cohesion.[20]

With the enactment of Law 3879/2010 ("Development of Lifelong Learning and other provisions"), a single national Lifelong Learning (LLL) strategy is for the first time being developed in Greece and the National Network for Lifelong Learning is set up, consisting of all management and service LLL providers.

The Greek education system is divided into 3 categories[21]:

1. The Formal Education System

It includes three levels:

a) Primary Education, which consists of:
   - Pre-primary school: it is compulsory for 5-year-old children
   - Primary School, which lasts 6 years and it is compulsory
b) Secondary Education, which includes two cycles:
   - The Lower Secondary School, which is compulsory and it lasts 3 years
   - The Upper Secondary School – General and Vocational, which is optional and it lasts 3 years for Day Schools and 4 years for Evening Schools
c) Higher Education, which includes the:
   - University Sector:
     i. Universities
     ii. Technical Universities
     iii. The School of Fine Arts
   - Technological Sector:
     i. Technological Educational Institutions
     ii. The School of Pedagogical and Technological Education

Both primary and secondary education may be and/or private, while higher education is only public.

2. General Formal Adult Education

It is part of the formal education. Certification is equivalent to the one awarded by Lower Secondary Schools. It gives the opportunity to the holder to continue his studies within the formal education system. Formal Adult Education is provided to:

a) Second Chance Schools
b) Evening General Upper Secondary Schools
c) Evening Vocational Upper Secondary Schools

3. Non-formal Adult Education

According to Law 3879/2010, Law 4186/2013 and Law 4386/2016, as amended and in force, non-formal Education is provided in an organized educational framework outside the formal education system and can lead to the acquisition of certificates recognized at national level.[22] It includes:

- The initial vocational training
- Continuous vocational training
- The post-secondary cycle of studies-apprenticeship class
- General adult education

It is addressed to graduates from Lower and Upper Secondary Schools or Higher Education and it is available in:

- Vocational Training Institutes (IEK)
- Lifelong Learning Centers
- Colleges
- Vocational Training Schools

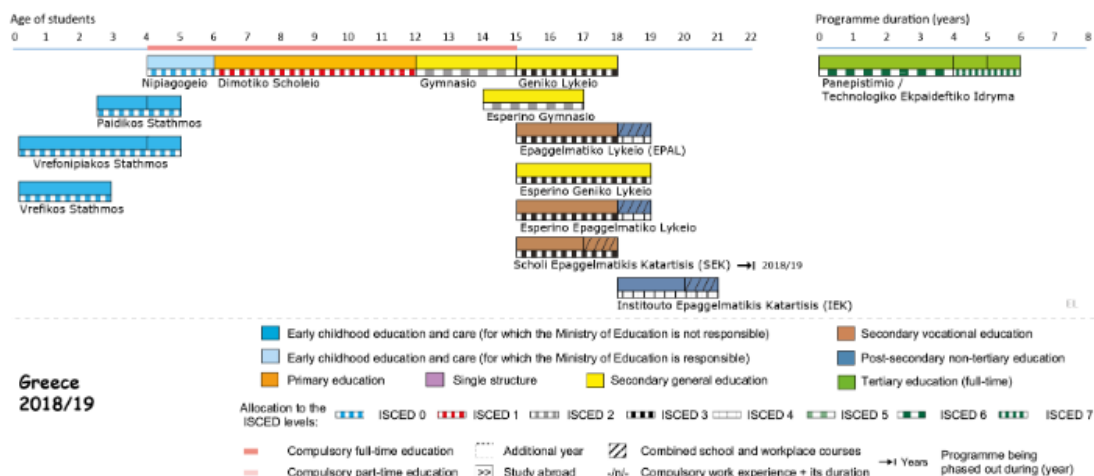Below is the diagram of the Greek education system:

Figure 3. Structure of Greek National Education System (Source: Eurydice 2018/2019)

Hellenic Qualifications Framework[23]

The development of the National Qualifications Framework in Greece has led to the formation of a coherent and comprehensible system for describing, assessing and classifying of qualifications for all education levels in the country.

The development of the National Qualifications Framework started in 2010 and is being implemented under the supervision and the coordination of the Ministry of Education, Research and Religious Affairs by the National Organisation for the Certification of Qualifications and Vocational Guidance (EOPPEP), which is the statutory body for the development and implementation of the Hellenic Qualifications Framework (NQF) in correspondence with the European Qualifications Framework (EQF), according to the provisions of the Law 3879/2010 and the Law 4115/2013 as in force.

From the point of view of the common European strategy "Europe 2020", the National Qualifications Framework and its matching with the European Qualifications Framework (EQF) is a comparability tool of qualifications, serving the broader goal of lifelong learning and mobility of human resources.

The Hellenic Qualifications Framework structure is simple and mainly functional and is defined by the following features:

- **Levels:** the eight levels of the National Qualifications Framework cover the full range of qualifications from primary to higher education. Each level includes a set of knowledge, competences and abilities that determine the learning outcomes. The learning outcomes constitute the qualifications of the corresponding level.
- **Learning outcomes:** these qualifications have the form of learning outcomes that are ranked in levels. The learning outcomes – what the person knows, understands and can do after the completion of a learning process – is categorized into knowledge, competences and abilities.
- **Descriptive indicators:** the learning outcomes which correspond to the qualifications of a certain level are determined by descriptive indicators, which are defined by the qualitative and quantitative classifications of knowledge competences and abilities.
- **Types of qualifications:** qualifications are categorized into types, which represent a group of titles with common features. The use of qualification types facilitates the categorization process of qualifications, which are classified in the same level.

Links between the Hellenic Qualification Framework and the European Framework[24]

The following table of descriptors defining all Qualification Levels in formal education was produced between 30th May 2013 and 30th January 2014 by working groups whose members were selected by the Ministry of Education, Research and Religious Affairs, the General Secretariat for Lifelong Learning and the New Generation, the National Organization for the Certification of Qualifications and Vocational Guidance (EOPPEP), the Greek Rectors' Conference, the Technological Educational Institute Presidents' and Vice-presidents' Conference, the Ministry of National Defence, the Ministry of Culture, the Ministry of Tourism and the Ministry of Shipping & Island Policy. A Committee for Referencing the National Qualifications Framework to the European Qualifications Framework has been formed , its members including representatives from the Ministry of Education, Research and Religious Affairs, the National Organisation for the Certification of Qualifications and Vocational Guidance (EOPPEP), the Greek Rectors' Conference, the Technological Educational Institute Presidents' and Vice-presidents' Conference, the Hellenic Quality Assurance and Accreditation Agency (HQA), the social partners, as well as one person working (externally) for EOPPEP and two experts with international experience.

On 10 September 2014, under the provisions of Law 4283/2014, the following vocational education and training qualifications were specified along with the respective levels:

- Level 3 Vocational Training School (SEK) Certificate
- General Upper Secondary School Certificate, awarded to General Lykeio (GEL) graduates
- Level 4 Vocational Upper Secondary (EPAL) School Certificate, awarded to Vocational Lykeio (EPAL) Grade 3 graduates upon in-school examinations

- Level 4 Vocational Upper Secondary School (EPAL) Degree, awarded to Vocational Lykeio (EPAL) Grade 3 graduates upon in-school examinations
- Level 5 Vocational Upper Secondary School Degree, awarded to EPAL Apprenticeship Class graduates
- Level 5 Vocational training Diploma, awarded to vocational Training Institute (IEK) graduates

The referencing of the Hellenic National Qualifications Framework to the European Qualifications Framework was completed with presentation made by the Greek delegation during the 33rd Meeting of the European Qualifications Framework Advisory Group on 2 December 2015, in Berlin.

Below is the table of the National Qualifications Framework and its correspondence with the European Qualifications Framework:

Table 7. The Greek National Qualifications Framework and its correspondence with the European Qualification Framework

LEVELS OF NQF and EQF	VET	GENERAL EDUCATION	HIGHER EDUCATION
1		Primary Education Leaving Certificate	
2		Lower Secondary Education Leaving Certificate	
3	Diploma of Vocational Specialisation, Education and Training LEVEL 3 (granted to graduates of the apprenticeship year of vocational training schools following a certification)		
4	Vocational School Certificate Vocational Secondary Education Leaving Certificate (equivalent to the common upper secondary education leaving certificate), (granted to graduates of the third year of Vocational upper secondary Education following in-school exams)	Common Upper Secondary Leaving Certificate LEVEL 4 (granted to graduates of common upper secondary education following in school exams)	
5	Diploma of Vocational Specialization, Education and Training, LEVEL 5 (granted to graduates of the apprenticeship year of vocational upper secondary education following certification) Diploma of vocational specialization, education and training, LEVEL 5 (granted to graduates of Vocational Training Institutes following a certification) Diploma/certificate of a tertiary education school (tertiary, but not higher education)		

6				Higher Education Certificate (University/ Technological Educational Institute)
7				Master (M.Sc.)
8				Ph.D. Diploma

Validating non-formal and informal learning and links to the NQF

In the first stage of the National Qualifications Framework was developed the ranking system of qualifications obtained through formal education, while in a later stage, a methodology will be developed in order to rank the qualifications acquired through non-formal education and informal learning.

3.5. National Framework Qualifications system in Latvia

Introduction

The Latvian Qualifications Framework (LQF) is a state level referencing system where the qualifications awarded in the Latvian education system are categorized in levels (in the context of EQF). The LQF structure and functions were developed based on EQF and the context and traditions of the Latvian education, as well as the interests of the stakeholders.

The Education Law (1998, amendments in July 18, 2015, entered into force in July 16, 2015) define the general legislation for Latvian Qualifications Framework.

Latvian Qualifications Framework is an eight-level system that covers all stages of education (basic, secondary and higher education), all types of education (general education, vocational education, academic education) and vocational qualifications obtained in the non-formal education system. The Latvian Qualifications Framework is connected with the European Qualifications Framework.

LQF levels are characterized by the learning outcomes achieved in the educational stage. Every educational stage contains knowledge, skills and competences from the previous stage.

The Vocational Education Law (1999, amendments in April 23, 2015, entered into force in July 16, 2015) matches the vocational qualification level with the LQF levels[25]:

1. Level 1 vocational qualification – corresponds to the LQF level 2;
2. Level 2 of professional qualification corresponds to the LQF level 3;
3. Level 3 of professional qualification corresponds to the LQF level 4;
4. Level 4 of professional qualification corresponds to the LQF level 5;
5. Level 5 of professional qualification corresponds to the LQF level 6 and 7.

The Cabinet of Ministers regulation No 322 entitled "Regulation on the Classification of Latvian education" (June 13, 2017, entered into force in June 16, 2017) determine the descriptions of knowledge, skills and competences according to LQF levels and match the education program types to the LQF/EQF levels.

LQF level descriptions are based on study results in three dimensions:

- Knowledge (knowledge and comprehension);
- Skills (ability to apply skills, communication, general skills);
- Competences (analysis, synthesis and assessment).

Latvian Qualification Framework

According to the Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning adopted by the European Parliament and Council in April 2008 "qualification is a formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards".

However, "learning outcomes are defined by the learner's knowledge, comprehension and skills".

Thus, the term "qualification" in the context of LQF and EQF covers all education types (vocational, general and higher education), all educational stages (basic, secondary and higher education, continuing education), as well as all education forms (formal, non-formal and informal learning). Thus, the Latvian Qualifications Framework covers not only vocational qualifications but general education and academic higher education programs as well.[26]

Table 8. Latvian formal education documents and LQF level

LQF Level	Education documents (qualifications)
1	Certificate for general basic education (special education programs for students with (severe) mental development disorders or several severe development disorders)
2	Certificate for general basic education Certificate of vocational basic education Certificate of vocational qualification
3	Certificate of vocational education Certificate of vocational qualification
4	Certificate of general secondary education Diploma of vocational secondary education Certificate of professional qualification
5	First level professional higher education diploma (college, 2-3 years of full-time studies)
6	Bachelor's diploma Professional Bachelor's diploma Professional higher education diploma, diploma of higher professional qualification (at least 4 years of full-time studies)
7	Master's diploma Professsional Master's diploma Professional higher education diploma, diploma of higher professional qualification (at least 5 years of full-time studies in total)
8	Doctorate Professional Doctorate in Arts

Indication of the LQF level in education certificates

The Cabinet of Ministers regulation No 202 entitled "Procedure for issuing state-recognized certificates of higher education" (April 16, 2013, entered into force in April 19, 2013) adapted

the content of the higher education diploma supplement to correspond the Latvian education system to The European Qualifications Framework. The diploma supplement contains the qualification level in accordance with the Latvian professional qualifications level, European/Latvian Qualifications Framework or EHEA qualification framework level.

The Cabinet of Ministers regulation No 541 entitled "Procedures for issuing state-recognized documents certifying vocational education and professional qualification and documents certifying acquisition of a part of an accredited vocational education program" (2005, with amendments on April 5, 2016, entered into force for LQF on January 1, 2017) determine the requirement to indicate the professional qualification level in the Latvian Qualifications Framework as well.[27]

Broadening of the qualification term

According to the Recommendation of the European Parliament and of the Council on the establishment of the European Qualifications Framework for lifelong learning adopted by the European Parliament and Council in April 2008 "qualification means a formal outcome of an assessment and validation process which is obtained when a competent body determines that an individual has achieved learning outcomes to given standards".[28]

And "learning outcomes means statements of what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills and competence".

Thus, the term "qualification" covers all education sectors (vocational, general and higher education), all educational levels (basic, secondary and higher education, continuing education), as well as all education forms (formal, non-formal and informal learning).

Hence the Latvian qualifications framework includes not only professional qualifications (from basic to higher education level) but also general education and academic higher education qualifications.

3.6.   National Framework Qualifications system in Slovenia

Introduction to the Slovenian education system and professional training

The primary goal of the education system in Slovenia is to provide optimal development of the individual, irrespective of gender, social and cultural background, religion, racial, ethnic or national origin, and regardless of their physical and mental constitution or physical and mental disability. Right to free education is enshrined in Constitution of the Republic of Slovenia. Basic education is compulsory and is publicly funded. The state is obliged to create opportunities for citizens to obtain proper education. Universities and colleges are autonomous

In the Republic of Slovenia, the education system is organised mainly as public service rendered by public and private institutions and private providers holding a concession who implement officially recognised or accredited programmes. By law, public schools are secular and the school space is autonomous; in public schools, political and confessional activities are prohibited. By law, it is allowed to establish private educational institutions that provide their own programmes, thus one may opt for education in line with one's worldview. Concerning the governance of public institutions, the state and the local communities have several roles given that they are the regulators, founders, main financiers and supervisors.

In Slovenia, the Ministry of Education, Science and Sport is responsible for education. It has authority to formulate and implement education policies, as well as make system regulations. The Ministry directly or indirectly outlines national programmes and draws up budgets for preschool, basic, upper secondary, higher vocational and higher education. Furthermore, it lays down criteria for financing public services, oversees budget implementation, supports the salary system administration and standardization of staff statuses, and develops investment and major maintenance programmes. It renders decisions on allocation of different educational programmes to institutions for upper secondary and adult.
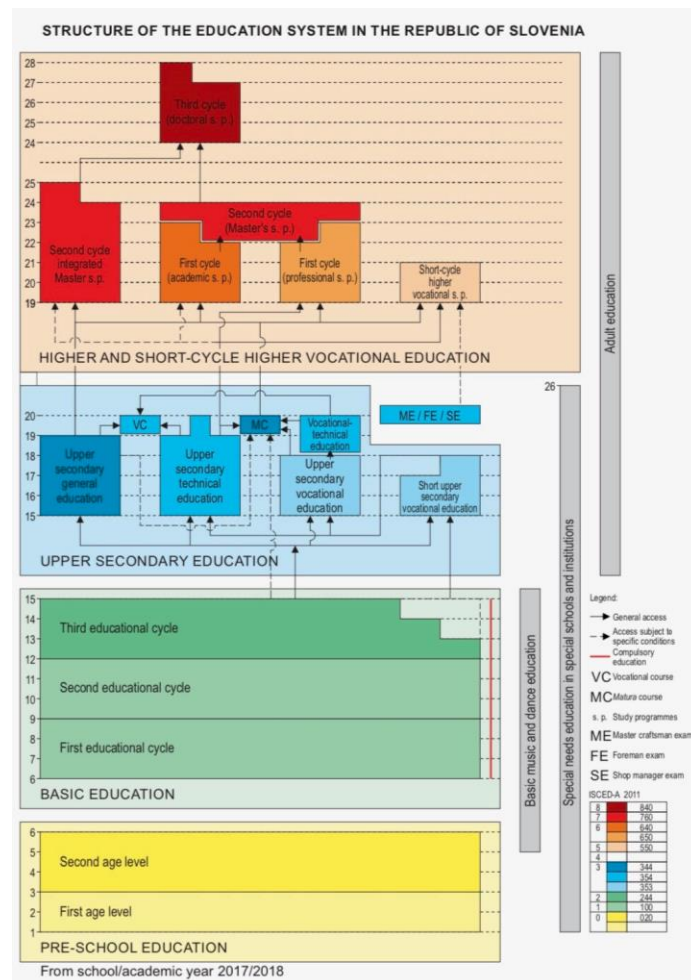

Figure 4. Structure of the Education System in the Republic of Slovenia (Source: MIZG)

Slovenian Qualification Framework[29]

The Slovenian Qualifications Framework (SQF) represents a unified system of qualifications in the Republic of Slovenia for the classification of qualifications into levels with regard to learning outcomes. It consists of 10 levels.

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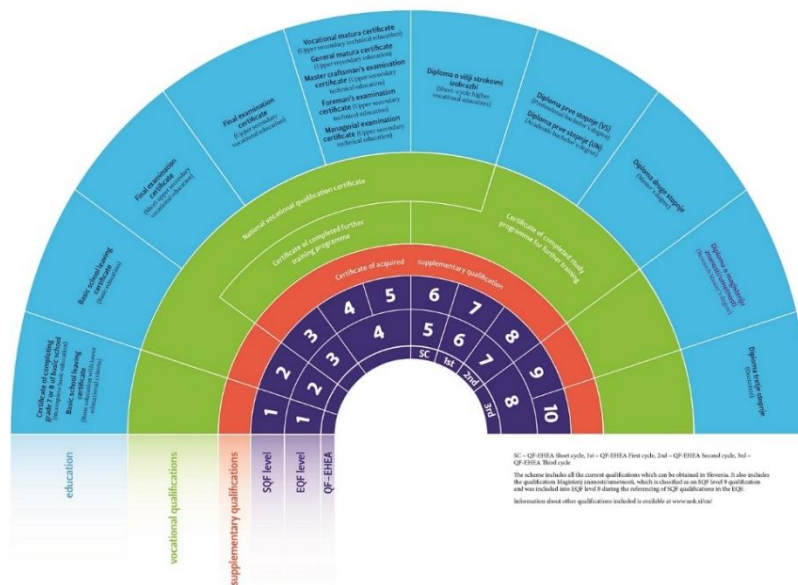
Figure 5. Slovenian Qualifications Framework (Source: NOK)

The Slovenian Qualifications Framework (SQF) represents a unified system of qualifications in the Republic of Slovenia for the classification of qualifications into levels with regard to learning outcomes. It consists of 10 levels.

The SQF is aimed at everyone who wishes to find out about the wide choice of educational and other qualifications available in Slovenia or to verify the mutual comparability of different qualifications. You can use the SQF to check which level your educational or other qualification corresponds to in the European Qualifications Framework (EQF) or the Qualifications Framework for the European Higher Education Area (QF-EHEA).

The SQF includes three categories of qualifications:

- Education, demonstrated by a public document certifying completion of education
- Vocational qualification, demonstrated by an NVQ certificate, issued in accordance with the regulations governing NVQs, or another document certifying completion of a further training programme, issued in accordance with the regulations governing vocational and higher education
- Supplementary qualification, demonstrated by a certificate of acquired supplementary qualification

<u>Links between the Slovenian Qualification Framework and the European Framework</u>[30]

The main role of the Slovenian and other Qualifications Framework is to give explanations on horizontal and vertical relations between different types of qualifications, certificates and diplomas/degrees.

The framework consists of level descriptors whereby each level descriptor is described in terms of learning outcomes. Consequently, learning outcomes constitute the main foundation, term, concept and yardstick of the National Qualifications Framework on which the success and transparency of the National Qualifications Framework and the implementation of the European Qualifications Framework in the EU Member States depends on.

Learning outcomes by means of the National Qualifications Framework aim at:

- Comparability and transparency of qualification systems
- Lifelong learning
- Recognition of non-formal and informal learning
- Quality assurance as well as better integration between education and the labour market

The purpose of the Slovenian Qualifications Framework (SQF) is to achieve transparency and recognisability of qualifications in Slovenia and the EU, while its fundamental objective is to support lifelong learning; to connect and coordinate Slovenian qualifications subsystems; and improve the transparency, accessibility and quality of qualifications with regard to the labour market and civil society.

The SQF is a framework of communication that also contains a small element of reform. The starting points for the classification of qualifications in the SQF are the relevant sectoral legislation and the Classification System of Education and Training (KLASIUS).

The NQF Act was adopted and published in Slovenian Official Journal on 28 December 2015 (no. 104/2015). It is available online (in Slovene language only).

Table 9. Comparison between EQF and SQF

Level	Education	EQF level	SQF level
Educational qualifications	Basic school leaving certificate Certificate of completing grade 7 or 8 of basic school	1	1
Educational qualifications Vocational qualifications	Basic school leaving certificate National vocational qualification certificate	2	2
Educational qualifications Vocational qualifications Supplementary qualifications	Final examination certificate National vocational qualification certificate Certificate of completed further training programme, SQF level 3 Certificate of acquired supplementary qualification, SQF level 3	3	3
Educational qualifications Vocational qualifications Supplementary qualifications	Final examination certificate National vocational qualification certificate Certificate of completed further training programme, SQF level 3 Certificate of acquired supplementary qualification, SQF level 4	4	4
Educational qualifications Vocational qualifications	Vocational matura certificate General matura certificate Master craftsman's examination certificate Managerial examination certificate Foreman's examination certificate National vocational qualification certificate	4	5

	Certificate of completed further training programme, SQF level 5		
Supplementary qualifications	Certificate of acquired supplementary qualification, SQF level 5		
Educational qualifications	Short cycle higher vocational diploma 120	5	6
Vocational qualifications	National vocational qualification certificate Certificate of completed study programme for further training, SQF level 6		
Supplementary qualifications	Certificate of acquired supplementary qualification, SQF level 6		
Educational qualifications	Professional Bachelor 180 – 240 Academic Bachelor 180-240 Pre-Bologna professional higher education Specialisation following old short cycle higher education	6	7
Vocational qualifications	Certificate of completed study programme for further training, SQF level 7		
Supplementary qualifications	Certificate of acquired supplementary qualification, SQF level 7		
Educational qualifications	Master's degree 60 – 120 CP Master's degree 300 – 360 CP Pre-Bologna academic higher education Old higher education		
Vocational qualifications	Certificate of completed study programme for further training, SQF level 8		
Supplementary qualifications	Certificate of acquired supplementary qualification, SQF level 8		
Educational qualifications	Specialisation diploma following academic higher education; referenced as EQF level 7 Pre-Bologna research master Specialisation following old higher education; referenced as EQF level 7		
Educational qualifications	Old research Master		

3.7. Conclusions

ECVET is intended to facilitate the recognition of learning outcomes in accordance with national legislation, in the framework of mobility, for the purpose of achieving a qualification.

Thus, as conclusion it is possible to declare that not all countries are ready for ECVET implementation at the same level and there is still work for a complete integration, mainly with those countries without a credit system.

The European Qualifications Framework (EQF) is a common European reference framework whose purpose is to make qualifications more readable and understandable across European countries and systems.

The comparative analysis developed for each national qualification system of the Consortium stressed the need to provide a clear regulatory framework in terms of European statements in terms of ECVET and EQF.

As it has been defined, the core of the EQF its eight reference levels defined in terms of learning outcomes, i.e. knowledge, skills and autonomy-responsibility. Each country has developed national qualifications frameworks (NQFs) to implement the EQF.

By April 2018, 35 countries had formally linked ("referenced") their national qualifications frameworks to the EQF: Austria, Belgium (Flanders and Wallonia), Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, the Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kosovo, Latvia, Lichtenstein, Lithuania, Luxembourg, Malta, Montenegro, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Sweden, Switzerland, Turkey and the United Kingdom (England, Scotland and Wales).[31]

Thus, regarding the BRACKET Consortium, all partners' countries except Spain have already implemented EQF. It is expected that the remaining countries will also soon implement it.

4. Learning outcomes

4.1. Introduction

Learning outcomes are statements that describe significant and essential learning that learners have achieved and can demonstrate at the end of a course or program. In other words, learning outcomes identify what skills or knowledge that learners acquire and are able to show by the end of a course or program.

According to the target group needs, as defined in IO1, training paths will be designed to meet the necessary areas of knowledge. Specifically, to meet knowledge needs, core training paths and training modules in native languages will be developed to address the specific needs of certain job profiles.

The main conclusions from the implemented survey in IO1 were the following:

- The most important general skills in the near future were innovation management, financing KET projects and entrepreneurs' competences.
- In the field of nanotechnology, nanotechnology for food, medicine and materials, integration of nanotechnology in food, medicine and materials and basic issues of nanotechnology were the most frequently identified.
- Within the field of biotechnology, waste treatment, bioremediation and decontamination, introduction of biotechnology and waste revalorization in high-value products by biotechnological approaches were emphasized as the most important.
- As the most relevant skills related to advanced materials, respondents rated skills in the fields of wood composites, adhesives and resins, and manufacturing of materials with advanced properties.

4.2. Methodology

For designing the common curriculum, the learning outcomes approach was followed according to the principles of European credit system for vocational education and training (ECVET) so as to support lifelong learning, the flexibility of learning pathways and the assessment, recognition and accumulation of the learning outcomes of each individual.

According to the Recommendation on the European Qualifications Framework (EQF), learning outcomes are statements of what a learner knows, understands and is able to do on completion of a learning process. The qualification framework usually details the overall level of learning outcomes. For ECVET purposes, the EQF is used as a reference for levels. Learning outcomes may be acquired through a variety of learning pathways, modes of delivery (school-based, in company, etc.), in different learning contexts (formal, non-formal and informal) or settings (i.e. country, education and training system, etc.).

Based on the main findings of the Skills Analysis developed in IO1, content developers defined the learning outcomes through the suggestions of sector experts and VET authorities by using the term of Knowledge, Skills and Competences according to the Council Recommendation on the European Qualification Framework for lifelong learning.

❖ **Knowledge** means the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the EQF, knowledge is described as theoretical and/or factual.

❖ **Skills** means the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments).

❖ **Competences** mean the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development.

Such learning competences were grouped in units and sub-units, being a unit a component of a qualification, consisting of a coherent set of knowledge, skills and competences that can be assessed and validated. For this, a Unit Description Template was prepared, that includes the basic information for the description of units using ECVET principles:

- The generic unit titles.
- The generic qualification titles.
- The reference of the qualification according to the EQF and NQF levels.
- The learning outcomes contained in the units, in terms of knowledge, skills and competences.
- The procedures and criteria for assessment of such learning outcomes.
- The ECVET points associated.

The BRACKET training curriculum has been designed to further implement those quality indicators that may be applicable to BRACKET, and proposed by the European Parliament and the Council for establishing a European Quality Assurance Reference Framework for Vocational Education and Training. Which will be used to support the quality assurance and improvement cycle, implemented within the European Quality Assurance Reference Framework.

4.3.   Definition of the learning outcomes

For the definition of training units and learning outcomes it was following the Learning Outcomes approach, considering the main modules of BRACKET contents as Units of Learning Outcomes (here after Units).
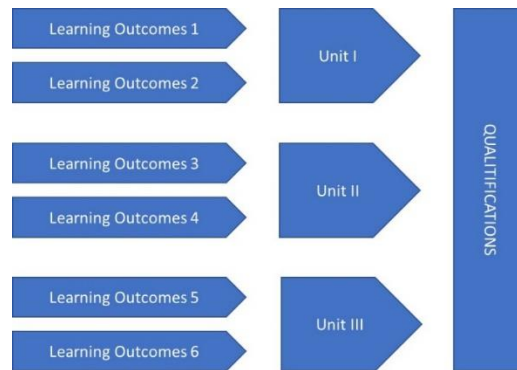

Figure 6. Description of qualifications in terms of units of learning outcomes. Source: http://www.ecvet-toolkit.eu

While preparing the proposal, partners designed the five different BRACKET units, being independent from each other and avoiding redundancies among them.
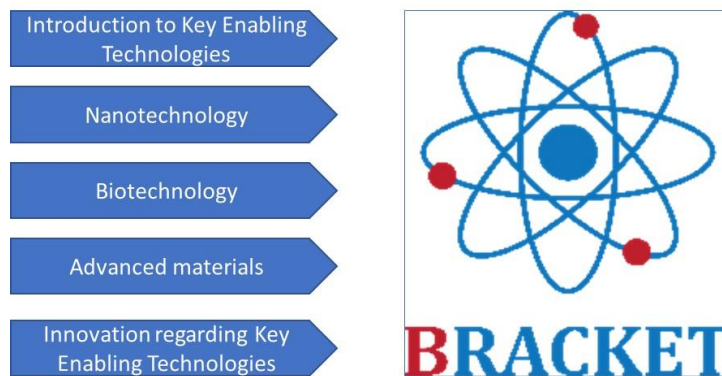

Figure 7. BRACKET Units

In the activities IO2-A1 "*Definition of Learning Outcomes and harmonization to the European qualification system"* and IO2-A2 "Description of Learning Outcomes", these units are broken into learning outcomes. These learning outcomes are statements of what a learner knows, understand and is able to do on completion of a learning process. The following five units and relevant learning outcomes were defined:

Unit 1. Introduction to Key Enabling Technologies

Knowledge (The trainee should know about)	Skills (The trainee should (be able to)	Competences (The trainee should)
- Describe the concept of Industry 4.0 and its current status - Describe the current state (2017-2019) of industrial sector regarding digital transformation - Describe the existence of technologies that allow hybridisation between the physical and digital worlds - Describe the existence of technologies for communication and data treatment - Describe the existence of tools for management of the business and collaborative platforms - Identify sustainability risks and prospects - Reproduce a fundamental understanding of relevant aspects of the natural, environmental and social sciences - Identify moral and social issues relating to sustainability - Understand relevant political and economic factors related to sustainability - Describe Key Enabling Technologies (KETs) - Identify what KETs are	- Identify possible Key Enabling Technologies (KETs) of the Industry 4.0 - Use of HADA tool for digital transformation in automatic diagnosis - Identify technologies that allow hybridisation between the physical and digital worlds - Identify technologies for communication and data processing - Identify tools for management of the business and collaborative platforms - Identify alternatives ways to promote sustainable development in different settings and sectors - Interpret and analyse data related to sustainability - Identify some relevant political, economic factors related to sustainability - Identify moral and social issues related to sustainability - Identify KET and its different types	- Move to next steps to go deeper in concepts of Industry 4.0 and its Key Enabling Technologies (KETs) - Move to next steps for digital transformation in the industrial sector. - Have excellent communications tools - Have persuasion techniques and leadership strategies - Have organisational skills and time management - Demonstrate problem-solving skills - Be able to perform critical analysis of facts and figures - Outlet what KET are - Analyse and compare the different KETs identified

Unit 2. Nanotechnology

Knowledge (The trainee should know about)	Skills (The trainee should (be able to)	Competences (The trainee should)
- Describe the basic concept and definition of nanotechnology - Define the history and evolution of nanotechnology - Define the physical phenomena at the nanoscale, as well as the limitations of classical science and technology - Enumerate the differences between dominant physical processes and effects at the nanoscale and those at the macroscale - State why nanotechnology is an enabling technology - Describe the risks, challenges and limitations that nanotechnology is confronted - Enumerate the main current and future technological applications of nanotechnology, especially in the fields of food, medicine and materials - Describe and the legislation on intellectual property in the field of knowledge and application of nanotechnology - Identify ethical principles and legislative standards in the field of nanotechnology	- Identify the physical phenomena at the nanoscale, as well as the limitations of classical science and technology - Identify the differences between nanoscale and macroscale - Identify the major milestones in the historical development of nanotechnology - Identify nanotechnology risks, challenges and limitations - Identify the current and future technological applications of nanotechnology, especially in the fields of food, medicine and materials and be able to place them in the general context of research and industry - Identify the legislation on intellectual property in the field of knowledge and application of nanotechnology - Identify the ethical principles and legislative standards in the field of nanotechnology	- Have a basic general understanding of challenges of nanotechnology in a wider context - Build capacity for generating new ideas related to nanotechnology applications - Be able to reflect in a holistic way on the pros and cons of nanotechnology - Be sensitized to potential risks relating to the use of nanotechnology - Show interest and initiative in nanotechnology-related matters - Demonstrate familiarity with governance, policy and legislation of nanotechnology - Develop new goods or ideas for current and future technological applications of nanotechnology, especially in the field of food, medicine and materials - Apply the legislation on intellectual property in the field of nanotechnology (knowledge and application) - Apply ethical principles and legislative standards to the field of nanotechnology

Unit 3. Biotechnology

Knowledge (The trainee should know about)	Skills (The trainee should (be able to)	Competences (The trainee should)
- Describe the basic concept and definition of biotechnology and the utilization of microbial, plant, animal and human cells - Define the history and evolution of biotechnology and its competitive advantages cooperated to other non-biological processes - Identify the main aspects and scopes of Food Biotechnology, Agricultural Biotechnology, Medical Biotechnology, and Environmental Biotechnology - Enumerate the use and applications of microorganisms in Environmental Biotechnology and bioremediation - Describe the biological and biochemical principles and technical limitations for some of the most important industrial biotechnological process, emphasizing in microbial bioprocess - Enumerate the main industrial products of biotechnology in the agro-food sector, in medicine and in energy production - Describe the biotechnological processing stages of diverse processes in a research or an industrial environment - Describe the fundaments of biocatalysis and its applications to the chemicals industry, to pharmaceuticals and to food	- Describe the science of biotechnology and identify its product domains and their advantages - Outline the steps in producing and delivering a product made through a biotechnological process - Outline how scientific methodologies are used to conduct research - Apply innovative biotechnological approaches in industrial production in the agro-food, medicine, chemical industry - Outline current and potential applications and uses of biotechnological products - Describe the meaning and industrial applications and processing stages of biocatalysis using enzymes or immobilized cells - Identify and get familiar with the legislation on intellectual property in the field of knowledge and application of biotechnology - Identify and apply the ethical principles and legislative standards in the field of biotechnology	- Demonstrate knowledge that gives the basis or opportunity to be original in the development and/or application of ideas in the field of biotechnology - Demonstrate the capacity of integrating the knowledge and tools of biotechnology and biocatalysis in order to apply them to the different industrial sectors (agro-food, pharmaceuticals, energy and chemicals production, or environmental bioremediation) - Be able to design protocols for the safety and quality control of biotechnological products in compliance with safety regulations (e.g. regarding genetically modified organisms) and bioethics (e.g. in animal or human studies) - Demonstrate ability to use tools, systems or processes in order to conduct research or an solve practical problems in the field of biotechnology, biocatalysis and biotransformation - Demonstrate the ability to utilise intellectual property outputs and disseminate innovation in the field of biotechnology

- Describe biocatalytic stages of diverse processes in a research or an industrial environment - Describe how to disseminate the advantages and innovations of biotechnological products - Define the legislation on intellectual property in the field of knowledge and application of biotechnology - Identify the ethical principles and legislative standards in the field of biotechnology		

Unit 4. Advanced materials

Knowledge (The trainee should know about)	Skills (The trainee should (be able to)	Competences (The trainee should)
- Describe what qualifies a product as fitting the criteria of an advanced material - Recall the manufacturing steps and processes of specific materials to achieve advanced properties - Identify the applications and markets for advanced materials (i.e. advanced engineering wood composites) - Describe the types of graphene and carbon-based materials used in producing advanced materials - Recognise the important properties of graphene and carbon-based materials - Identify the production processing steps for various graphene and carbon-based materials - Describe the types of renewable adhesives and resins used in the production of advanced materials - Recognise the important properties of renewable resins and adhesives - Identify the production processing steps for various renewable adhesives and resins - Recognize various types of advanced engineered wood composite products made from bio-materials (i.e. wood) - Identify the main uses of various wood composites	- Identify the advantages and disadvantages of different manufacturing processes used to produce materials with advanced properties - Determine possible methods and technology to create materials with more advanced properties - Implement product design methodology to fit efficient material use - Identify the advantages and disadvantages of various graphene and carbon-based materials for use in advanced materials applications - Differentiate between the types of graphene and carbon-based materials - Describe the material properties of graphite and carbon-based properties - Identify the advantages and disadvantages of using each type of renewable adhesives and resins in advanced material applications - Differentiate between the types of renewable adhesives and resins - Describe the material properties renewable adhesives and resins - Identify the advantages and disadvantages of each type of advanced engineered wood-based composite products, as compared to competing products	- Employ the use of manufacturing processes to produce materials with advanced properties - Assume responsibility in the preparation of product design according to the type of material to be used - Use advanced manufacturing principles to discover new advanced materials - Employ the use of the appropriate graphene and/or carbon-based materials in advanced material applications - Develop potential advanced materials that include graphene and/or carbon-based materials - Illustrate how graphene and carbon-based materials are used in advanced materials - Employ the use of the appropriate renewable adhesive and/or resin in advance material applications - Develop potential uses for renewable adhesives and resins in advanced composite applications - Illustrate where renewable adhesives and resins are used in advanced materials - Employ the use of the appropriate advanced engineered wood-based composite products in a design situation

- List the raw materials that are used to manufacture different advanced engineered wood-based composites	- Explain the uses and limitations for each type of advanced engineered wood-based composite products - Explain the manufacturing steps for producing advanced engineered wood-based composite products.	- Develop potential uses for appropriate advanced engineered wood-based composite products - Lead the development of product which use advanced engineered wood-based composites

Unit 5. Innovation regarding Key Enabling Technologies

Knowledge (The trainee should know about)	Skills (The trainee should (be able to)	Competences (The trainee should)
- Enumerate categories of IPR and the differences between them - Describe procedures for the protection of intellectual property - Define the structure of patent procedure and the importance of patent claims - Describe the basic structure and aims of IPR agreements and how to implement them. - Describe the structure of license agreements - Reproduce the principles behind the commercialisation process - Identify critical milestones in the research-to market process - Identify commercialisation strategies and how to adapt them to KETs research-to-market processes. - Identify market characteristics and market opportunities - Identify opportunities and limitations in initiating digital marketing in own business context	- Identify Intellectual property rights (IPR) legislation and types of IPR - Be able to apply for a patent protection - Identify trade secrets - Use patent databases - Use licensing - Identify the procedure behind building competitive advantage of a modern enterprise - Identify the stages of research-to-market process for the commercialisation of R&D goods - Use innovation and commercialization strategies - Use management competences in the area of technology commercialisation - Identify Academic entrepreneurship - Identify corporate Entrepreneurship - Identify innovation processes and IPR in the context of public and private organisations	- Illustrate patents as assets, think proactive and be sensitized to IPR protection in the early stage of KET R&D - Be able to analyse patents and draft IP strategies and/or commercialisation strategies based on IPR - Be capable of using patent databases as important tools for technological information and novelty search - Develop communication and negotiation skills (licensing) - Develop a systematic and general understanding of the complexity of KET research-to-market processes. - Be able to detail the process of commercializing R&D output from different angles (researcher, company manager, investors, etc.) - Develop analytical competences and creativity

- Describe the conditions of the organizational process of commercialization of R&D within public research institutions and corporations - Define the legal requirements relating to the process of commercialization of R&D within public and private organisations - Describe the legal forms of commercialisation of scientific research and its main features - Recognise needs and opportunities regarding implementing ICT tools that improve business processes in leading employees toward innovation - State the inclusion of KETs to European and National documents - Identify the most important grants from public and private funds for KETs-related projects - Have knowledge on analysing the need for and potential advantages of using new learning methods exploiting e-learning, formal and non-formal training - Have knowledge on the objectives and benefits from using MOOCs	- Identify spin-off as a form of technology commercialisation - Describe key success factors for efficient digital marketing - Define general steps in planning, implementing and improving digital marketing - Describe ICT tools and concepts supporting collaboration towards innovation and business processes driven by technology - Create concepts of implementing and improving business analyses and strategy planning - Identify the documents which includes KETs at national and European level - Identify the most suitable opportunities for public and private funding of KETs - Use search engines for detecting online courses; find with multiple criteria MOOC and Free Online Courses from Coursera, edX, FutureLearn and other providers and Universities - Describe main advantages and disadvantages of e-learning and online courses - Use examples of available online free MOOC for the purpose of self-development	- Build social competences and communication skills - Develop entrepreneurial thinking - Exploit and innovate digital marketing trends - Exploit digital trends to innovate strategic business and operating models - Enhance creativity - Develop capabilities relating to conflict-solving and decision-making - Develop communication skills - Demonstrate networking capabilities - Be able to instigate innovative processes driven by technology - Be able to apply for KET funding in public and private sector - Be able to detail the integration of KETs at national and European level - Improve own knowledge and skills in the area of KETs by attending online curses - Enable co-workers to exploit online courses and e-learning - Express interest in using available online free MOOC for the purpose of self-development

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