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R2.1 Guide on EQF/ECVET/EQAVET application

WP2: Curricula Design

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EXECUTIVE SUMMARY

The *BioS Training Framework: Methodological Guide on EQF/ECVET/EQAVET* has been elaborated through the Project *BioS*, project number 591945-EPP-1-2017-1-DE-EPPKA2-SSA, co-funded by the Education, Audio-visual and Culture Executive Agency of the Erasmus+ Programme of the European Union. This *Methodological Guide* provides information on the principles and technical specifications of:

- a) the European Qualifications Framework (EQF);
- b) the European Credit System for Vocational Education and Training (ECVET);
- c) the European Quality Assurance in Vocational Education and Training (EQAVET).

The main purpose of this framework is to provide useful information, practical examples and guidelines to support the *BioS* Curricula Design as well as its quality assurance process.

The *European Qualifications Framework* (EQF) is a common European reference framework which aims to contribute towards the mutual understanding and transparency of qualifications across different European countries and systems. The practical implementation of EQF is based on *the Recommendation on the European Qualifications Framework for Lifelong Learning* adopted by the European Parliament and the Council on April 23, 2008. The European Qualifications Framework proposes eight reference levels which span the full scale of qualifications, from basic (EQF level 1) to advanced (EQF level 8) levels. Each level is defined by a set of descriptors that indicate the relevant learning outcomes for qualifications in any given qualifications' system. The description of the EQF level increases in terms of complexity as the EQF level increases. Currently, all the countries that integrate the partnership of the Project *BioS* already have a National Qualifications Framework aligned with the European Qualifications Framework, despite the fact that countries have different stages of development and there are small variations in level descriptors. Following the EQF recommendations for the purposes of the *BioS* curricula design, learning outcomes will be described in terms of knowledge, skills and competence. From the system point of view, *BioS* curricula is aimed at Continuous Vocational Education and Training (C-VET). For that reason and taking into consideration the target group of participants it was decided *BioS* curricula to be aimed at EQF level 5. As a result, learning outcomes in terms of knowledge, skills and competence should be described by reference to the descriptors of EQF level 5.

The *European Credit System for Vocational Education and Training* (ECVET) is a common European technical framework for the transfer, recognition and (where appropriate) accumulation of individuals' learning outcomes with a view to achieve a qualification. In

conjunction with the European Qualifications Framework (EQF), the European Credit System for Vocational Education and Training (ECVET) aims to achieve greater compatibility between the different Vocational Education and Training systems (VET) across Europe and their qualifications. *The Recommendation of the European Parliament and of the Council, June 18, 2009 on the establishment of a European Credit System for Vocational Education and Training (ECVET)* is a key European tool with guidelines to boost the creation and implementation of a European credit system for Vocational Education and Training (VET). This Recommendation establishes common ECVET principles and technical specifications for ECVET and recommends wider ECVET promotion and implementation by all Member States.

ECVET implementation requires that qualifications be described in terms of learning outcomes, which should be grouped into units of learning outcomes. A qualification should be composed of a set of units of learning outcomes, and the units can be accumulated and transferred to obtain a certain qualification. To do so, a credit point system has to be put into practice. A certain number of credit points must be assigned to the whole qualification and to each unit of learning outcome in particular. ECVET points are numerical representations of the overall weight of learning outcomes and of the relative weight of units in relation to the qualification.

A step by step methodology has been described in this guide in order to facilitate the conception of the *BioS* curricula and ensure that it is conceived in such a way that all conditions for ECVET implementation are attended.

The first step of the methodology is to identify the expected learning outcomes of the training. The whole training referential of the qualification has to be described in terms of learning outcomes. Within the context of *BioS* Project, learning outcomes are understood as a set of knowledge, skills and competences needed to put into practice key tasks or *key technical outcomes*. The description of the *knowledge*, *skills* and *competence* are interconnected for each *key technical outcome*. Within the context of the Project *BioS*, knowledge is described in terms of what the learner knows and understands. In the description of what the learner knows, the body of facts, principles, theories and practices which are related to a field of work or study are implied. 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). Within the context of the Project *BioS*, skills are described in terms of what the learner is able to do. The description of the skills must obey, in terms of writing, to the structure of the statement initiated by the verb that indicates the type of skill, conjugated in the infinity, followed by the description of the action. Competences are described in terms of what the learner

does, applying knowledge, skills, and putting in evidence professional attitudes, personal, social and methodological abilities. The description of the competence must obey, in terms of writing, to the structure of the statement initiated by the action verb that indicates the type of competence, conjugated in the present simple and continuous forms, followed by the description of the observable action.

The second step of the methodology is to group learning outcomes into units and define the units of learning outcomes that compose the qualification of BioS. A *unit of learning outcome* is a component of a qualification, consisting of a coherent set of knowledge, skills and competence that can be assessed and validated with a number of associated ECVET points. The main rule for grouping *learning outcomes* into *units* is the coherence, interconnectivity, reciprocity and interdependence of knowledge, skills and competence associated with each *key technical outcome* among each other. A set of criteria are taken into account to group *learning outcomes* such as: the relation of *learning outcomes* to the same set of key technical tasks; the relation of *learning outcomes* to the same product/outcome; the relation of *learning outcomes* to the same production technique. For the purposes of the Project *BioS*, it is considered that a *unit of learning outcomes* should be composed by the following components: title of the qualification to which the unit relates; EQF level; title of the unit; number of hours; key technical outcome; knowledge; skills; competences; performance criteria; *outputs*; ECVET credit points.

The third step of the methodology is to attribute ECVET Points to qualifications and units, representing the qualification and each unit by a specific number of ECVET Points. A certain number of ECVET credit points are allocated to units of learning outcomes, so it can be possible to transfer and accumulate units of learning outcomes. Within the context of the *BioS* Project, the role for the attribution of ECVET Points to Units of Learning Outcome follows the convention to which 60 points are allocated to the learning outcomes expected to be achieved in a year of formal full time vocational education and training, in accordance with the *Recommendation of the European Parliament and of the Council of 18 June 2009*. Following the convention, a VET formal learning context is taken as a reference in each country and on the basis of 60 ECVET points per year of formal full time VET, the total number of ECVET points are assigned to the qualification.

The European Quality Assurance in Vocational Education and Training (EQAVET) is a practice that brings Member States, Social Partners and the European Commission together to promote European collaboration by developing and improving quality assurance in Vocational Educational and Training. The *Recommendation of the European Parliament and of the Council of June 18, 2009 on the establishment of a European Quality*

Assurance in Vocational Education and Training established a European quality assurance reference framework, comprising a quality assurance and improvement cycle, composed by four phases – planning, implementation, evaluation/assessment, review/revision – which is supported by a selection of quality criteria, descriptors and indicators applicable to quality management of both VET-system and VET-provider levels. Indicators could be used as a *toolbox* from which VET providers can select the more relevant indicators for their quality assurance system.

The EQAVET working group has also identified a set of building blocks which could support the implementation of work based learning, providing guidance and set up activities that could help VET providers to develop and implement a quality assurance approach for work based learning procedures that are in line with the EQAVET framework.

For BioS purposes the indicators 4 “Completion rate in VET programmes” and 6 “Utilization of acquired skills at the workplace” are going to be incorporated in the development of the quality assurance process. Some possible questions for the further exploration of these indicators are also proposed by this guide. Furthermore where relevant and applicable, during the implementation of work-based learning component of BioS VET program key questions for building blocks setting should be effectively addressed.

Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including Commission services and project reviewers)	
CO	Confidential, only for members of the consortium (including EACEA and Commission services and project reviewers)	

Table of Contents

EXECUTIVE SUMMARY	3
LIST OF ABBREVIATIONS	9
PREFACE	10
1. EUROPEAN QUALIFICATIONS FRAMEWORK (EQF)	12
1.1 What is the European Qualifications Framework (EQF)?.....	12
1.2 The main Principles of the European Qualifications Framework.....	12
1.3 Reference Levels in the European Qualifications Framework	13
Source: Adapted from the <i>European Parliament and of the Council (2008). Recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning</i> (pp. C111/5-C111/6). Official Journal of the European Union. 2008/C 111/01.	15
1.4 Development State of the National Qualifications Framework (NQF) in the Consortium Countries	15
1.5 European Qualifications Framework (EQF) and BioS Curricula Design	17
2. EUROPEAN CREDIT SYSTEM FOR VOCATIONAL EDUCATION AND TRAINING	19
2.1 What is the European Credit System for Vocational Education and Training (ECVET)?	19
2.2 Benefits of European Credit System for Vocational Education and Training (ECVET) ..	19
2.3 Stage of Development of the European Credit System for Vocational Education and Training (ECVET) in the Countries of the Consortium	20
2.4 How does the European Credit System for Vocational Education and Training (ECVET) Work? 22	
2.5 Integration of EQF and ECVET principles into BioS Curricula design.....	25
2.5.1 Identifying the Learning Outcomes	25
2.5.2 Defining units of learning outcomes	27
2.5.3 Attributing ECVET Points and Credits to Units of learning Outcomes	32
3. EUROPEAN QUALITY ASSURANCE IN VOCATIONAL EDUCATION AND TRAINING	34
3.1 What is the European Quality Assurance in Vocational Education and Training (EQAVET)?.....	34
3.2 How does EQAVET Work?	34
3.3 Work based learning building blocks.....	38
BIBLIOGRAPHY	41
DOCUMENTS	41
WEBSITES.....	43

<https://eacea.ec.europa.eu/national-policies/en/mobility-scoreboard/ivet-indicators/scoreboard-indicator-3-recognition-learning-outcomes-0>..... 43

List of Tables

Table 1: Descriptors defining levels in the European Qualifications Framework. 13

Table 2: Development of National Qualifications Frameworks in the countries of the Consortium.
 15

Table 3: EQF descriptors for level 5 in the European Qualifications Framework. 17

Table 4: Template to describe a Unit of Learning Outcomes in Project BioS (example of module 1)...... 30

Table 5: Indicators per EQAVET cycle phase. 37

Table 6: Building blocks for WBL. 37

List of Figures

Figure 1: Benefits of ECVET...... 19

Figure 2: Recognition of learning outcomes in Europe for VET (2017)...... 20

Figure 3: Diagram on ECVET implementation. 22

Figure 4: Diagram on ECVET principles and technical components. 23

Figure 5: Unit of learning outcomes in BioS. 28

Figure 6: The four phases of the quality assurance model. 34

LIST OF ABBREVIATIONS

C-VET: Continuing Vocational Education and Training

ECVET: European Credit System for Vocational Education and Training

EQAVET: European Quality Assurance in Vocational Education and Training

EQF: European Qualifications Framework

ILO: International Labour Organization

I-VET: Initial Vocational Education and Training

NQF: National Qualifications Framework

OECD: Organisation for Economic Co-operation and Development

VET: Vocational Education and Training

WBL: Work Based Learning

PREFACE

The **BioS Training Framework: Methodological Guide on EQF/ECVET/EQAVET** has been elaborated through the **Project BioS**, project number 591945-EPP-1-2017-1-DE-EPPKA2-SSA, co-funded by the Education, Audio-visual and Culture Executive Agency of the Erasmus+ Programme of the European Union.

The purpose of the **BioS Training Framework: Methodological Guide on EQF/ECVET/EQAVET** is to provide guidance on EQF (European Qualifications Framework), ECVET (European Credit System for Vocational Education and Training) and EQAVET (European Quality Assurance in Vocational Education and Training) to support the BioS Curricula Design.

This Guide is one public resource of the Project BioS available in paper and digital format, elaborated by the partner Escola Profissional do Alto Lima CIPRL. It corresponds to task number 2.1 of Work package number 2 – "BioS Curricula design".

The **BioS Training Framework: Methodological Guide on EQF/ECVET/EQAVET** is aimed at:

- Organizations that integrate the Consortium of the BioS Project;
- Expert Advisory Board;
- Education, Audio-visual and Culture Executive Agency;
- Healthcare sector representatives:
 - Medical doctors
 - Nurses professionals;
 - Schools of Medicine;
 - Nursing Schools;
 - Public Health Care Organizations;
 - Private Health Care Organizations;
- Medical and Scientific Associations and Societies;
- Teaching-Research Institutions;
- Adult Learning Providers;
- Bioinformatics sector representatives;
- Policy makers;
- Scientific Editors of Medical Journals;
- Medical Media;
- General Public.

1. EUROPEAN QUALIFICATIONS FRAMEWORK (EQF)

1.1 What is the European Qualifications Framework (EQF)?

The *European Qualifications Framework*, herein after referred to as EQF, is a common European reference framework which aims to contribute towards the mutual understanding and transparency of qualifications across different European countries and systems (Office for Official Publications of the European Communities, 2008).

The guidelines provided by EQF make it possible to have a comprehensive overview of qualifications among the 39 European countries that are currently involved in its implementation.

EQF constitutes itself as a bridge between the national qualifications systems and takes into account the diversity of national systems and facilitates the translation and comparison of qualifications between countries.

This common framework contributes towards the development of a Europe knowledgeable at all levels of education and training, as well as, the internationalization and educational and training excellence in Europe, supporting cross-border mobility of learners and workers and lifelong learning across Europe.

EQF is a necessary basis for the achievement of educational objectives related to the smart, sustainable and inclusive growth of the Europe 2020 Strategy.

The *European Qualifications Framework* covers qualifications at all levels and in all sub-systems of education and training.

1.2 The main Principles of the European Qualifications Framework

The implementation of the European Qualifications Framework implies the following principles (Office for Official Publications of the European Communities, 2008):

- development of National Qualifications Frameworks in accordance with the European Qualifications Framework and national legislation and practice;
- follow the European framework of qualification levels to describe qualifications;
- use an approach based on learning outcomes when defining and describing qualifications, and promote the validation of non-formal and informal learning in accordance to the common European principles;
- use a common set of descriptors to indicate the relevant learning outcomes of qualifications at each level in any system of qualifications;
- apply common principles of quality assurance in education and training.

Therefore, the following definitions are given for common understanding by the European Parliament and Council (2008)

- National Qualifications Framework – *“an instrument for the classification of qualifications according to a set of criteria for specified levels of learning achieved,*

- which aims to integrate and coordinate national qualification subsystems and improve the transparency, access, progression and quality of qualifications in relation to the labour market and civil society”;*
- National Qualifications System – *“all aspects of a Member State's activity related to the recognition of learning and other mechanisms that link education and training to the labour market and civil society. This includes the development and implementation of institutional arrangements and processes relating to quality assurance, assessment and the award of qualifications. A national qualifications system may be composed of several subsystems and may include a national qualifications framework”;*
 - Qualification – *“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”;*
 - Learning Outcomes – *“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”.*

1.3 Reference Levels in the European Qualifications Framework

The Council of the European Union (2017), proposes eight reference levels for the European Qualifications Framework which span the full scale of qualifications, from basic (Level 1 - example school leaving certificates) to advanced (Level 8 - example Doctorates) levels.

Being a tool for Lifelong Learning, EQF encompasses all levels of qualifications acquired in general, vocational education and training and academic education. The framework addresses both qualifications acquired in initial and in continuing education and training.

Each level is defined by a set of descriptors that indicate the relevant learning outcomes for qualifications in any given qualifications' system. Each level is defined in terms of knowledge, skills and competence.

The description of the EQF level increases in terms of complexity as the EQF level increases. In the context of EQF: knowledge is described as theoretical and/or factual; skills are described as cognitive and practical; competence is described in terms of responsibility and autonomy.

Table 1 describes the relevant learning outcomes for each EQF level, in terms of knowledge, skills and competence, according to the Annex II of the *Recommendation on the European Qualifications Framework for Lifelong Learning adopted by the European Parliament and the Council (2008)*.

Table 1: Descriptors defining levels in the European Qualifications Framework.

EQF Level	Knowledge	Skills	Competence
	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, competence is described in terms of responsibility and autonomy. Responsibility and Autonomy are described as the ability of the learner to apply knowledge and skills autonomously and with responsibility.
Level 1 Relevant LO:	Basic general knowledge.	Basic skills required to carry out simple tasks.	Work or study under direct supervision in a structured context
Level 2 Relevant LO:	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.
Level 3 Relevant LO:	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 methods, tools, materials and information.	Take responsibility for completion of tasks in work or study; adapt own behaviour to circumstances in solving problems.
Level 4 Relevant LO:	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.
Level 5 Relevant LO:	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.
Level 6 Relevant LO:	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.
Level 7 Relevant LO:	Highly specialized knowledge, some of which is at the forefront of knowledge in a field of work or study, as the	Specialised problem-solving skills required in research and/or innovation in order to develop new knowledge and procedures and to	Manage and transform work or study contexts that are complex, unpredictable and require new strategic approaches; take

	basis for original thinking and/or research. Critical awareness of knowledge issues in a field and at the interface between different fields.	integrate knowledge from different fields.	responsibility for contributing to professional knowledge and practice and/or for reviewing the strategic performance of teams.
Level 8 Relevant LO:	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.

Source: Adapted from the *European Parliament and of the Council (2008). Recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning* (pp. C111/5-C111/6). Official Journal of the European Union. 2008/C 111/01.

1.4 Development State of the National Qualifications Framework (NQF) in the Consortium Countries

Currently, all the countries that integrate the partnership of the Project *BioS* already have a National Qualifications Framework aligned with the European Qualifications Framework, despite the fact that countries have different stages of development and there are small variations in level descriptors.

Portugal is one of the most developed countries, with an operational National Qualifications Framework aligned with the European Qualifications Framework since 2011.

Table 2 compares the state of development of the National Qualifications Framework in the countries that integrate the Consortium.

Table 2: Development of National Qualifications Frameworks in the countries of the Consortium.

Country	Scope of the Work	Number of levels	Levels descriptors	Stage of development	NQF linked to EQF
Belgium-fl	Comprehensive NQF, including all levels and types of qualification from formal education and training and from the professional qualifications system.	Eight	<ul style="list-style-type: none"> • knowledge/skills • context/autonomy/responsibility 	Operational	2011, 2014 update
Belgium-fr	Designed as comprehensive framework; will include all levels and types of qualification from formal education and training and from the professional qualifications system.	Eight	<ul style="list-style-type: none"> • knowledge/skills • context/autonomy/responsibility 	Formally adopted	2013
Belgium-de	Comprehensive NQF including all levels and types of qualification from formal education and training.	Eight	<ul style="list-style-type: none"> • occupational competence (knowledge and skills) • personal competence (social competence and autonomy) 	(Early) Operational	
Cyprus	Comprehensive NQF, including all levels and types of qualification from formal education and training and from the system of vocational qualifications.	Eight with sublevels at levels 5 and 7	<ul style="list-style-type: none"> • knowledge • skills • competence 	(Early) Operational stage	2017
Finland	Comprehensive framework including all state recognized qualifications.	Eight	<ul style="list-style-type: none"> • integrated level descriptors include knowledge, skills and key competences 	Operational	2017
Germany	Comprehensive NQF for lifelong learning; includes qualifications from general education, VET, higher education and qualifications from regulated further training.	Eight	<ul style="list-style-type: none"> • professional competence (knowledge and skills) • personal competence (social competence and autonomy) 	Operational	2012
Greece	Comprehensive NQF including all levels and types of qualification from formal education and training.	Eight	<ul style="list-style-type: none"> • knowledge • skills • competence 	(Early) Operational stage	2015

Italy	Comprehensive framework will include all levels and types of qualification from formal education and training and regional qualifications.	Eight	<ul style="list-style-type: none"> • knowledge • skills • autonomy and responsibility 	Formally adopted	2013	major national qualifications from formal education and training linked directly to EQF
Portugal	Comprehensive NQF including all levels and types of qualification from formal education and training and from the national system for the recognition, validation and certification of competences.	Eight	<ul style="list-style-type: none"> • knowledge • skills • attitudes 	Operational	2011	
Spain	Designed as comprehensive NQF for lifelong learning; will include all levels and types of qualification from formal education and training. NQF for higher education in place.	Eight proposed	<ul style="list-style-type: none"> • knowledge • skills and abilities • competence 	Advanced development stage		

Source: Adapted from the CEDEFOP (2017). *Overview of National Qualifications Framework Developments in Europe 2017*. Thessaloniki: Publications Office.

1.5 European Qualifications Framework (EQF) and BioS Curricula Design

The *BioS* curriculum is aimed at Continuous Vocational Education and Training (C-VET), and specifically at advancing the skills of medical doctors on digital skills and computational biology as well as their transversal skills.

For this reason and depending on the specific country conditions training provided by BioS will be at the level of higher secondary vocational training (EQF level 5). Therefore, **the description of learning outcomes (knowledge, skills and competence) should be done by reference to the descriptors of EQF level 5 which is presented in table 3.**

Table 3: EQF descriptors for level 5 in the European Qualifications Framework.

EQF Level	Knowledge	Skills	Competence
	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, competence is described in terms of responsibility and autonomy . Responsibility and Autonomy are described as the ability of the learner to apply knowledge and skills autonomously and with responsibility.
Level 5 Relevant LO:	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.

Source: Adapted from the *European Parliament and of the Council (2008). Recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning* (pp. C111/5-C111/6). Official Journal of the European Union. 2008/C 111/01.

Independently of the variations founded between countries in the level descriptors, in the context of BioS curricula design, we propose to describe learning outcomes in terms of “knowledge”, “skills” and “competence”. More detailed information on how to describe learning outcomes can be found in Chapter 2.

2. EUROPEAN CREDIT SYSTEM FOR VOCATIONAL EDUCATION AND TRAINING

2.1 What is the European Credit System for Vocational Education and Training (ECVET)?

The European Credit System for Vocational Education and Training, hereinafter referred to as ECVET, is a common European technical framework for the transfer, recognition and (where appropriate) accumulation of individuals' learning outcomes in light of achieving a qualification.¹

In conjunction with the European Qualifications Framework (EQF), the European Credit System for Vocational Education and Training (ECVET) aims to achieve greater compatibility between the different Vocational Education and Training systems (VET) across Europe and their qualifications (European Parliament and Council, 2009).

ECVET has been set up to work with other European tools and aims to make it easier for European citizens to recognize their knowledge, skills and competencies in another European country.

ECVET is foreseen to be a European tool supporting mutual trust in the field of qualifications and increasing transparency in relation to individual learning experiences, making mobility more attractive between different countries and different learning environments. (European Commission, 2005; European Parliament and Council, 2008; European Parliament and Council, 2008).

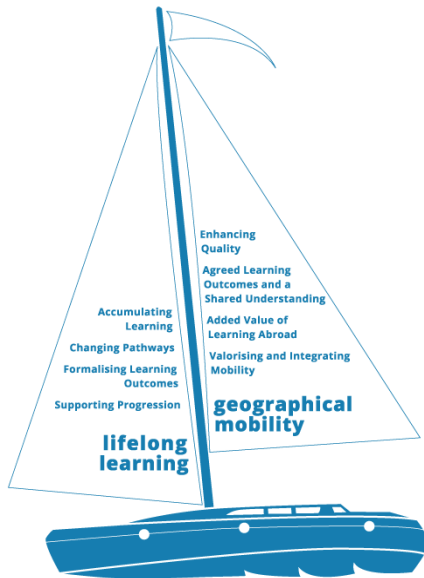
ECVET contributes towards lifelong learning, recognizing learning outcomes achieved in formal, non-formal and/or informal settings in order to ensure that such achievements can contribute to the acquisition of a qualification.

2.2 Benefits of European Credit System for Vocational Education and Training (ECVET)

ECVET brings a set of benefits for geographic mobility and lifelong learning.

¹ <http://www.ecvet-toolkit.eu/introduction/what-ecvet>

Figure 1: Benefits of ECVET.



Source:

<http://www.ecvet-toolkit.eu/introduction/why-use-ecvet>

From the lifelong learning point of view², ECVET supports the flexibility of programmes and pathways. ECVET enhances the opportunities for lifelong learning making it easier to recognize the learning achievements that youths or adults gained in other contexts, such as in other countries, organizations or systems, as well as in different settings (formal, non-formal, or informal learning).

2.3 Stage of Development of the European Credit System for Vocational Education and Training (ECVET) in the Countries of the Consortium

Countries have different stages of development regarding the recognition of learning outcomes in VET.

In accordance with the European Commission's Mobility Scoreboard³, in October 2017, the indicator “recognition of learning outcomes” obtained the following results for VET:

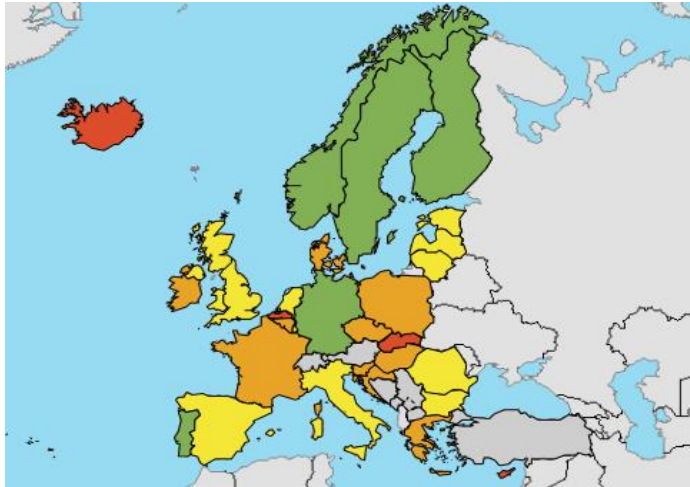
- Portugal, Germany and Finland – “very good performance”;
- Spain and Italy – “good performance”;
- Greece and Belgium-fr – “some progress has been made”;

² <http://www.ecvet-toolkit.eu/introduction/why-use-ecvet>

³ The European Commission's Mobility Scoreboard has been developed by Eurydice (higher education) and Cedefop (Initial Vocational Education and Training - IVET). It follows up on the 2011 'Youth on the Move' Recommendation of the Council of the European Union, providing a framework for monitoring progress made by European countries in creating a positive environment supporting learner mobility. Indicators aim to help countries identify actions to remove obstacles to learner mobility.

- Cyprus – “little progress has been made yet”.

Figure 2: Recognition of learning outcomes in Europe for VET (2017).



Legend:

4.5 < Country's score in the indicator	Excellent performance
3.5 < Country's score in the indicator ≤ 4.5	Very good performance
2.5 < Country's score in the indicator ≤ 3.5	Good performance
1.5 < Country's score in the indicator ≤ 2.5	Some progress has been made
Country's score in the indicator ≤ 1.5	Little progress has been made yet

Source: <https://eacea.ec.europa.eu/national-policies/en/mobility-scoreboard/ivet-indicators/scoreboard-indicator-3-recognition-learning-outcomes-0>

Concerning the range of learning components that can be taken into account for the recognition of learning outcomes acquired abroad by VET learners, countries are distinguished depending on the variety of learning components that their approach to recognition covers. The components considered are courses, credit points, units, modules, programmes, qualifications/diplomas /degrees. In 2017, the situation was as follows⁴: In Germany, Portugal, Finland and Greece all six types of components are covered. Spain and Belgium-FR recognize four types of components. Italy and Belgium-NL recognize three types of components. In Cyprus, the recognition approach in place only applies two components. In Belgium-DE, recognition mechanisms are lacking or with very limited coverage.

In reference to overall coordination in VET mobility policy, in 2017, the situation was as follows⁴: Finland, Germany, Italy and Portugal have a complete countrywide coordination with decentralised implementation. In Greece, part the of the VET mobility policy is

⁴ <http://www.cedefop.europa.eu/en/publications-and-resources/data-visualisations/mobility-scoreboard/country-fiches?fiche%5B%5D=2143&year%5Bvalue%5D%5Byear%5D=2017>

already coordinated, and there are plans for the overall coordination. In Spain, part of the VET mobility policy is already coordinated, but there are no plans for overall coordination. In Belgium-FR, Belgium-DE, Belgium (NL) and Cyprus there are no coordination mechanisms.

It is considered that as sooner recognition is processed and notified, the better will be for learner to go ahead with further study/work plans. The analysis of the time limit for processing applications and/or granting recognition, in 2017, shows that⁵:

- in Germany, the sending organization has to ensure that competencies relevant for the qualification are acquired, so in practice a recognition process doesn't exist;
- in Portugal, the regulatory time limit for processing recognition is 30 working days;
- in Finland, there is a time limit of four months for handling application for the recognition of qualifications;
- in Spain, Italy, Greece, Belgium-FR and Belgium-NL there is no time frame at all;
- Belgium-DE has no recognition mechanisms.

Concerning the analysis of use of EU tools for visibility, transfer and recognition of learning outcomes acquired abroad in VET, five tools were considered: Europass Mobility Document; Europass Certificate Supplement; ECVET; EQF/NQF; learning outcomes approach. Countries are distinguished depending on the number of tools that are using. In 2017, the situation was as follows⁵: Germany, Portugal, Spain are using all five European tools. In Finland, four European tools are in use. In Greece, three European tools are in use. Cyprus, Italy and Belgium-FR are using two European tools. Only one European tool is in use in Belgium-DE and Belgium-NL.

2.4 How does the European Credit System for Vocational Education and Training (ECVET) Work?

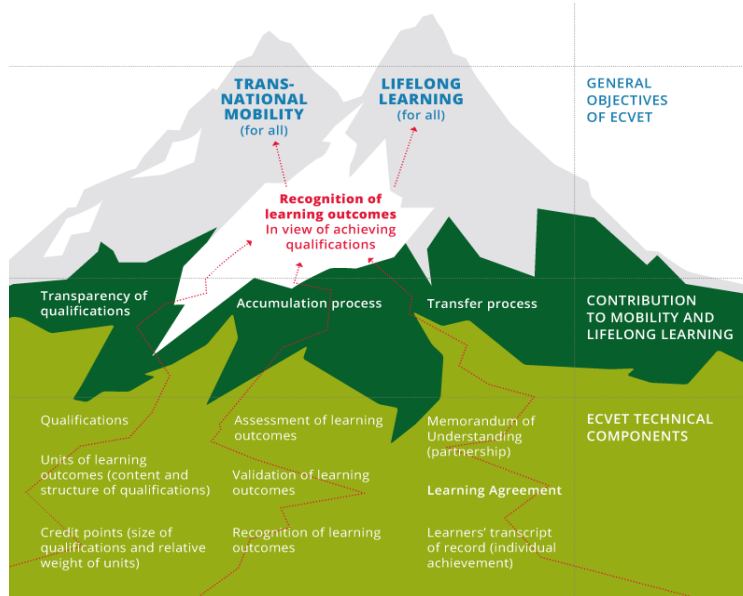
ECVET implementation requires that qualifications be described in terms of learning outcomes, which should be grouped into units of learning outcomes (European Parliament and Council, 2009). Learning outcomes can be achieved by individual learners through various different learning pathways and different learning contexts.

A qualification should be composed of a set of units of learning outcomes, and the units can be accumulated and transferred to obtain a certain qualification. To do so, a credit point system has to be put into practice. A certain number of credit points must be assigned to the qualification. A qualification and each unit of learning outcomes must be

⁵ <http://www.cedefop.europa.eu/en/publications-and-resources/data-visualisations/mobility-scoreboard/country-fiches?fiche%5B%5D=2145&year%5Bvalue%5D%5Byear%5D=2017>

represented by a specific number of credit points.

Figure 3: Diagram on ECVET implementation.



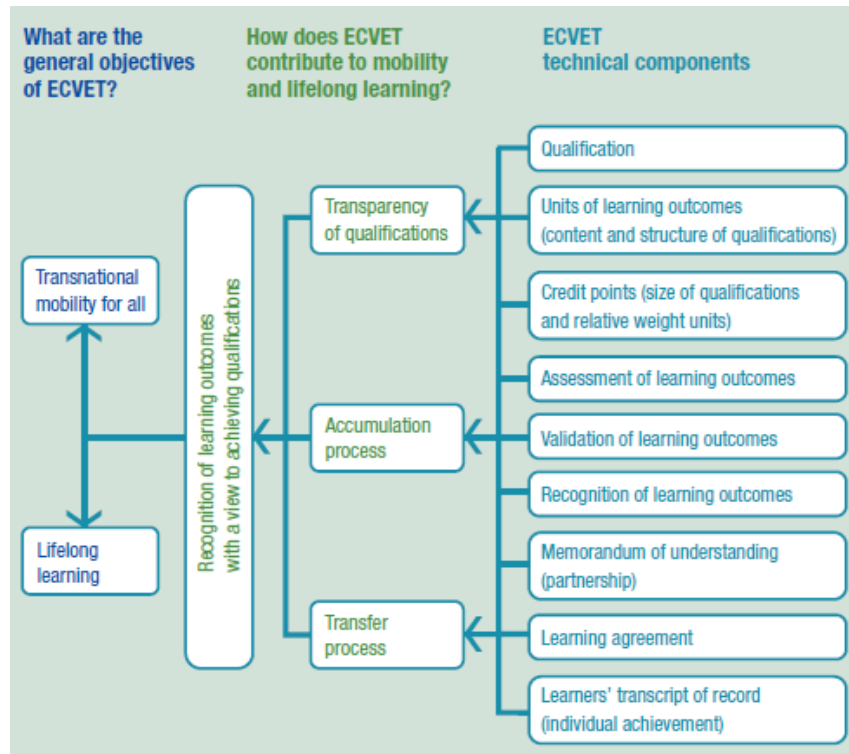
Source: <http://www.ecvet-toolkit.eu/introduction/ecvet-principles-and-technical-components>

Credits can be accumulated and transferred. Credit transfer consists of a process through which learning outcomes achieved in one context can be validated and recognized and taken into account in another context. Credit transfer implies a previous evaluation, validation and recognition of learning outcomes. Credit accumulation consists of a process through which learners can progressively achieve qualifications by successive assessment processes and validation of learning outcomes. Within the ECVET framework, ECVET points allocated to qualifications and units of learning outcomes are recommended. ECVET points are “a numerical representation of the overall weight of learning outcomes in a qualification and of the relative weight of units in relation to the qualification” (*European Parliament and Council 2009*). The number of ECVET points allocated to a qualification, alongside units, learning outcomes and EQF level, can support the understanding of a qualification. “The number of ECVET points allocated to a unit provides the learner with information concerning the relative weight of what he/she has accumulated already. It also provides the learner with information concerning what remains to be achieved.” (Aribaud and Hess, 2011, p. 22).

Units of learning outcomes achieved in a given context have to be assessed. Assessment of learning outcomes means the “methods and processes used to establish the extent to which a learner has in fact attained particular knowledge, skills and competence”

(European Parliament and Council, 2009). After successful assessment, learning outcomes can be transferred to another context, for example, to another country. In this second context, learning outcomes have to be validated and recognized by the competent institution as part of the requirements for the qualification that the learner is aiming to achieve.

Figure 4: Diagram on ECVET principles and technical components.



Source: Cedefop (2012). *Necessary conditions for ECVET implementation*. Luxembourg: Publications Office of the European Union.

In the ECVET recommendations (European Parliament and Council, 2009), validation of learning outcomes is defined as “the process of confirming that certain assessed learning outcomes achieved by a learner correspond to specific outcomes which may be required for a unit or a qualification” and the recognition of learning outcomes is defined as “the process of attesting officially achieved learning outcomes through the awarding of units or qualifications”. According to the same source, “credit transfer based on ECVET and applied to learning outcomes achieved in formal learning contexts should be facilitated by establishing partnerships and networks involving competent institutions, each of which is empowered, in their own setting, to award qualifications or units or to give credit for achieved learning outcomes for transfer and validation”.

2.5 Integration of EQF and ECVET principles into BioS Curricula design

For the design of the BioS curricula the following methodology is going to be followed:

1. Identification of the learning outcomes;
2. Defining units of learning outcomes;
3. Attributing of ECVET point and credits to the units of learning outcomes.

The EQF and ECVET principles are going to be incorporated in this methodology.

2.5.1 Identifying the Learning Outcomes

The identification of the learning outcomes is the essential part of designing a training programme. The main aim of BioS project is to produce a training programme for medical doctors in bioinformatics; therefore, learning outcomes have to be defined according to their training needs, prior to defining the training content and training methodology and evaluation. This is one basic principal for ECVET implementation. Learning outcomes should be clearly identified and described in accordance with a common conceptual framework in order to allow a reciprocal understanding of the qualification.

What are Learning Outcomes?

In VET programmes, learning outcomes are being referenced to a functional or research-based analysis of labour market demand, based in occupational standards and associated professional competences. Usually, countries formulate their categorisation of knowledge, skills, competences, aptitudes or attitudes. (CEDEFOP, 2009)

Learning Outcomes have been described (European Parliament and Council, 2009) as *“statements of what a learner knows, understands and is able to do upon completion of a learning process and which are defined in terms of knowledge, skills and competence”*.

Within the context of the *BioS* Project, learning outcomes are understood as a set of knowledge, skills and competences needed to put into practice key realizations or key tasks by learners. Therefore, *learning outcomes* are described in terms of knowledge, skills and competences. The description of the knowledge, skills and competences are interconnected for each key technical outcome.

For the formulation of BioS learning outcomes the following points should be taken into consideration:

- *Learning outcomes* are described from the perspective of the learner and focus on the results that are expected to be achieved upon the completion of the learning process.

- *Learning outcomes* are focused as outputs, instead of being focused as inputs (learning targets or learning path).
- Learning outcomes should be verifiable and assessable.
- Learning outcomes refers to vocational qualifications at EQF level 5 and should follow the relevant descriptors.

(Kennedy, D., 2007; European Parliament and Council, 2009; Directorate-General for Education, Youth, Sport and Culture, European Commission, 2016; CEDEFOP, 2014a; CEDEFOP, 2016; Lameira, S. et al., 2015; Grun, G. et al., 2017; Nunes, C. 2018)

Knowledge (European Parliament and Council, 2008) is *“the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the European Qualifications Framework, knowledge is described as theoretical and/or factual.”*

Within the context of the Project *BioS*, we propose that **knowledge** should be described in terms of **what the learner knows and understands**⁶. It is the description of what the learner knows, the body of facts, principles, theories and practices which are related to a field of work or study that are implied.

The knowledge description integrates four categories – factual, conceptual, procedural and metacognitive – which are assumed to lie along a continuum from concrete (factual) to abstract (metacognitive). (Anderson, L.W. et al., 2001)

The depth and breadth dimensions are important for the definition and description of knowledge and depend on the selected level of EQF.⁶ Since the BioS curriculum is based on EQF level 5 learning outcomes in term of knowledge is “Comprehensive, specialized, factual and theoretical within the specific field of work or study and an awareness of the boundaries of that knowledge” (European Parliament and Council of European Union, 2008).

Skills can be described as a set of abilities available to perform a specific task. *“Skills’ means the ability to apply knowledge and use know-how to complete tasks and solve problems.”* (European Parliament and Council, 2008)

As in the domain of knowledge, in the skills description various levels of **depth and breadth** are also considered.⁶ In line with the EQF level 5 suggestions that BioS follows, skills are described as cognitive (involving the use of logical, intuitive and creative

⁶ <https://eurspace.eu/ecvet/ecvet-methodological-guide-for-professionals/ecvet-methodological-guide-for-professionals-view-online/>

thinking) and practical (involving manual dexterity and the use of methods, materials, tools and instruments) required to develop creative solutions to abstract problems (European Parliament and Council, 2008).

Within the context of the Project BioS, we propose that **skills** are described in terms of **what the learner is able to do**. In the *BioS* methodology, the description of the skills must obey, in terms of writing, to the structure of the statement initiated by the verb that indicates the type of skill, conjugated in the infinity, followed by the description of the action.

Competences are “*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*” (European Parliament and Council, 2008).

The European Qualifications Framework defines competence in terms of responsibility and autonomy.

Within the context of the Project *BioS*, we propose that **competence** be described in terms of **what the learner does, applying knowledge, skills, and other soft skills and methodological abilities**. For qualifications reporting to EQF level 5, it is expected that the learner puts into practice specialized factual and theoretical knowledge, comprehensive range of cognitive and practical skills, higher personal, social and/or methodological abilities, with a higher degree of depth, breadth and dexterity, carrying out management and supervision of work where there is unpredictable change, reviewing and developing performance of self and others.

According to *BioS* methodology, the description of the competence must obey, in terms of writing, to the structure of the statement initiated by the action verb that indicates the type of competence, conjugated in the present simple and continuous forms, followed by the description of the observable action.

2.5.2 Defining units of learning outcomes

The second step of the methodology is to **group learning outcomes into units and define the units of learning outcomes that compose the qualification**⁷.

Units of learning outcomes can be considered as one technical specification to put ECVET into practice. ECVET implementation requires not only that qualifications be described in terms of learning outcomes, but also that learning outcomes be brought together in units.

What are units of learning outcomes?

⁷ <https://eurspace.eu/ecvet/pedagogicalkit/framework-for-grouping-common-learning-outcomes-in-nuclear-units/>

A *unit of learning outcomes* is a concept different from a course or a module of a training framework. It is a component of a qualification, consisting of a coherent set of knowledge, skills and competence that can be assessed and validated with a number of associated ECVET points. A qualification comprises several units and is made up of the whole set of units. Thus, a learner can achieve a qualification by accumulating the required units, achieved in different countries and different contexts (formal and, where appropriate, non-formal and informal), while respecting national legislation relating to the accumulation of units and the recognition of learning outcomes.

A unit may be specific to a single qualification or common to several qualifications. The expected learning outcomes defining a unit may be achieved irrespective of where or how these have been achieved (European Parliament and Council, 2009).

Units of learning outcomes should be described as occupational activities and key technical tasks.⁸

Units of learning outcomes have to be assessable. The description of the unit also has to include the performance criteria related to the learning outcomes of each key technical outcome. Due to the fact that learning outcomes focus on the results achieved upon completion of a learning process, both contextual conditions, learning processes, learning methodologies and resources are considered with no additional relevance for the description of the *unit of learning outcomes*.

Grouping learning outcomes into units in BioS project

In the context of the Project *BioS*, we propose that *units of learning outcomes* be understood as a coherent set of knowledge, skills and competences needed to put into practice key realizations or key tasks, which are interconnected in a coherent, comprehensible and logical set of key technical outcomes, observable and verifiable in outputs.⁸

The main rule for grouping *learning outcomes* into *units* is the coherence, interconnectivity, reciprocity and interdependence of knowledge, skills and competences associated with each *key technical outcome* among each other.

The following criteria are taken into account to group *learning outcomes*:

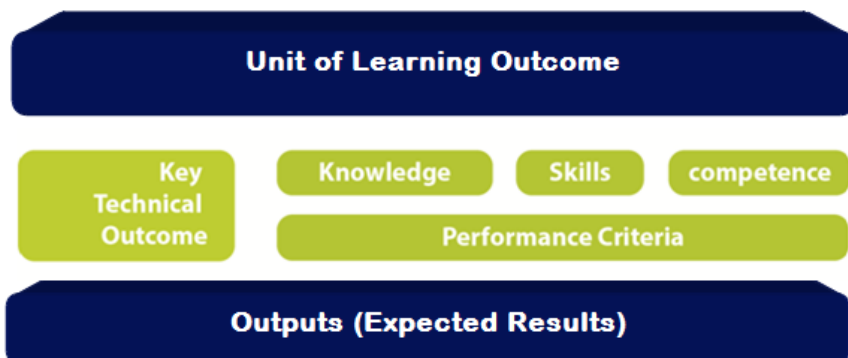
- relation of *learning outcomes* to the same set of key technical tasks;
- relation of *learning outcomes* to the same outcome;
- relation of *learning outcomes* to the same technique.

⁸ <https://eurspace.eu/ecvet/pedagogicalkit/framework-for-grouping-common-learning-outcomes-in-nuclear-units//>

Each *unit of learning outcomes* is composed of one or more *key technical outcomes* which are interconnected and lead to observable and evaluable *outputs*.

Whenever possible, *units of learning outcomes* should be designed in such a way that can be achieved as independently as possible of other *units*, so that *learning outcomes* in a qualification should be assessed only once.

Figure 5: Unit of learning outcomes in BioS.



Source: Adapted from <https://eurspace.eu/ecvet/ecvet-methodological-guide-for-professionals/ecvet-methodological-guide-for-professionals-view-online/>

Unit of learning outcomes components

Following the ECVET technical specifications (European Parliament and Council, 2009) for the purposes of the Project *BioS*, it is considered that a *unit of learning outcomes* should be composed by the following components:

◆ EQF Level

◆ Title of the Unit

The title of the unit should be as short as possible and should reflect the importance of the learning outcomes for the labour market. The title should reflect the global learning outcomes that are contained in the unit, and not focusing only on some of them.

◆ Key Technical Outcomes

Key technical outcomes are statements that express the main technical tasks that the learner has to perform to prove a specific output. Key technical outcomes are expressed in a simple, short and objective statement, beginning by the action verb that indicates the main technical task that the learner has to perform, conjugated in the infinitive.

◆ Knowledge

Knowledge is the theoretical and/or factual body of facts, principles, theories and practices that are related to a field of work or study. Knowledge is described in terms of what the learner knows and understands.

◆ **Skills**

Skills are cognitive or practical abilities to apply knowledge and use know-how to complete tasks and solve problems. Skills are described in terms of what the learner is able to do.

◆ **Competence**

A competence is considered the proven ability to use knowledge, skills and personal, social and/or methodological abilities at work or in academic situations and in professional and personal development. Competences are described in terms of what the learner does, applying knowledge, skills, and proving the following abilities: attitudes, personal, social and methodological.

◆ **Performance Criteria**

Performance criteria are the quality requirements associated with performance and the quality standards that ensure that the individual acts competently (required quality for achievements). The performance criteria are specifically associated with each key technical outcome and respective set of knowledge, skills and competence.

Performance criteria are measurable, observable and provide qualitative important information on the expected performance.

◆ **Outputs**

Outputs are the results, the obtained products or the proof. The outputs are directly associated with key technical outcome and performance criteria, being the observable result of the performance. Outputs are described in a clear, objective and short manner, expressing the main nuclear professional proof for a given qualification.

◆ **Number of Hours**

The number of hours is an indicator that helps to balance the size of the unit and it is a fundamental indicator for the assignment of ECVET Points.

◆ **ECVET Credit Points**

The allocation of ECVET Points to units of learning outcomes is crucial for the validation and recognition of the acquired learning outcomes. The attribution of Credit Points is important for the reason that credits represent the volume of learning outcomes achieved by the learner. Credits express the volume of learning outcomes involved in each unit of learning outcome.

Table 7 presents a template to be used for the elaboration of a unit of learning outcomes, within an example on how to define learning outcomes on bioinformatics, EQF level 5.

Table 4: Template to describe a Unit of Learning Outcomes in Project BioS (example of module 1).

EQF LEVEL	UNIT OF LEARNING OUTCOME		HOURS	CREDITS
5	INTRODUCTION TO BIOINFORMATICS		40	4
KEY TECHNICAL OUTCOME	KNOWLEDGE	SKILLS	COMPETENCE	
1. Retrieve information and data regarding specific genes and proteins which could be chosen as candidate genes for a disease.	The Learner knows and understands: <ul style="list-style-type: none"> The relevance of biological sequences for health and diseases Basic terms related to sequence handling Medical relevance of sequence annotation 	The Learner is able to: <ul style="list-style-type: none"> Gather information on selected genes and proteins using tools such as BLAST, UniProt, and PDB Compare biological sequences through multiple sequence alignment Identify the active site of an HIV Serine protease (or of any other structurally characterized enzyme) 	The Learner: <ul style="list-style-type: none"> Is aware of the power of modern high-throughput sequencing methods and applies sequencing data to improve diagnostics of diseases with a suspected genetic component Uses up-to-date knowledge from databases of genes and proteins to support their estimates of the significance of genes suggested as contributors in a genetic disease When needed, considers protein structure in the interpretation of variant data 	
	PERFORMANCE CRITERIA			
<ul style="list-style-type: none"> Uses sequence and annotation files to access up-to-date, in-depth knowledge of medically relevant genes (with the help of the demonstrated Internet databases and tools) Uses the discovered information to make more informed clinical decisions based on genetic variant data 				
KEY TECHNICAL OUTCOME	KNOWLEDGE	SKILLS	COMPETENCE	
2. Visualize genomic features and perform simple analysis on them using Internet based tools.	The Learner knows and understands: <ul style="list-style-type: none"> List of available databases and other Internet resources Functional Genome Annotation and Metabolic Pathways 	The Learner is able to: <ul style="list-style-type: none"> Visualize genomic data in a genome browser Find information of known genome variants associated to desired genes Find and visualize functional genome annotations and metabolic pathway information 	The Learner: <ul style="list-style-type: none"> Uses genomic tools routinely to get a quick, integrated view of data related to any gene as necessary Gains a knowledge-based, data driven view of every new disease-related gene they encounter 	
	PERFORMANCE CRITERIA			
<ul style="list-style-type: none"> Uses the demonstrated tools to visualize annotations of their candidate gene lists; Uses Internet resources including Genome Browsers and KEGG; Interprets gene information critically in the light of up-to-date information. 				
OUTPUTS				
<ul style="list-style-type: none"> More confidence in data from modern-day high-throughput sequencing; Making more use of such data in clinical decision-making; More informed interpretation of personal genome data; Quicker and more relevant diagnoses of diseases with an assumed genetic component. 				

Source: <https://eurspace.eu/ecvet/qualification-benchmarks-based-on-learning-outcomes/>

2.5.3 Attributing ECVET Points and Credits to Units of learning Outcomes

In the Project *BioS*, **ECVET credit points are allocated** to each unit of learning outcomes, so it can be possible to transfer and accumulate units of learning outcomes. **Each unit is represented by a specific number of ECVET Points.** These procedures are considered very important in order to ensure the **processes of validation and recognition of learning outcomes**, as well as **credits transfer and accumulation (European Parliament and Council, 2009).**

What are Credit Points?

“Credit for learning outcomes (credit) means a set of learning outcomes of an individual which have been assessed and which can be accumulated for a qualification or transferred to other learning programmes or qualifications”. (European Parliament and Council, 2009)

A credit system associated with qualifications implies that the qualification and each unit is represented by a specific number of Credit points. Credit points supplement the units (or sub-units). They express the volume of learning outcomes involved in each unit and also give information on the relative weight of the units which make up a qualification. Credit refers to the fact that the learner has achieved the expected learning outcomes which have been assessed positively and the outcome of the assessment is documented in a personal transcript. Based on this documentation, other institutions can recognise the learners’ credits. Credit points represent the volume of learning outcomes achieved by the learner. Credit points are acquired by the individual at the same time as the units, sub-units and, if necessary, part of a unit are achieved, accumulated within the learning pathway and used to indicate the learners’ progress and the completion of an individual learning pathway leading to a qualification. Credit points may be used to allow a learner: to move from one qualification to another within the same EQF level; to move from one qualification level to another; to move from one learning system to another. Credit points are not automatically recognized. Recognition is a decision taken at the national level by the competent bodies responsible for the qualification or of its implementation. (European Commission, 2011)

How to transfer and accumulate Credits?

Credit transfer is the process through which learning outcomes achieved in one context can be taken into account in another context. **Credit transfer is based on the processes of assessment, validation and recognition.** In order to be transferred, learning outcomes have to be assessed. The outcome of the assessment is recorded in a learner’s personal transcript and constitutes credits. On the basis of the assessed outcomes, the credit can be validated and recognised by another competent

institution. Two cases of credit transfer exist:

- Credit transfer in the framework of partnerships for mobility – in which Credit Points are converted to ECVET Points. When the credit transfer takes place in the framework of organized mobility, underpinned by a learning agreement, if the assessment is positive, credit should be validated and recognised automatically;
- Credit transfer outside partnerships – it depends on the rules established by the National Qualifications Frameworks.

Credit accumulation is a process through which learners can acquire a given qualification in a progressive way by successive assessments and validation of learning outcomes. When the learner has accumulated the required credit for the qualification and when all conditions for the award of the qualification are fulfilled, the learner is awarded the qualification. In ECVET, accumulation is enabled by the use of units of learning outcome which can be progressively assessed, validated and recognized. (European Commission, 2011)

What are ECVET Points?

ECVET points are *“a numerical representation of the overall weight of learning outcomes in a qualification and of the relative weight of units in relation to the qualification”* (European Parliament and Council, 2009). They provide information about qualifications and units in a numerical form and they refer and reflect the achievement and accumulation of units. The number of ECVET points allocated to a unit of learning outcomes provides the learner with information concerning the relative weight of what has been already achieved and accumulated, as well as, what remains to be achieved in order to acquire the qualification.

Allocation of ECVET points to units of learning outcomes in BioS project

Within the context of the Project *BioS*, the attribution of ECVET points to units of learning outcomes follows the convention to which 60 points are allocated to the learning outcomes expected to be achieved in a year of full time formal Vocational Education and Training, in accordance with the relevant recommendations (European Parliament and Council of European Union, 2009). Following the convention, for a given qualification, a VET formal learning context is taken as a reference in each country and on the basis of 60 ECVET points per year of formal full time VET, the total number of ECVET points are assigned to the qualification.

3. EUROPEAN QUALITY ASSURANCE IN VOCATIONAL EDUCATION AND TRAINING

3.1 What is the European Quality Assurance in Vocational Education and Training (EQAVET)?

The European Quality Assurance in Vocational Education and Training (EQAVET) is a practice that brings Member States, Social Partners and the European Commission together to promote European collaboration by developing and improving quality assurance in Vocational Educational and Training.⁹

The *Recommendation of the European Parliament and Council (2009) on the establishment of a European Quality Assurance in Vocational Education and Training* established a European quality assurance reference framework, comprising a quality assurance and improvement cycle, composed by four phases – planning, implementation, evaluation/assessment and review/revision – based on a selection of quality criteria, descriptors and indicators applicable to quality management of both VET-system and VET-provider levels.

The aim of the *framework* is to contribute towards quality improvement in VET systems and VET policy developments between Member States, in order to increase the transparency, consistency and mutual trust in VET systems, facilitating the mobility of workers and learners, and lifelong learning.

3.2 How does EQAVET Work?

EQAVET embrace a quality assurance and improvement cycle which is applicable at the system level and at the level of VET providers, supported by quality criteria and indicators to be used.¹⁰

EQAVET quality cycle includes four interrelated phases¹¹:

1. **Stage 1: Planning** – Set up clear, appropriate and measurable goals and objectives in terms of policies, procedures, tasks and human resources.
2. **Stage 2: Implementation** – Establish procedures to ensure the achievement of goals and objectives (e.g. development of partnerships, involvement of stakeholders, allocation of resources and organizational or operational procedures).
3. **Stage 3: Evaluation** – Design mechanisms for the evaluation of achievements

⁹ <https://www.eqavet.eu/About-Us/Mission>

¹⁰ <https://www.eqavet.eu/EU-Quality-Assurance>

¹¹ [https://www.eqavet.eu/Aligning-with-EQAVET/Aligning-a-QA-approach/Bruges-communicue-\(1\)](https://www.eqavet.eu/Aligning-with-EQAVET/Aligning-a-QA-approach/Bruges-communicue-(1))

and outcomes by collecting and processing data in order to make informed assessments/evaluation.

4. **Stage 4: Review** – Develop 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.

Figure 6: The four phases of the quality assurance model.



Source: Adapted from <https://www.eqavet.eu/Aligning-with-EQAVET/Aligning-a-QA-approach/Bruges-communication-1>

For the Project *BioS* proposes, emphasis will be given to the **application of EQAVET at VET providers level.**

The four stages of the quality assurance cycle are interrelated and need to be addressed together.

The quality assurance cycle – planning, implementation, evaluation and review of VET – is supported by common quality criteria, indicative descriptors and a set of indicators. Indicators are used as a *toolbox* from which VET providers can select the more relevant indicators for their quality assurance system. Indicative descriptors help VET providers to consider their approach to quality assurance and to know-how much progress has been made.¹²

EQAVET Indicative Descriptors for Stage 1 – Planning:

- Explicit goals/objectives and targets are set and monitored, and programmes are designed to meet them.

¹² <https://www.eqavet.eu/EU-Quality-Assurance/For-VET-Providers/Building-your-System/Review/Indicative-Descriptors>

- *Ongoing* consultation with social partners and all other relevant stakeholders takes place to identify specific local/ individual needs.
- Providers plan cooperative initiatives with other VET providers and all other relevant stakeholders.

EQAVET Indicative Descriptors for Stage 2 – Implementation:

- Relevant and inclusive partnerships, including those between teachers and trainers, are explicitly supported to implement the actions planned.
- VET providers' programmes enable learners to meet the expected learning outcomes and become involved in the learning process.
- VET providers respond to the learning needs of individuals by using approaches to pedagogy and assessment which enable learners to achieve the expected learning outcomes.
- VET providers use valid, accurate and reliable methods to assess individuals' learning outcomes.

EQAVET Indicative Descriptors for Stage 3 – Evaluation:

- Evaluation and review the collection and use of data, and adequate and effective mechanisms to involve internal and external stakeholders.

EQAVET Indicative Descriptors for Stage 4 – Review:

- Learners' feedback is gathered on their individual learning experience and on the learning and teaching environment. Together with teachers', trainers' and all other relevant stakeholders' feedback this is used to inform further actions.
- Procedures on feedback and review are part of a strategic learning process in the organization, support the development of an high quality provision, and improve opportunities for learners.

The Recommendation of the European Parliament and Council (2009) set out 10 indicators which can be used to support the evaluation and quality assurance of VET. They are also part of a toolbox and can be selected to meet the circumstances and requirements of the user.

Indicator no 1

Relevance of quality assurance systems for VET providers:

- (a) share of VET providers applying internal quality assurance systems defined by law/at own initiative;
- (b) share of accredited VET providers.

Indicator no 2

Investment in training of teachers and trainers:

- (a) share of teachers and trainers participating in further training;
- (b) amount of funds invested.

Indicator no 3

Participation rate in VET programmes:

Number of participants in VET programmes (1), according to the type of programme and the individual criteria (2)

(1) For I-VET: a period of 6 weeks of training is needed before a learner is counted as a participant. For lifelong learning: percentage of population admitted to formal VET programmes.

(2) Besides basic information on gender and age, other social criteria might be applied, e.g. early school leavers, highest educational achievement, migrants, persons with disabilities, length of unemployment.

Indicator no 4

Completion rate in VET programmes:

Number of persons having successfully completed/abandoned VET programmes, according to the type of programme and the individual criteria

Indicator no 5

Placement rate in VET programmes:

(a) destination of VET learners at a designated point in time after completion of training, according to the type of programme and the individual criteria (3);

(b) share of employed learners at a designated point in time after completion of training, according to the type of programme and the individual criteria

(3) For I-VET: including information on the destination of learners who have dropped out.

Indicator no 6

Utilization of acquired skills at the workplace:

(a) information on occupation obtained by individuals after completion of training, according to type of training and individual criteria

(b) satisfaction rate of individuals and employers with acquired skills/competences.

Indicator no 7

Unemployment rate (4) according to individual criteria

(4) Definition according to ILO and OECD: individuals aged 15-74 without work, actively seeking employment and ready to start work

Indicator no 8

Prevalence of vulnerable groups:

(a) percentage of participants in VET classified as disadvantaged groups (in a defined region or catchment area) according to age and gender

(b) success rate of disadvantaged groups according to age and gender

Indicator no 9

Mechanisms to identify training needs in the labour market:

(a) information on mechanisms set up to identify changing demands at different levels

(b) evidence of their effectiveness.

Indicator no 10

Schemes used to promote better access to VET:

(a) information on existing schemes at different levels

(b) evidence of their effectiveness

The placement of the indicators within the EQAVET quality cycle is shown in the following table.

Table 5: Indicators per EQAVET cycle phase.

Planning	Indicators 1, 2
Implementation	Indicators 3,7,7
Evaluation	Indicators 4,5,6
Review	Indicators 9,10

3.3 Work based learning building blocks

The EQAVET working group¹³ has identified a set of building blocks which could support the implementation of work based learning. These building blocks provide guidance and set up activities that could help VET providers to develop and implement a quality assurance approach for work based learning procedures that are in line with the EQAVET framework.

Table 6: Building blocks for WBL¹⁴.

Building blocks	Guidelines for implementation	Key questions
Design	work with partner organisations to ensure the relevance of learners' training during periods of work based learning	<ul style="list-style-type: none"> ○ which organisations to work with in order to provide high quality training? ○ which courses/qualifications should learners follow?

¹³ <https://www.eqavet.eu/Aligning-with-EQAVET/Work-based-learning/Guidelines>

¹⁴ Adapted from EQAVET - Quality assuring work-based learning, available at: <https://www.eqavet.eu/Eqavet2017/media/Documents/EQAVET-Quality-assuring-work-based-learning.pdf>

Improve	agree with partner organisations when the quality of training will be monitored and how improvements will be made	<ul style="list-style-type: none"> ○ how organisation(s) should take responsibility for monitoring quality? ○ when and how improvements will be made?
Respond	continue to be aware of the specific needs of learners throughout their work based learning	<ul style="list-style-type: none"> ○ how to respond to learners' on-going or emerging training needs? ○ how to fix any problem experienced by a learner?
Communicate	ensure learners and partner organisations are kept well informed and receive frequent updates on all aspects of training	<ul style="list-style-type: none"> ○ the ways in which organisations involved in the training will communicate? ○ how each partner involved in the training keeps in touch with each other and the learners?
Train	ensure staff are well prepared for their training role which includes quality assurance	<ul style="list-style-type: none"> ○ how all staff will be made aware of how quality is assured? ○ which staff will need training in relation to quality assurance?
Assess	work with partner organisations to review the work based training programme, assess and certify individual learner's achievement, where appropriate	<ul style="list-style-type: none"> ○ what type of assessment will be completed by the learner? ○ who will assess each learner – and has the learner been informed? ○ what a learner has to demonstrate to “pass” or complete the training?

3.4 The incorporation of EQAVET principles into BioS quality assurance planning

For BioS purposes the indicators 4 “Completion rate in VET programmes” and 6 “Utilization of acquired skills at the workplace” are going to be incorporated into the development of the project quality assurance process.

Possible key questions to be answered for the exploration of each indicator could be the following (Luomi-Messerer & Ulicna, nd).

Indicator 4

- Do learners with diverse needs successfully complete the VET programme If not what the VET provider can do about it?
- Do learners fail to complete VET programme? If so why?
- What completion rates and or her data tell about the VET provision?
- What are the emerging issues concerning the completion of the programme?
- In what way can the VET provider improve the situation?

Indicator 6

- Are programme participants satisfied with the information, advice and guidance they got from their provider after completing their training?
- Are employers and employees satisfied with the acquired skills/competences?
- How can the VET provider fit together the different needs and wants of employers and employees?
- How can the VET provider suitably improve its information mechanisms?
- How can the VET provider raise the level of its stakeholders' satisfaction?
- What evidence does the VET provider have that both, learners and employers, value the full range of what people know and can do after completing a VET programme?

Furthermore, where relevant and applicable, during the implementation of work-based learning component of BioS VET programme the afore mentioned key questions of building blocks could be effectively addressed.

BIBLIOGRAPHY

DOCUMENTS

- Anderson, L.W. (Ed.), Krathwohl, D.R. (Ed.), Airasian, P.W., Cruikshank, K.A., Mayer, R.E., Pintrich, P.R., Raths, J., & Wittrock, M.C. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's Taxonomy of Educational Objectives*. New York: Longman.
- Aribaud, M. and Hess (coord.). European Commission, DG EAC (2011). *The European Credit System for Vocational Education and Training ECVET. Get to know ECVET better. Questions and Answers*. ECVET Users' Group.
- CEDEFOP (2009). *The shift to learning outcomes. Policies and practices in Europe*. Luxembourg: Office for Publications of the European Communities. Cedefop reference series. No 72.
- CEDEFOP (2012). *Necessary conditions for ECVET implementation*. Luxembourg: Publications Office of the European Union.
- CEDEFOP (2014a). *Terminology of European education and training policy: a selection of 130 key terms*. Second edition. Luxembourg: Publications Office.
- CEDEFOP (2016). *Application of learning outcomes approaches across Europe: a comparative study*. Luxembourg: Publications Office. Cedefop reference series. No 105.
- CEDEFOP (2017). *Defining, writing and applying learning outcomes – a European Handbook*. Luxembourg: Publications Office of the European Union.
- Council of the European Union (2017). *Council Recommendation of 22 May 2017 on the European Qualifications Framework for lifelong learning and repealing the Recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of the European Qualifications Framework for lifelong learning*. Official Journal of the European Union. 2017/C 189/03).
- Directorate-General for Education, Youth, Sport and Culture, European Commission (2016). *Implementation of the Recommendation of the European Parliament and of the Council of 18 June 2009 on the establishment of a European Credit System for Vocational Education and Training (ECVET)*. EU Publications.
- European Commission, Directorate-General for Education and Culture (2005). *European Credit System for VET (ECVET) Technical Specifications (Report of the Credit Transfer Technical Working Group)*. Brussels: Credit Transfer Technical Working Group, 2005.

- European Commission, Directorate General Education and Culture; Education, Audiovisual and Culture Executive Agency (2018). *Erasmus+ Programme Guide*. Version 1, 2018.
- European Commission, DG EAC (2011). *Get to Know Better ECVET. Questions and Answers*. Brussels.
- European Parliament and Council (2008). *Recommendation of the European Parliament and of the Council of 23 April 2008 on the establishment of a European Qualifications Framework for Lifelong Learning*. Official Journal of the European Union. 2008/C 111/01), pp. 111/1-111/7.
- European Parliament and Council (2009). *Recommendation of the European Parliament and of the Council of 18 June 2009 on the establishment of a European Credit System for Vocational Education and Training (ECVET)*. Official Journal of the European Union. 2009/C 155/02), pp. 11-18.
- European Parliament and Council (2009). *Recommendation on the establishment of a European Quality Assurance Reference Framework for Vocational Education and Training*. Official Journal of the European Union. /C 155/1).
- Grün, G, Tritscher-Archan, S., Weiß, S. (2009). *Guidelines for the Description of Learning Outcomes*. Available at: [http://www.ecvet-toolkit.eu/sites/default/files/Zoom Guidelines for the Description of Learning Outcomes.pdf](http://www.ecvet-toolkit.eu/sites/default/files/Zoom%20Guidelines%20for%20the%20Description%20of%20Learning%20Outcomes.pdf)
- Kennedy, D. (2007). *Writing and using learning outcomes: a practical guide*. Cork, University College Cork.
- Lameira, S.; Curado, C., Silva, M.; Duarte, T. (2015). *Guia Metodológico – Conceção de qualificações baseadas em resultados de aprendizagem*. Agência Nacional para a Qualificação e o Ensino Profissional, I.P. Lisboa: Editorial do Ministério da Educação e Ciência.
- Luomi-Messerer, K. & Ulicna, D. (nd). Description of units of learning outcomes. Examples from the 2nd generation of ECVET pilot projects. Available at: [http://www.ecvet-projects.eu/Documents/Examples Units%20of%20LO guidelines 2nd%20generation.pdf](http://www.ecvet-projects.eu/Documents/Examples%20of%20LO%20guidelines%202nd%20generation.pdf)
- Nunes, C. (2018). ECVET Methodological Guide for Professionals. Methodology developed within the EURspace Project. Available at:

[file:///C:/Users/epr/Downloads/ECVET Methodological Guide for Professionals EN.pdf](file:///C:/Users/epr/Downloads/ECVET%20Methodological%20Guide%20for%20Professionals%20EN.pdf)

Office for Official Publications of the European Communities (2008). *The European Qualifications Framework for Lifelong Learning (EQF)*. Luxembourg.

Publications Office of the European Union (2011). *Referencing National Qualifications Levels to the EQF, European Qualifications Framework Series: Note 3*. Luxembourg.

Publications Office of the European Union (2011). *Using Learning Outcomes, European Qualifications Framework Series: Note 4*. Luxembourg.

Publications Office of the European Union (2017). *Defining, writing and applying learning outcomes, A European handbook*. Luxembourg.

WEBSITES

<https://eacea.ec.europa.eu/national-policies/en/mobility-scoreboard/ivet-indicators/scoreboard-indicator-3-recognition-learning-outcomes-0>

<http://ec.europa.eu/eqf>

<http://www.anqep.gov.pt/>

<http://www.ecvet-projects.eu>

<http://www.ecvet-secreariat.eu/en>

<http://www.ecvet-toolkit.eu>

<https://www.eqavet.eu>

https://ec.europa.eu/education/policy/vocational-policy/ecvet_pt

<https://ec.europa.eu/programmes/erasmus-plus/>

<https://erasmusmais.pt/>

www.ecvet-toolkit.eu/

<https://eurspace.eu>