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D2.2 Handbook on Curricula Development &ECTS/ESG

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Abstract: D2.2 describes modern curricula concepts and relative guidelines; it discusses critical points of the European Credit Transfer System (ECTS) and the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG). It also provides basic principles of curriculum design models in a MOOC environment.

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Abstract

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1 Modern curricula development concepts and guidelines

The word ćurriculum ’originally comes from the Latin verb ćurrere ’, “ t o r u n ” . Indeed, modern approaches concerning the way we perceive and reflect the term curriculum have drastically changed over time. In our times, a straightforward description of what a “ c u r r i c u l u m ” would be the group of courses that consist of a program of study mainly at higher education contexts.

According to Grant (2014)[1], the curriculum should present a reasoned picture of the subject to be studied and define the teaching and learning processes, and the intended outcomes of that study. However, all curriculum choices should be based on a common ground provided by a curriculum profile that clearly states essential information, such as goals, mission and scope. Moreover, that statement has to be aligned with the vision, expectations and policies of each educational institution. Such statements defined through explicit arguments will lead to a holistic shift (i.e. on an academic, administrative and managerial level), in order to achieve the goals set by each curriculum.

A primary target of a curriculum is to support all actors in the educational process (i.e. learners, instructors and institutional/educational administrators) while allowing and enabling tutors to be creative and tailor their teaching approaches based on their preferences and the needs, preferences and capabilities of their students. Naturally, courses are delivered in various ways among institutions due to different learning and teaching processes implemented by different educators, while covering approximately the same material. Nevertheless, this does not affect the structural elements of curriculum design and development.

Curriculum development can be considered as a staged process that focuses on achieving new, complete and quality study programs study programs for specific educational subjects. As the world evolves and especially as technology advances affecting all aspects of human daily life, new technological solutions are available for curricula delivery, while at the same time new educational needs are created. These have a direct impact on curricula in terms of courses and their content, learning processes, delivery modes and educational (ICT) tools. Therefore, institutions need a solid but flexible strategy for curriculum design and development that will take into account all these perspectives and opportunities to encompass contemporary and innovative approaches and methods in their curricula, in order to improve learning outcomes and remain competitive.

The curriculum development process encompasses diverse educational approaches and organizational procedures to support learners evolve, excel and achieve well-defined learning outcomes. This process defines the courses to be taught, the target audience and teaching/learning processes in a systematic manner. Each element links and influences with the others. For instance, the courses a curriculum will include, and their order depends on the learner’s educational background. Learning and teaching processes are

[1] Grant, J. (2014). Principles of curriculum design. *Understanding medical education: evidency, theory and pratice. 2a ed. Malden: Wiley Blackwell*, 31-46.

tightly connected with learning styles), as well as the learning profile and environment (e.g. physical or virtual).

A crucial aspect of designing, developing and delivering a curriculum (Ind4.0 focuses on developing a Master's program, thus, of this curriculum development we consider them in a framework that will guide and support all activities. It has to be noted that there is no consensus in an approach or framework for curriculum development in the literature. Therefore, a golden standard for curriculum development does not exist, and various methods and models could prove successful depending on the needs they are used to address. A curriculum should simply meet the needs that led to its conception and achieve its goals concerning the institutional context. Despite different perspectives among professionals and researchers, almost all agree that the curriculum design and development process must address four main issues, initially set out by Tyler in 1949[2]:

What is the purpose of the educational programme?

How will the programme be organized?

What experiences will further these purposes?

How can we determine whether the purposes are being attained?

This chapter aims at describing key concepts and guidelines, rather than indicating a specific methodology for curriculum development. To this end, Fig. 1 presents a generic framework that summarizes the main stages of developing curricula, which most curriculum studies agree should be included in this process. Although these stages and their individual procedures and methods are described in a serial manner in the following sections, in reality, they are used simultaneously, or in an altered order, due to strong interdependencies and agile approaches.

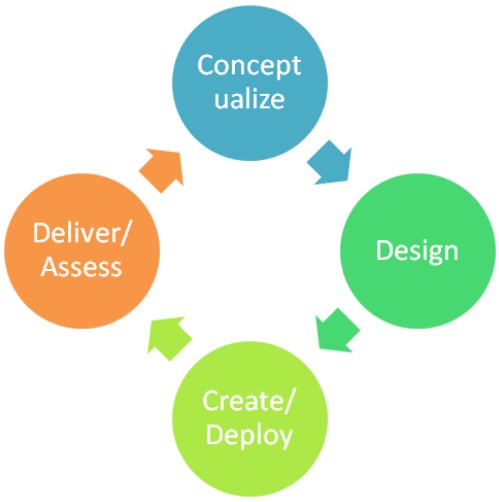

Figure 1. Ind4.0 curricula development framework

[2] Tyler RW (1949) Basic Principles of Curriculum and Instruction. University of Chicago Press, Chicago

The first stage is conceptualization, where the idea of setting up a new curriculum (as previously mentioned, in this document, a curriculu creation) is explored on the basis of specific needs and lack of corresponding training offer. The outline of a concept is then produced with necessary information concerning the purpose, the target audience, the mission, the goals of the curriculum.

The second stage is a lot more demanding and refers to the design of a curriculum. Several aspects should be taken into account, such as learning outcomes, programme organization (or curriculum design) approach, content management, curriculum structure, assessment methods and admission issues.

Creation/deployment includes laboratories set up (if those do not exist), production of appropriate learning material, construction/integration of suitable learning tools (e.g. in case of a blended or e-learning model a learning management system should be set up and customized to meet the curriculum requirements). This stage realizes what has been planned in the previous stage.

Finally, the delivery and assessment stage is the one where a curriculum is delivered to learners, and information is gathered and analyzed from various sources to enhance several aspects of the curriculum and its associated procedures.

1.1 Conceptualization

Curriculum conceptualization explores its feasibility, usability and sustainability. It is critical to illustrate the need for a curriculum/Master's programme and purposeful to realize it and invest the much larger resources required by the next stages of the curricula development framework presented above.

1.1.1 Needs identification, assessment and analysis

Towards this direction, the curriculum development process initially has to highlight what triggered its birth. The problem/need has to be described clearly and simply, indicating the people that deal and/or have to address the problem/need directly or indirectly and the contributing factors in this problem among others. Practically, this description identifies the curriculum's scope. A useful tool to define learning objectives is based on real-world situations that produce new (or previously not tackled) educational needs. It offers the foundation to build the curriculum's scope achievement.

Several tools and methodologies can be used for needs assessment, such as surveys and interviews with those dealing with the problem the curriculum looks into, along with people from the broader communities affected by this problem. A broad consultation including the academic community, professionals, employers and other stakeholders has to be carried out. It is essential to have the right people involved in the needs assessment process. These people should include the academics and members of the instructional design team, as well as the people that experience the problem under investigation either in a direct or in an indirect manner and not people that are just aware of this problem. This way, the curriculum's content will be competitive, meaningful, relevant, and able to deliver added value.

When the needs assessment process is over, and all required data is collected and analyzed, the unique attributes of the target group (i.e. audience) are identified based on what is missing between the optimal and actual situation. The most critical areas the curriculum should focus on are also determined by observing the frequency of topics mentioned or met in interviews and surveys, respectively. Domain experts can then add topics that the needs assessment process did not reveal, yet they are considered ne success (e.g. in the case of ICT curricula, innovative fields could be explored even if they have not yet led into known commercial products). In any case, topics should be in line with the preferences and needs of the target audience so that the curriculum will be appealing and draw the learners. Learners should feel that the curriculum is quite necessary for their development and will effectively enhance their knowledge and skills.

1.1.2 Curriculum profile

An essential outcome of this phase is a curriculum profile (or outline) describing the following:

General information –Title, short description, type (e.g. full time, part-time) and length, supported language(s).

Purpose –The purpose of a curriculum is usually structured upon a list of aims and/ or a mission and vision statement. Regardless of the means to express the curriculum's purpose, the addressed (educa appropriateness, generic objectives, principles and traits of the stated curriculum have to be effectively highlighted.

The reasons for introducing a new curriculum or reforming an old one need to be explicitly indicated. The new curriculum also needs to be linked to the institutional mission or profile and existing curricula. Links between the curriculum and research activities should be also identified.

Target group – Determination of the intended audience and its characteristics. Definition of background knowledge and participation prerequisites in terms of qualifications (including experience and required ICT equipment from learners, in order to attend curriculum classes and/or learning activities.

Goals/Learning objectives –The generic, abstract goals of the curriculum and the desired knowledge outcome.

Topics/subject areas –Which is the knowledge domain of the curriculum and which are the broad topics/areas it covers.

Note: The curriculum profile must be amended after the second stage needs to include additional information, such as the curriculum structure and content of the courses. A complete profile is vital for any curriculum.

1.2 Design

This phase emphasizes on design issues of the curriculum and includes several procedures that should be taken into account. Fundamental issues encompass learning outcomes

definition, content selection, curriculum organization and structure and learning, teaching and assessment activities. Besides, several other secondary nevertheless important issues are described in this stage, such as accreditation, admission and master thesis/internship details.

1.2.1 Defining learning outcomes

This step essentially translates needs into assessable outcomes for the learners. Specific learning objectives are characterized by the term learning outcomes because it implies learning follows a structured, organized approach and a measurable outcome is expected. The learning outcomes-based approach facilitates the shift from the conventional teacher-centred learning model to the learner-centred approach. In the former strategy, teachers were responsible for selecting both the instructional strategy and the content. The curriculum and course outlines described the contents of each lecture (sometimes regarding core and mandatory educational material) and assessment served as a tool to evaluate how well the learners assimilated this content. The learner-centred approach focuses on what the learners are expected to learn (knowledge) and able to do (skills/competences) as they progress through the course and the assessment explores whether learners achieved these learning outcomes.

In order to avoid misconceptions and ambiguity caused by (even slightly) different interpretations in the literature, the following list clarifies relative terminology according to the European Qualifications Framework (2017)[3],

> ***Qualification*** means a formal outcome of an assessment and validation process which is obtained when a competent authority determines that an individual has achieved learning outcomes to given standards.
>
> ***Learning outcomes*** means statements regarding what a learner knows, understands and is able to do on completion of a learning process, which are defined in terms of knowledge, skills, responsibility and autonomy.
>
> > *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 EQF, knowledge is described as theoretical and / or factual.
> >
> > *Skills* mean 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).
> >
> > *Responsibility and autonomy* mean the ability of the learner to apply knowledge and skills autonomously and with responsibility.

[3] 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 (2017/C 189/03).

Competence means the proven ability to use knowledge, skills and personal, social and / or methodological abilities, in work or study situations and professional and personal development.

It is highly recommended to define learning outcomes following a **qualification framework** if such exists. Qualifications frameworks are necessary instruments for achieving comparability and transparency within the higher education area. This is expected to lead to improved recognition of qualifications and of all forms of prior learning. An example in the EU context is the European Qualification Framework (EQF). The core of the EQF concerns eight reference levels describing what a learner knows, understands and is able to do – the learning outcomes. Levels of national qualifications will be placed at one of the central reference levels, ranging from basic (Level 1) to advanced (Level 8). This will enable much more straightforward comparison between national qualifications and should also mean that people do not have to repeat their learning if they move to another country. Each level of qualification is defined by a set of descriptors; for the EQF they have been formulated as learning outcomes. For Masters programmes, descriptors of EQF level 7 apply (see Annex C for details).

Writing learning outcomes with an emphasis on correctness and quality requires the employment of particular techniques. Additionally, they must address – exclusively and separately – one of the levels identified in the **Bloom taxonomy**[4] [5] (see Annex A), i.e. *the Cognitive (knowledge-based), the Affective (emotion-based) and the Psychomotor (action-based)* domains. Contemporary and updated versions of Bl made structure for writing learning outcomes and are frequently recommended. It consists of a hierarchy of increasingly complex processes students should acquire and corresponding verbs characterizing students' ability to demonst key to writing learning outcomes. Two main approaches are used to write learning outcomes; the **ABCD** and the **SMART approach** (see Annex B). The author of learning outcomes may select the most convenient for him/her to use.

Taking into account the previous theories, methods and frameworks, the Ind4.0 partnership adopts the following steps to write learning outcomes:

Step 1: Collect data related to the topic of the course or the module and prepare a textual description.

Step 2: Analyse the meaning of every word given and define every new term.

Step 3: Differentiate between knowledge, skill and competence knowledge domain.

Step 4: Apply the ABCD and SMART approaches to create one learning outcome for each knowledge, skill or competence.

[4] Bloom, B. S.; Engelhart, M. D.; Furst, E. J.; Hill, W. H.; Krathwohl, D. R. (1956). Taxonomy of educational objectives: The classification of educational goals. Handbook I: Cognitive domain. New York: David McKay Company.

[5] Bloom, B.S., Masia, B.B. and Krathwohl, D. R. (1964). Taxonomy of Educational Objectives Volume II: The Affective Domain. New York: McKay.

Step 5: Evaluate the learning outcomes for clarity, coherence, completeness (concerning the domain AND to Bloom's taxonomy and the ability to be assessed.

Step 6: Go to step 1 if any of the above conditions is not met and repeat the cycle.

Especially for learning outcomes, the following guidelines apply when developing them:

- Each learning outcome should refer to one, and only one level in Bloom's taxonomy.
- Each learning outcome should contain one and only one action verb; use the list of verbs associated with each level in the taxonomy.
- Each learning outcome should contain one concept of the knowledge domain.
- The learning outcomes must be observable, measurable and capable of being assessed.
- Avoid complicated sentences. If necessary use more one than one sentence to ensure clarity.
- Avoid vague terms like know, understand, learn, be familiar with, be exposed to, be acquainted with, and be aware of. These terms are associated with teaching objectives rather than learning outcomes.
- Bear in mind the timescale within which the outcomes are to be achieved and the available resources. There is always the danger that one can be over-ambitious when writing learning outcomes.
- Only the minimum number of outcomes considered to be essential should be included.
- Before finalizing the learning outcomes, evaluate them with colleagues and students.

1.2.2 Content selection and structuring

The majority of the educators consider the content as the cornerstone of course design. Therefore, much attention is given to select the courses that the curriculum will consist of, the content each course will include, the educational resources that will cover this content, etc. Also, educators have to deliver the content in a specific schedule, which usually puts pressure on them. Conventional, physical classrooms where teaching is done face-to-face are still the primary means of teaching. Specifically, educators need to ask themselves these two questions[6]:

- What specific content will add value to the overall goals of this course or programme?
- What content is essential for meeting the learning outcomes for this course, and what desirable but not necessarily obligatory?

[6] Bates, AW Tony. *Teaching in a digital age: Guidelines for designing teaching and learning*. 2018.

Content selection starts from the definition of the problem (see section 1.1.1) the curriculum is intended to address. At this point, the required specialization for curriculum developers delineated. For instance, in the Ind4.0 curriculum, experts familiar with subject matter relative to essential Ind4.0 topics, such as the Internet of Things, Cloud Computing, Artificial Intelligence and Big Data Analytics, as well as experts on Supply Chain Management and Business Modelling, would participate in the entire curriculum design and development life cycle. If the starting point of the curriculum development has been a needs assessment and analysis, the courses and the content spectrum should be known, as the needs should have been mapped to specific learning outcomes that determine the content to be used.

In several occasions, educators do not determine the content of courses or programmes they teach. Other organization, such as national/regional/local authorities, policies development agencies, accreditation organizations and qualification frameworks and standards often shape the decisions over content selection and delivery. Nevertheless, the fast increase in available knowledge in a multitude of sectors opposes the idea of prearranged and consolidated collections of content. Specifically, fast teaching paces and excessive content coverage are not recommended, since students need balanced workload and enough free time to reflect on what they are being taught, in order to assimilate knowledge and gradually master the skills they need for their professional career. Specialization is a means of narrowing down the vast amounts of available knowledge; however, real-world situations and problems usually require multidisciplinary approaches. Therefore, educators have to implement teaching methods that enable students to investigate concepts with a transdisciplinary focus and the use of extra-curricular activities in order to deliver the broader range of skills that drive innovation and creativity and nurture forward-looking skills, including entrepreneurship skills. However, this kind of educational reform movements requires remodelling of the educational process adopting new educational models such as those based on STEM and ST(E)AM.

A fundamental contribution of educators concern the curriculum structure; they take into account the order and inter-dependencies among training modules (which usually represent courses and laboratories). The curriculum should be structured in a way that assures consistency and constant development of learning outcomes. An important decision that directly affects curriculum structure concerns the adopted curriculum organization approach that is described in the next subsection

1.2.3 Curriculum/programme organization

Curriculum organization can be realized in various ways. The choice should also consider the learning and teaching processes that an institution wants to implement. Several approaches exist to organize curricula, with spiral, modular, core and options and linear being widely used.

Spiral - the curriculum is weaved around key topics/subjects enabling students to deepen their knowledge upon them as the curriculum progresses. Learners should revisit the material at increasing levels of complexity as they progress through the course. This is almost unavoidable, in practice.

Modular - Modularization is based on the principle of dividing the curriculum into small discrete modules or units that are independent, non-sequential, and typically short in duration. Students accumulate credits for modules which can lead to the qualification when a specific number of credit points is acquired[7].

The primary notion of having modules is to achieve flexibility and customizability that tailor the curriculum into individual's needs and preferences. This curriculum model is also known as the "core curriculum organization" approach that enables differentiated learning pathways to achieve the desired specialization. Learning modules are mostly standalone and lead to a small group of learning outcomes. These outcomes should be accomplished in a specific period of time as the modular curriculum organization approach is based on the required study effort and resources to achieve them.

Linear- this approach concentrates on developing skills following a sequential logic. The progression is done in a serial manner from beginning to end. It can start with facts and suggestions and progressively frame them. For instance, it could start with an issue or a problem and focus on the necessary skills to address it.

All previously mentioned approaches do not exclude one another, and many curricula use them complementarily. So, an integrated curriculum with a modular core of mandatory content and student-selected options, which contain topics that are revisited in increasing depth at successive stages of the curriculum, is entirely possible and possibly the most common approach among new curricula[8].

1.2.4 Learning, teaching and assessment activities

This stage determines how students will achieve the identified learning outcomes. It is the point where everything should be pulled together from the traits and needs of the target audience to the expected learning outcomes, the learning material and environment. All the effort put into curriculum design would be meaningless if learning and teaching activities fail to attract, engage and support learners in achieving the whether these are intended for conventional classroom use or online and blended learning.

It is evident that apart from determining the most suitable content for the curriculum, learning and teaching activities should be carefully selected and designed so that the content is delivered in a compelling format. Learning and teaching activities should engage, inspire, motivate and stimulate students and educators. The most important thing is whether students use the acquired knowledge and skills and not if an educator has a broad and solid educational background or the content itself. So, teaching should mainly focus on whether learners are applying what they learn and what they become capable of doing (i.e. gained knowledge and skills reflected by learning outcomes) to real-world situations. This is when teaching is being the most effective.

[7] Dejene, W., & Chen, D. (2019). The practice of modularized curriculum in higher education institution: Active learning and continuous assessment in focus. Cogent Education, 6(1), Research-Article.

[8] Grant, J. (2014). Principles of curriculum design. Understanding medical education: evidency, theory and pratice. 2a ed. Malden: Wiley Blackwell, 31-46.

The following list summarizes various options for teaching and learning activities that can be employed in diverse teaching approaches, with any size of students' groups

- Concept mapping
- Participatory Learning in Action (PLA) Techniques
- Formative quizzes
- Problem-solving
- Brainstorming
- Discussion groups
- Interviews
- Debates
- Case studies

Apart from learning and teaching activities, decisions have to be made for the assessment methods that are crucial for an efficient learning process. Assessment methods provide students with the opportunity to test / show if they have achieved programme's learning outcomes. Nevertheless, it is doubtful that a single assessment tool will address all assessment requirements. There exists a variety of methods and tools for assessment activities that include multiple-choice questions, open questions, assignments, exercises, projects and presentations of project work and assessment by peers. Some sophisticated approaches may use electronic games, 3D environments and CAD software as assessment tools.

Nothing is likely to drive student learning more than the method of assessment. At the same time, assessment methods are rapidly changing and are likely to continue to change[9]. It can be argued that some of these assessment methods are both formative, in helping students to develop and increase their competence and knowledge, as well as summative, in assessing knowledge and skill levels at the end of a course or programme. In a digital age, assessment and teaching will become even more closely integrated and contiguous. There is an increasing range of digitally based tools that can enrich the quality and range of student assessment. Therefore the choice of assessment methods and their relevance to other components are vital elements of any effective learning environment[9].

Evolvement in terms of education enables people to enhance and/or enrich previously gained knowledge, skills and competencies. Thus, it would be logical to follow a linear model in organizing a curriculum (this does not exclude a blending with a modular model), in order to achieve an increased progression through a sequential approach. A theory (or principle) used for devising teaching and learning activities, and assessment tasks, that directly address the intended learning outcomes are called constructive alignment.

'Constructive alignment' starts with the notion that the learner constructs his or her learning through relevant learning activities. The teacher's task is to create a learning environment

[9] Bates, AW Tony. *Teaching in a digital age: Guidelines for designing teaching and learning*. 2018.

that supports the learning activities appropriate for achieving the desired learning outcomes. The key is that all components in the teaching system - the curriculum and its intended outcomes, the teaching methods used, the assessment tasks - are aligned with each other. All are tuned to learning activities addressed in the desired learning outcomes. The learner finds it difficult to escape without learning appropriately[10].

According to John Biggs[11] Constructive Alignment involves:

Thoughtfully determining intentions for what students should learn and how they will demonstrate their achievement of these intended learning outcomes, and communicating these to students;

Designing teaching and learning activities so that students are optimally engaged in achieving these learning outcomes; and

Creating assessments that will allow students to demonstrate their attainment of the learning outcomes and allow instructors to discern how well these outcomes have been achieved.

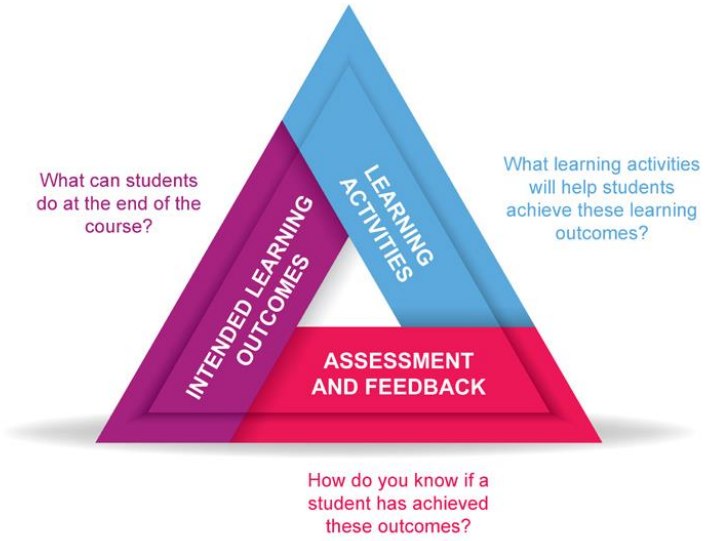

Figure 2. Constructive alignment (Source: https://www.ntu.edu.sg/)

1.2.5 Modes of delivery

Various modes to deliver a curriculum exist, a domain that has been significantly enriched by recent technological advancements. The following basic modes of curriculum delivery can be identified:

Classroom teaching without technological support. This is also referred to as traditional face-to-face teaching.

Blended learning in different formats that include:

technology-assisted learning, the most common example of this learning mode is a PowerPoint presentation to support a lecture,

[10] Biggs, J. (2003). Aligning teaching for constructing learning. *Higher Education Academy*, *1*(4).
[11] Biggs, J (2014). Constructive alignment in university teaching. *HERDSA News*, *36*(3), 5.

utilization of a learning management system (LMS) to support the learning process providing a digital repository of educational material, a course schedule of topics, forum functionalities for online discussions, and a submission subsystem for student assignments, but teaching is still delivered mainly through classroom sessions,

Video recordings for lectures, where students watch the lecture via streamed video then come to class for discussion or other work,

one-semester, face-to-face on campus and two semesters online,

hybrid/flexible learning where teaching is mainly done by online means and learners visit the educational provider premises for a few scheduled face-to-face meetings to discuss questions and offer insight into learning material and other curriculum procedures, or for laboratories and hands-on sessions that cannot be conduction in an online fashion.

completely online learning that may include:

online versions of courses offered via traditional means (i.e. classroom-based) that lead to a degree (or a certificate) but require admission,

Massive Open Online Courses (MOOCs) that are open courses available to everyone.

1.2.6 Accreditation

ECTS Credits (see chapter 2 for a detailed description of the European Credit Transfer System) have to be allocated to the curriculum and its elements (i.e. courses and thesis)

The Master programme in Ind4.0 will last two years and consists of 120 ECTS

ECTS credits are allocated based on the expected workload for students. For the estimation of the workload, all learning activities required to achieve the expected learning outcomes, including the time spent on independent work, compulsory work placements, preparation for assessment and the time necessary for the assessment must be taken into account. For details of how ECTS credits are allocated based on workload, please see chapter 2.

The Master programme should guarantee the mobility of students, who should be able to complete it in the predefined schedule.

1.2.7 Admission

An admission procedure to the curriculum/Master programme has to be established, through which applicants will be evaluated in terms of specific criteria, such as required previous knowledge, owned degree(s) and professional experience. All admission requirements should be described in the curriculum outline.

An admission committee has to be created to perform the evaluation of all applicants and decide if an applicant meets on/off requirements while rating other criteria, such as the overall grade of a previously acquired degree to create a rated list of applicants. Other factors could be taken under consideration for the rating as well, such as the applicants' motivation ar to the final rating of applicants.

If the native language of the student does not match the language of the programme (e.g. English), language skills have to be proven by appropriate certificates as defined by the admission commission.

1.2.8 Master thesis and degree

The Master thesis should meet some basic requirements that should be explicitly stated in study regulations, such as ECTS points, language, examination procedure, public defence, template and formatting and thesis assessment components, among others.

There should be decided whether a diploma supplement in English will be issued together with the diploma.

1.3 Creation/deployment

The stage of design creates the plan for the curriculum, and the creation/deployment phase constructs it. What should be taught and how are already known, and the next step is to develop learning material, synthesize content from multiple sources and create exercises, assignments and assessment tests. This process involves educators and knowledge domain experts in an iterative process through which learning and assessment objects may go over multiple reviews from technical and scientific perspectives before being ready for use. Advancing through the creation/deployment stage, the constructive alignment principle should always guide the curriculum development team, so that (core and additional) learning material and assessment objects address the learning outcomes that were defined during the curriculum design stage. All training and assessment activities should be focused on supporting and fostering students achieve the intended learning outcomes.

When good planning and structuring is combined with quality material, a much more learner-friendly outcome can be reached. For example, an MS Word document that has quality content, yet its styling and formatting are lagging, or another document that has excellent formatting, but low quality content. In both cases, the document will fail to fulfil its objectives. When a quality design is coupled with appropriate content, learning material becomes more easily understandable, and even complex documents can become appealing and engaging. Curriculum content should include the following:

1. Course profile that describes the content, teaching approach, assessment procedures and schedule.
2. Easy to comprehend learning material and other material to support lectures (e.g. PowerPoint slides).
3. Teachers' and students' guides for each t activities, along with tips for delivering educational material.
4. Well-defined learning activities (see section 1.2.4 for activities examples).

In technology-based teaching, content development typically follows an instructional model, such as ADDIE (an acronym for Analyze, Design, Develop, Implement, Evaluate), which has been widely used for instructional planning in e-learning and distance learning programmes. The model is mainly applied on an iterative basis, with evaluation leading to reanalysis and

further design and development modifications[12]. A primary reason for its increased adoption is its ability to handle and realize composite and sizeable curriculum designs. Another reason that ADDIE is flourishing is the quality it offers in design with clearly expressed learning goals and outcomes, well-structured components, balanced study and work efforts for learners and trainers respectively and appropriate teaching, learning and assessment activities directly connected to specific learning outcomes.

Also, this phase may include learning tools/systems/platforms development when blended, or fully online learning approaches are implemented. For instance, LMSs are computer-based systems that provide a virtual learning environment and support the learning process throughout a course or educational programme. Most LMSs, such as Moodle, Canvas and Blackboard provide the digital equivalents of physical classroom and associated interactions between students and teachers. Courses can be organized in a weekly format, and learning and assessment objects can be cut into small groups and be allocated to different weeks. Very large classes can be broken down to smaller ones, each one assigned a different teacher, and all these classes can run in parallel with more or less the same pace. LMSs also offer tools for asynchronous communication between peers and between teachers and students, such as blogs, personal messages and forums, while other tools, such as wikis may also be available. Another widely used technological tool is Massive Open Online Courses (MOOCs), such as those offered by edX and Coursera, which can be simultaneously accessed by unlimited users (for more information on MOOCs see chapter 4).

Laboratories deployment is part of this phase as well. They may be either virtual or physical and in both cases, their set up is guided by specific needs without having some kind of protocol that can be used in different occasions.

1.4 Delivery and assessment

The final stage includes the delivery and assessment of the curriculum. Delivery concerns the implementation of all design and development tasks, the actual realization of the curriculum/programme. Summarizing the preparation steps, successfully delivery depends on:

- Reliable outcomes of the needs assessment and analysis.
- Well-articulated learning outcomes that define what students are expected to know or be able to do after the course/programme ends.
- A carefully crafted training plan (i.e. teaching, learning and assessment activities).
- Suitable learning and assessment materials that match the intended learning outcomes.
- Clear and straightforward teaching instructions.
- Well-prepared teachers, able and eager to set up and maintain a constructive learning environment.

There are two main guidelines when using learning materials:

[12] Bates, AW Tony. *Teaching in a digital age: Guidelines for designing teaching and learning*. 2018.

Teachers and trainers are those who exert the most significant influence throughout the learning process regardless of whether they are highly skilled or of low potential.

The way content is delivered to students is the most crucial issue concerning the size of information and acquired knowledge of students.

Apart from being the final step of the curriculum development framework, assessment should be done in all stages to validate the outcomes of each stage. For instance, after identifying the driving needs, there should be an assessment of their accuracy and prevalence. Furthermore, other educators with related or relative expertise should review developed learning materials before finalizing and delivering them to students and teachers. Naturally, this assessment intervention may force the curriculum design and development team to go back to stage 2, where the required content is identified before being developed in stage 3. This type of assessment (also called process assessment) assures an increased quality of the outcomes of each stage and each process within stages.

The most common type of assessment takes place by the end or right after the course end. A questionnaire is usually filled by students, which calls them to assess both the learning effect as well as the user experience. Assessment can also take place at the end of each training session through sort questionnaires or single simple questions (e.g. "How
Another possibility is to conduct follow-up assessment activities (e.g. questionnaires filling or focus groups) 6 months or one year after training has ended, in order to explore whether graduates found handy and used the acquired knowledge and skills and how they did it in their professional careers.

A widely used classification of evaluation distinguishes two main types, **formative** and **summative**. The former utilizes information to assess the overall learning process (e.g. student comprehension, learning progress and content relevance) with the generic goal of improving student learning and teaching methods, while these are ongoing. It characterizes an evaluation as formative, the fact that is used while teaching and learning activities are conducted, for the purposes of in-process changes and adaptations. In contrast, summative evaluation is used to assess if students have achieved specific learning outcomes after the end of a training period (which usually is a semester in the case of Master programmes). Many educators consider formative evaluation as a structural element of effective learning and an integral component of teaching and learning activities. Drawing an analogy with cooking, when the cook tastes a food, this is formative evaluation. When other people eat it, it is a summative evaluation.

The aims of assessment are to:

evaluate what has been implemented,

upgrade curriculum development approaches, tools and methods,

evaluate faculty staff,

disseminate results to relevant stakeholders,

provide feedback to institutional policies, as well as to regional and national policies.

The essential spots assessment should take place in the curriculum development process are:

1. Needs assessment. Identify the curriculum's target group along with their special characteristics and educational needs.
2. Conclusion of the design stage. Verify selected contents and specified learning and teaching activities are the most appropriate before the next stage begins.
3. End of curriculum creation. Verify the quality of developed learning material.
4. Beginning of the delivery of the curriculum and start of each component (i.e. course) to assess the current level of knowledge of students, which will act as a baseline for forthcoming assessments.
5. During the delivery to monitor students' progress, lea and teaching activities effectiveness among others.
6. Completion of delivery to assess if and at which level the learning outcomes have been achieved.
7. Follow-up assessment after the curriculum has ended to monitor its impact on professional careers, attitudes, skills of students.

There are plenty of options with regards to evaluation tools that can be applied to all of the occasions mentioned above. IT is up to each curriculum development group to choose among them in terms of relevancy and effectiveness. It has to be noted that excessive assessment might have a negative impact and a balanced to its frequency, as well as a variety of applied methods, are strongly recommended.

2 ECTS application guidelines

ECTS is a learner-centred system for credit accumulation and transfer. Transparency of the learning, teaching, and assessment processes is the principle it is based on. It aims at facilitating the planning, delivery, and evaluation of study programs and student mobility. It can be achieved by recognizing learning achievements and qualifications and periods of learning.

ECTS was initially designed in 1989 as a pilot program in the Erasmus program to facilitate the international mobility of students, more effectively to facilitate the recognition of periods spent abroad. Over the last two decades, it has undergone significant changes, mainly because the Bologna Process has introduced sweeping changes. First, it was transformed from a primary means of credit transport into a mechanism of credit transport and accumulation. In the last years, in the light of the growing importance of lifelong learning, it has been re-examined in the context of the development of qualifications frameworks and has been oriented to keep pace with Bologna Procecess's general shift towards a student-centred focus. The attempt to shift the education system from a teacher-centred to a learning-centric one has brought significant changes to the ECTS system: it has been transformed into a student-centred system for credit accumulation and transfer based on the transparency of learning outcomes, and learning processes. Thus, the European Higher Education Area acquires a means of facilitating the design, delivery, evaluation, recognition, and validation of qualifications or part of them.

ECTS has been adopted by the majority of higher education institutions in Europe, and in numerous countries, it has been embedded in the national legislation. In the remaining countries, ECTS is widely supported, in some cases, financially. However, so far, implementation practices vary, and it is still far from the vision described above. The Eurydice study prepared for the ministerial conference in Leuven/Louvain-la-Neuve in April 2009 showed the variation in defining ECTS in European countries, different understandings, and/or various stages of development. In some countries, the ECTS system is based on student workload and learning outcomes, in others, ECTS is based on student workload only. Some countries defined ECTS on the bases of contact hours or contact hours and student workload. In some countries, higher education institutions use the ECTS credit system with various definitions of "a credit". From these, it follows that a common methodological guide for users is needed. Today the ECTS system finds itself in a transition period between the workload-based ECTS credits, taking into account learning outcomes as described in the ECTS Key Features (December 2008), the ECTS Users' Guide 2009 and the ECTS Users' Guide 2015 —all published by the European Commission.

2.1 ECTS basics

The essential features of the ECTS system are:

1. **ECTS credits** express the volume of learning based on the defined learning outcomes and their associated workload. 60 ECTS credits are allocated to the learning outcomes and associated workload of a full-time academic year or its equivalent,

which usually comprises several educational components to which credits (based on the learning outcomes and workload) are allocated. ECTS credits are generally expressed in whole numbers.

2. **Learning outcomes** are statements of what the individual knows, understands, and can do on completion of a learning process. The achievement of learning outcomes has to be assessed through procedures based on clear and transparent criteria. Learning outcomes are attributed to individual educational components and programs as a whole. They are also used in European and national qualifications frameworks to describe the level of the particular qualification.
3. **The workload** is an estimation of the time the individual typically needs to complete all learning activities such as lectures, seminars, projects, practical work, work placements, and individual study required to achieve the defined learning outcomes in formal learning environments. The correspondence of the full-time workload of an academic year to 60 credits is often formalized by national legal provisions. In most cases, workload ranges from 1,500 to 1,800 hours for an academic year, which means that one credit corresponds to 25 to 30 hours of work. It should be recognized that this represents the typical workload and that for individual students, the actual time to achieve the learning outcomes will vary.

Note: This handbook uses «work placement» or «internship» as synonyms.

4. **Allocation** of credits in ECTS is the process of assigning several credits to qualifications, degree programs or single educational components. Credits are allocated to entire qualifications or programs according to national legislation or practice, where appropriate, and regarding national and/or European qualifications frameworks. They are assigned to educational components, such as course units, dissertations, work-based learning, and work placements, taking as a basis the allocation of 60 credits per full-time academic year, according to the estimated workload required to achieve the defined learning outcomes for each component.
5. **Awarding credits** in ECTS is the act of formally granting students and other learners the credits that are assigned to the qualification and/or its components if they achieve the defined learning outcomes. National authorities should indicate which institutions have the right to award ECTS credits. Credits are awarded to individual students after they have completed the required learning activities and achieved the defined learning outcomes, as evidenced by appropriate assessment. If students and other learners have achieved learning outcomes in different formal, non-formal, or informal learning contexts or timeframes, credits may be awarded through assessment and recognition of these learning outcomes.
6. **Accumulation of credits** in ECTS is the process of collecting credits awarded for achieving the learning outcomes of educational components in formal contexts and for other learning activities carried out in informal and non-formal contexts. A student can accumulate credits to:
    - obtain qualifications, as required by the degree-awarding institution,

- document personal achievements for lifelong learning purposes.

7. **Transfer of credits** is the process of having credits awarded in one context (program, institution) recognized in another formal context to obtain a qualification. Credits awarded to students in one program may be transferred from an institution to be accumulated in another program offered by the same or another institution. Credit transfer is the key to successful study mobility. Institutions, faculties, departments may make agreements that guarantee automatic recognition and transfer of credits.
8. **ECTS documentation**: The use of ECTS credits is facilitated and quality enhanced by the supporting documents (Course Catalogue, Learning Agreement, Transcript of Records, and Work Placement Certificate). ECTS also contributes to transparency in other documents such as the Diploma Supplement.

2.2 ECTS and the European Higher Education Area (EHEA)

In 1999, the Bologna Declaration included ECTS in the primary targets for countries participating in the Bologna Process. Following reforms, ECTS is a key tool of the European Higher Education Area (EHEA).

ECTS is adopted as the national credit system in most EHEA countries. In other parts of the world, its use is increasingly by institutions, or there is a successful interaction with local credit systems based on similar criteria, thus playing a role in the growing global dimension of education.

Within the EHEA, ECTS increases the transparency and readability of the educational process and is, therefore, a critical factor in stimulating change and modernization, as its implementation encourages change from a teacher-centred approach to a learner-centred learning (SCL), recognized as a core EHEA principle.

Using learning outcomes and workload in curriculum design and delivery, ECTS makes the student the centre of the educational process. Also, the use of credits facilitates the creation and documentation of flexible learning pathways, thus allowing students greater autonomy and responsibility.

Due to its outcome-based approach, the use of ECTS serves other purposes of the EHEA:

It facilitates the recognition of prior learning and experience and encourages a higher level of completion and broader participation in lifelong learning,
It establishes a closer link between educational programs and societal requirements and enhances interaction with all stakeholders, including the world of work and broader society,
It facilitates mobility within an institution or country, from institution to institution, from country to country, and between different educational sectors and contexts of learning (i.e., formal, non-formal, informal, and work-based learning), through recognition and credit transfer.

In national legislation, the use of ECTS can be a requirement for accreditation of higher education programs or qualifications.

2.3 ECTS for curriculum design, delivery, and monitoring

This section deals with the design of educational programs by higher education institutions (HEIs) or by other providers. The use of ECTS credits aids program design by providing a tool that improves transparency and helps to engender a more flexible approach to curriculum design and development.

From an institutional perspective, designing a program means planning a curriculum and its components in credits, indicating learning outcomes and associated workload, learning activities and teaching methods, and assessment procedures/criteria. The institutional credit framework should cater to the needs of different programs and support inter- and multi-disciplinary approaches.

Note: An **independent learner** may accumulate the credits required for the achievement of a qualification through a variety of learning modes. She/he may acquire the required knowledge, skills and competence in formal, nonformal and informal contexts: this can be the result of an intentional decision or the outcome of different learning activities over time. The learner may select educational components without immediate orientation towards a formal qualification. ECTS supports this process, as described in Section 2.5 on Lifelong Learning.

The use of ECTS in HEIs requires both an institutional credit framework based on institutional regulations and a profound understanding of the system by each member of the academic staff. Some institutions foster this understanding by regular training for staff members. Team-based decisions on program design enhance the coherence of the program.

The following steps have been identified as helpful in designing programs.

2.3.1 The context of curriculum

When a new program is developed, the first decision typically concerns the level of the qualification to be awarded, which is defined based on the relevant national legislation and existing qualifications frameworks (European, national, sectoral, institutional).

It will be evident that not all learning outcomes are at the same level – hence the full implementation of a credit system requires level descriptors.

Note: There are two European Qualifications Frameworks: the Framework for Qualifications of the European Higher Education Area (QF-EHEA) and the European Qualifications Framework for Lifelong Learning of the EU (EQFLLL). Both frameworks use learning outcomes to describe qualifications (e.g. Bachelor, Master, Doctor) and are compatible with each other as far as Higher Education is concerned (QF-EHEA cycles 1, 2 and 3 correspond to EQF-LLL levels 6, 7 and 8) and cover qualifications at ISCED levels 6, 7, 8.

In the QF-EHEA, three main cycles, as well as a short cycle, are identified and described by the so-called Dublin Descriptors, in terms of: applying knowledge and understanding, making judgments, communication skills, and learning to learn. The short, first and second cycles are also characterised by credit ranges:

Short cycle qualifications typically include approximately 120 ECTS credits.
First cycle qualifications typically include 180 or 240 ECTS credits.
Second cycle qualifications typically include 90 or 120 ECTS credits, with a minimum of 60 ECTS credits at the level of the second cycle.
The use of ECTS in the third cycle varies.

The QF-EHEA and the EQF provide overarching frameworks against which national and institutional frameworks and descriptors should be calibrated.

National frameworks usually are more detailed than these overarching frameworks, reflecting the range of tertiary qualifications offered in the country.

Higher Education Institutions which implement ECTS as a credit system will need an institutional framework that correlates with the national and international frameworks. The institutional framework will indicate how ECTS credits are to be used, usually specifying a minimum credit value for an educational component to facilitate inter/ multi-disciplinary programs (which will be created by combining educational elements from across a range of disciplines). European and national frameworks indicate the level of the final qualification.

Thus, institutions, recognizing that not all credits acquired in progressing towards a qualification are at the same level (learning outcomes achieved in the third year of a Bachelor degree, for example, will tend to be more complicated than those achieved in the first year) – may specify intermediate credit levels with appropriate descriptors which (together with progression rules) will help students in progressing along their learning pathways.

Before designing the program in detail, it should be set in the context of institutional and departmental mission statements, professional specifications (regulations, requirements), and the institutional academic framework for credit allocation.

2.3.2 The profile of curriculum

The profile presents the distinctive features of the program[13]. It indicates the field(s) of study (which may be expressed in ISCED-F codes), the level of the program, the main focus, the key learning outcomes expected on completion, the learning environment, and the prior learning, teaching, and assessment activities. A compelling program profile will make it clear to students and stakeholders what generic and subject-specific competencies will be developed and the employability potential of the program. For this purpose, it is recommended that the profile is defined in consultation with relevant stakeholders and is presented clearly and transparently.

The profile should be part of the program description included in the Course Catalogue.

2.3.3 The learning outcomes of curriculum

The program learning outcomes are based on the program profile and describe what a student knows, understands, and can do on completion of the program.

Formulating program learning outcomes

Considerable care needs to be taken in formulating learning outcomes. The following non-exhaustive list provides a set of guidelines which has proved to be helpful.

- The learning outcomes should adequately reflect the context, level, scope, and content of the program.
- The statements of learning outcomes have to be succinct and not too detailed.
- The learning outcomes have to be mutually consistent.
- The learning outcomes should be easily understandable and verifiable in terms of what the student has achieved at the end of the program.
- The learning outcomes have to be achievable within the specified workload.
- The learning outcomes have to be linked with appropriate learning activities, assessment methods, and assessment criteria.
- There are no rules on the ideal number of learning outcomes at the programme level. Experience suggests that between 10 and 12 is appropriate.
- A widely accepted way of formulating learning outcomes is based on three essential elements.

1. Use an active verb to express what students are expected to know and be able to do (e.g., graduates can ‘describe’, ‘conclude’, ‘assess’, ‘imp

2. Specify what this outcome refer
of hardware-components’, her ‘design ...

3. Specify the way of demonstrating the achievement of learning outcomes (e.g., ‘to give an overview of the main ...
develop a research design by applying up-to-date scientific method

[13] Lockhoff, J., Wegejis, B., Durkin, K., Wagenaar, R.,
formulating degree programme profiles. Including programme competences and programme learning outcomes.

The programme learning outcomes should be included in the Course Catalogue and the Diploma Supplement.

2.3.4 The structure and allocation of credits of the curriculum

The program profile is broken down into educational components, which may consist of single or several modules, other types of the course unit, work and clinical placements, research projects, laboratory work, and other relevant learning activities. They may also include social, and community activities (for example, tutoring and mentoring) provided they fit the program learning outcomes and carry credits.

Learning outcomes, with related assessment strategies and assessment criteria, should be defined for each educational component.

The learning outcomes of the program and its educational components are often mapped to demonstrate their mutual reinforcement. Many institutions use a matrix to correlate the learning outcomes of the degree program with those of its educational components.

> **Note:** The principles for formulating learning outcomes for educational components are the same as for programme learning outcomes.
>
> There are no absolute rules on the ideal number of learning outcomes for an educational component. It will depend on the level and the nature of the unit, as well as the estimated workload. However, good practice suggests that the number should be limited and general experience indicates that 6 to 8 is an appropriate number.

After the constituent parts of the program have been identified, the overall structure should be outlined and credits allocated to each component, based on its learning outcomes and associated workload, taking into account that 60 credits correspond to a full-time-equivalent academic year.

When educational components are of regular size (e.g. 5, 10, 15) they are often called ‘modules’. In a program made up of modules (a used when justified (for example, in the case of 4 modules per semester), but other decimals should be avoided. It is helpful if the institution determines the primary credit currency in terms of the minimum number of credits for a component, as this will facilitate collaboration on curricula across subjects and faculties.

Establishing ‘mobility wilitate learning mobility. Mobility e curric windows may be prescribed both in content and timing in the program design or may allow flexibility in timing and content for the individual student. Mobility windows are preferably not used to replicate what would be studied at home, but to enable students to benefit from diverse educational experiences in other settings. Progression requirements must be explicit if students are to navigate the program successfully and obtain the intended qualification.

Progression requirements may include, among other things, prerequisites, co-requisites, and recommendations. Progression rules may be expressed in terms of the numbers of credits or credit ranges required at different stages within a program of study (e.g. a minimum number

of credits needed to pass from one academic year/semester to another). They may also be formulated in terms of detailed rules on what components must and/or can be taken at what stage and of what level (e.g. compulsory courses, optional courses, and prerequisites).

Independent learners joining a formal program should receive appropriate counselling/ advice to support them in complying with progression requirements. Where relevant, this counselling should include recognition of prior learning and experience. Flexible program structures allow students' choice, including modes of learning and teaching.

2.3.5 Learning, teaching, and assessment

Higher education institutions need to define their learning and teaching objectives to their study programs and how they should be delivered and assessed.

1. **General principles for learning, teaching, and assessment:** Some general principles concerning learning, teaching, and assessment should be taken into account when delivering a program of study, regardless of the mode of learning and teaching.
2. **Open dialogue and participation:** The student-centred approach requires an open discussion and reflective feedback between students, teachers and the relevant administrators through which their needs and aspirations can be expressed and discussed. All stakeholders should be involved in constructive discussion of programme design and delivery. Student representatives should participate in such discussions with full voting powers.
3. **Transparency and reliability:** The Course Catalogue should provide reliable, up-to-date and quality assured information on degree programs, as well as on single educational components. It should give an accurate description of the degree program, including all details: structure, features, learning outcomes, workload, learning/teaching approaches, assessment methods, assessment criteria, and progression rules.
4. **Consistency**: The academic staff responsible for delivering the program and its components should ensure consistency between the learning outcomes stated in the program, the learning and teaching activities, and the assessment procedures. This constructive alignment[14] between learning outcomes, learning activities, and assessment is an essential requirement for educational programs.
5. **Flexibility:** A flexible program structure is essent meet different needs, e.g. opportunity should be given for developing personal learning pathways, and optional activities should be offered. A flexible organization of learning, teaching and assessment activities, including flexibility in the timetable and more opportunities for independent learning, is essential for accommodating different learning styles. This widens the choices of learning and teaching materials and activities and opens up opportunities for students with other profiles or needs (e.g. people with caring responsibilities or people with disabilities). The integration of digital technologies in higher education provision is having a significant impact on

[14] Biggs, J. (2003), Aligning teaching for constructing learning. Higher Education Academy: https://www.heacademy.ac.uk/aligning-teaching -constructing-learning

learning and teaching approaches. The allocation of credits to learning outcomes, which are achieved through new modes of delivery made possible by technology, is based on the same principles as the allocation of credits to learning outcomes for traditional educational components.

6. **Appropriate assessment of achievements:** Credits are awarded when proper assessment shows that the defined learning outcomes have been achieved at the appropriate level. If the student has not achieved the learning outcomes, no credits will be awarded. The number of credits awarded to the student who demonstrates the achievement of learning outcomes is the same as the number of credits allocated to the component.

   Assessment methods include the whole range of written, oral and practical tests/ examinations, projects and portfolios that progress and ascertain the achievement of the learning outcomes of a course unit or module. In contrast, assessment criteria are descriptions of what the student is expected to do, to demonstrate that a learning outcome has been achieved.

   In fact, the assessment methods and criteria were chosen for an educational component have to be consistent with the learning outcomes that have been defined for it, and with the learning activities that have taken place.

2.3.6 Monitoring of credit allocation

The program is monitored to establish whether the credit allocation, the defined learning outcomes and the estimated workload are achievable, realistic and adequate. Monitoring can be managed in different ways through questionnaires, focus groups, or interviews, or by monitoring the results achieved. Whatever method is used, feedback from students, staff and where appropriate, stakeholders should constitute an essential element for checking and revising credit allocation. Data on completion times and the assessment results of programs and their components should also be used.

It is important to inform students and staff about the purpose of the monitoring exercise, and how it will be carried out, to ensure accurate answers and a high response rate. If the information gathered reveals a discrepancy between the workload foreseen and the time is actually taken by the majority of students to achieve the defined learning outcomes, it would be necessary to revise the workload, credits, learning outcomes, or learning and teaching activities and methods. This could also involve redesigning the study program and its educational components. The revision should be done as soon as possible without creating problems for those who are currently taking the program and should be communicated to those who had participated in the monitoring exercise to foster an ongoing, cooperative feedback culture in the institution.

2.4 ECTS for mobility and credit recognition

Successful learning mobility requires academic recognition and transfer of credits. Recognition of credits is the process through which an institution certifies that learning outcomes achieved and assessed in another institution satisfy the requirements of one of the programs they offer.

Given the diversity of programs and HEIs, it is unlikely that the credits and learning outcomes of a single educational component in two different programs will be identical. This is even more the case in recognizing learning from other learning contexts (for example vocational education and training). An open and flexible approach to the recognition of credits obtained in another context, including learning mobility, is therefore recommended, based on compatibility of learning outcomes rather than equivalence of course contents. In practice, recognition means that the number of credits gained for compatible learning outcomes achieved in another context will replace the number of credits that are allocated for consistent learning outcomes at the awarding institution. Institutions should make their recognition policies known and easily accessible.

2.4.1 Degree mobility

Degree programs can vary in the number of ECTS credits they include. For recognition of qualifications for further studies, the difference in the number of ECTS credits gained after successful completion of qualification is not a consideration. The program learning outcomes should be the main factor to be taken into account. This means, for example, that a comparable Bachelor's degree should be recognized for consideration for admission to a Master's program, independently of whether it is based on 180 or 240 ECTS credits.

The Lisbon Recognition Convention

The Lisbon Recognition Convention, which entered into force in 1999, provides a legal framework for cross-border academic recognition.

The Convention stipulates:

'36. Qualifications may show differences in terms of content, profile, workload, quality, and learning outcomes. In the assessment of foreign qualifications, these differences should be considered flexibly, and only substantial differences given the purpose for which recognition is sought (e.g. academic or de facto professional recognition) should lead to partial recognition or non-recognition of the foreign qualifications.

37. Recognition of foreign qualifications should be granted unless a substantial difference can be demonstrated between the qualification for which recognition is requested and the relevant qualification of the State i

The European Area of Recognition Manual[15] gives the following explanation for the interpretation of substantial difference:

'By focusing on elements that together make up a qualification (level, workload, quality, profile, and learning outcomes) and by taking substantial differences into account, competent recognition authorities have transformed their approach from expecting foreign qualifications to be almost the same as those offered in their own countries, to focusing on substantial differences.

[15] EAR Manual a European Area of Recognition project: http://www.eurorecognition.eu/emanual/

Recognition of professional qualifications

EU Directive 2013/55/EU amends Directive 2005/36/EC on the recognition of professional qualifications.

It allows ECTS to be used as an additional means of expressing full-time course duration in the case of the seven 'sectoral' pro… terms of full-time academic years and total numbers of hours will remain for medical doctors, general care nurses, dentists, and midwives. For veterinary surgeons, pharmacists and architects, the obligation covers only full-time academic years.

Similarly, ECTS may also be used in levels (d) and (e) of the qualifications grid used in the General System, which covers all other qualification-based regulated professions in the EU and the EEA.

The new Directive has extended its scope to the recognition of work placements which are necessary to have access to a regulated profession. These can be undertaken in any EU/EEA member state, irrespective of where the qualification is delivered, and enjoy full recognition. Recital 27 states that … of a professional traineeship completed in another Member State should be based on a clear written description of learning objectives and assigned tasks, to be … Member State.' Article 55a requires … Authorities to … organization and recognition of professional traineeships carried out in another Member State or a third country, in particul…

Finally, the new Directive introduces common training standard… sets of knowledge, skills, and competencies' required in the … training applicable in at least one-third of Member States. These curricula may be proposed by representative professional bodies operating at the EU or national level, or by Competent Authorities. They are to be referenced to the European Qualifications Framework and are free to make full use of ECTS.

2.4.2 Credit mobility

ECTS was designed to facilitate learning mobility between institutions for short-term study periods ('credit mobility'). As the … Guide makes clear, ECTS has developed and been adopted for purposes of credit accumulation. However, it still plays a vital role in student mobility – facilitating the transfer and recognition of the achievements of the mobile student.

In ECTS, the following supporting documents help facilitate credit recognition for mobility:

- Course Catalogue
- Learning Agreement
- Transcript of Records
- Traineeship Certificate

These documents provide information on the learning outcomes achieved, on which the qualification-awarding institution can make decisions on credit recognition and transfer.

Please see chapter 7 of the European Recognition Manual for Higher Education Institutions (2014)[16] for details. The section includes a useful flowchart on the recognition of periods of study abroad.

The golden rule of recognition of credit mobility within the framework of inter-institutional agreements

All credits gained during the period of study abroad or during the virtual mobility –as agreed in the Learning Agreement and confirmed by the Transcript of Records –should be transferred without delay and counte additional work by or assessment of the student.

Before the credit mobility period: To facilitate the organization of credit mobility and its recognition, the three parties involved – the student, the sending institution and the receiving institution or organization/enterprise –should agree on the program abroad. They should formalize this in a Learning Agreement, to be signed by the three parties before the start of the mobility period. The Learning Agreement is intended to give the student the confirmation that the credits he/she successfully achieves during the mobility period will be recognized. The Erasmus+ program provides templates for the Learning Agreement for studies and traineeships for institutions participating in the program. It also guides institutions on how to use the templates and sets out specific deadlines institutions need to comply with.

The educational components to be completed during the mobility period should typically not be selected based on their equivalence with single educational components offered at the sending institution. The learning outcomes of the whole program of study abroad should be compatible with or complementary to the learning outcomes of the home degree program for which recognition is to be granted after the study period abroad. This makes it easier for the credits gained in the receiving institution to replace an equivalent number of credits flexibly in the sending institution's degree prograr period as a whole, instead of recording it component by component.

The Learning Agreement should identify a set of suitable educational components to be taken at the receiving institution and how they will be integrated into the program of the sending institution. The number of credits to be gained at the receiving institution should be proportionate to the time of study abroad. The student is expected to take educational components of 60 ECTS per full-time academic year.

The receiving institution commits to registering the incoming student in the planned educational components, verifying that these components are available for the foreseen mobility period.

[16] European Recognition Manual for Higher Education Institutions: http://eurorecognition.eu/Manual/EAR%20HEI.pdf

Once all three parties sign it, the Learning Agreement can be modified after that, if necessary, by agreement of all three parties concerned.

Note: New modes of ICT-enabled learning allow students to access and follow courses outside their own institution ('virtual mobility'). Students should be offered clear academic guidance and a Learning Agreement between the 'home institution' and the student.

In joint programmes agreed mobility schemes are adopted by the partner institutions, which include the rules for the recognition of credits. Learning Agreements are not necessary used in joint programmes: the credits achieved in a partner institution are automatically recognised, if the agreed rules are followed and all conditions are satisfied. Nevertheless, the planned learning pathway has to be clear to the student and Learning Agreements are good practice.

After the credit mobility period: The receiving institution provides the sending institution and the student with a Transcript of Records within a reasonably short period (stipulated between the two institutions) after the proclamation of the student's results at the institution.

Upon successful completion of the set of educational components included in the Learning Agreement and confirmed by the Transcript of Records sent by the receiving institution, the sending institution should recognize the agreed number of ECTS credits fully, transfer them into the student's program and use them to s sending institution should specify clearly how the educational components taken abroad have been integrated into the home degree program. When applicable, grades are converted (see section 2.4.4). All this information should be recorded in a Transcript of Record (or equivalent document/database) made available to the student.

Institutional procedures should be defined for assessment of educational components, in case the students have not completed them successfully at the receiving institution. Such procedures should be communicated to students beforehand.

The Diploma Supplement is designed to provide graduates with a transparent record of their achievements. Therefore, the educational components successfully completed abroad will be included in the Transcript of Records attached to the Diploma Supplement with their original titles (and their translation into the language(s) in which the Diploma Supplement is issued), the indication of the institution where they have been taken and the credits and grades awarded. In the case of work placements abroad, the transfer of credits will be documented in the Work Placement Certificate and the Diploma Supplement or Europass Mobility Document. In the case of the recent gra Europass Mobility Document is strongly recommended, as their work placement takes place after their graduation and the other documents mentioned above are not relevant for them.

Institutional rules and regulations: Experience has shown that the following good practice facilitates the management of credit mobility and recognition.

Institutional commitment: Specific institutional rules should be developed to deal with the recognition of other learning experiences, to allow for credit accumulation and transfer through various types of mobi experience, virtual learning, prior and informal learning.

The institution should clearly define responsibilities for implementing and monitoring credit mobility and ensure that application procedures and selection criteria for credit mobility are transparent and fair and that an appeal mechanism is in place. A staff member should be appointed in each department or subject area and formally authorized to discuss the program of study abroad with the student and to approve and sign the Learning Agreement on behalf of the sending institution, before the start of the mobility period and the Transcript of Records after the mobility period. Individuals should not be asked to negotiate academic recognition with staff members who are not authorized to do so or with a committee, before or after their study abroad period, neither should the student be asked to sit for any other examinations or have to do extra work after having returned.

Note: The Erasmus+ programme provides a template for the Learning Agreement, where the requirements for responsible persons are defined as follows:

- Responsible person in the sending institution: an academic who has the authority to approve the mobility programme of outbound students (Learning Agreements), to exceptionally amend them when it is needed, as well as to guarantee full recognition of such programmes on behalf of the responsible academic body.
- Responsible person in the receiving institution: an academic who has the authority to approve the mobility programme of incoming students and is committed to give them academic support in the course of their studies at the receiving institution.

Selection of partner institutions: It is suggested to make exchange agreements with institutions:

- that offer transparent descriptions of their programs, including learning outcomes, credits, learning and teaching approaches and assessment methods
- whose learning, the sending institution can accept teaching and assessment procedures without requiring the student to take any additional work or examination
- that are duly quality assured according to their respective national systems.

Agreements may not only be made with institutions offering similar programs, but also with those providing programs that are complementary.

Integration of credit mobility into programs: Structuring credit mobility in the curricula facilitates recognition. Institutions can:

- identify the semester or year when a period of study abroad would best fit into the program (mobility window)
- schedule in that semester/year the educational components with learning outcomes that can be easily achieved abroad (e.g. international or comparative courses, supplementary/ elective courses, preparation of a dissertation, language courses, work placements)
- identify partner institutions, where compatible/complementary learning outcomes could be achieved.

Note: In the Erasmus+ programme, several charters such as the Erasmus Charter for Higher Education (Institutional Commitment), the European Quality Charter for Mobility, the Erasmus Student Charter (European Code of Good Practice for Erasmus+ students) provide a framework for arranging credit mobility and recognition.

2.4.3 Grade distribution

Due to different cultural and academic traditions, European educational systems have developed not only different national grading scales but also other ways of using them within the same country, in various subject areas or institutions. While it is essential to acknowledge these differences, it is also crucial to make them transparent within the European Higher Education Area, so that grades awarded in all countries, subject areas, or institutions can be properly understood and correctly compared.

Mobile students have the right to fair treatment and to the transparency of their grades when credits are transferred from one institution to another, as access to further studies, grants, or other benefits may depend on their level of performance. Transparency of performance levels is equally vital for graduates applying for a job on their own or in another country.

To ensure transparent and coherent information on the performance of the individual student, each HEI should provide —in addition to their national/institutional grading scale and an explanation of the scale —a statistical distribution table of the passing grades awarded in the program or field of study attended by the student (grade distribution table) showing how the grading scale is used in that program. The grade distribution table was first introduced in the ECTS Users' Guide in 2009, as a replace
scales (A, B, C, D, E), which are not used anymore.

Even in cases when transferring the grades is not necessary for the local academic tradition of receiving institutions, calculating a grade distribution table will facilitate fair treatment of the incoming students on their return to the sending institution. It should be noted that it is also good practice to provide internal boards of examiners with detailed statistical data on examination grading to make the process more transparent and indicate any disparities which may show issues for further consideration.

Partners in joint degree programs should agree in advance within their consortium how they will deal with grading and transfer of grades.

Grade distribution tables show how the existing national or institutional scale is being used in the institution –whether in open access or selective systems –and allow for comparison with the statistical distribution of grades in a parallel reference group of another institution. They represent the statistical distribution of positive grades (pass and above) awarded in each field of study in a specific institution. It is important to provide additional information on success rates at the same level of aggregation, but these should not be used for transfer.

Grade distribution tables have to be developed in a standardized format for reference groups of students enrolled in degree programs belonging to the same field of studies. Such groups should be of reliable size in terms of the number of students and the number of years considered.

Calculating the grade distribution tables is a task that, in many institutions will be undertaken at a centralized level. The production of distribution tables should not cause undue difficulties in institutions as the required data are generally available in institutional information systems and the calculation of percentages is quickly done with simple software. It only requires the following steps:

1. Identify the reference groups within your institution by using objective and transparent criteria that should be attached to the grade distribution tables produced. In the absence of methods based on comparable learning outcomes, it is recommended to use the ISCED-F classification which offers a standardised and hierarchical classification of fields of study. To have reference groups that are large enough for a statistically relevant comparison, it is recommended to use an ISCED code at the 'narrow' or 'detailed' levels (Institute for Statistics, 2014).
2. Calculate the absolute number of passing grades awarded to each reference group identified in at least the last two years. Remember that information on success rates may be provided in general terms but not in this calculation.
3. Calculate the grade distribution in terms of percentages of the passing grades awarded to the reference group and develop cumulative percentages. As a result, there will be a grade distribution table with percentages and cumulative percentages for each reference group identified.

The following is an illustrative example of a grading table:

Grades used in an institution (from highest to lowest passing grade)*	Number of passing grades awarded to the reference group	Percentage of each grade concerning the total passing grades awarded	Cumulative percentage of passing grades awarded
10	50	5%	5%
9	100	10%	15%
8	350	35%	50%
7	300	30%	80%
6	200	20%	100%
Total:	1000	100%	

When included in a student's Transcript of Re
facilitate the interpretation of each grade awarded and will not require any further

calculation. The on-going European Grade Conversion System project (EGRACONS) is developing examples for the visual presentation of a grading table.

2.4.4 Grade conversion

When institutions decide to transfer their mob
for credit transfer should compare the grade distribution table from his/ her reference group with the one developed by the other institution for the parallel reference group. The position of each grade within the two tables can be compared and, on the basis of this comparison, individual grades are converted.

Typically, the percentage ranges of the grades overlap. The objective of the exercise is transparency. Therefore, the receiving institution should decide in advance whether they will take the minimum, average or maximum comparable grade of overlapping ranges.

Annex D includes examples of how grade conversion can be put into practice.

2.5 ECTS and lifelong learning/ECVET.

This section deals with the role of ECTS in facilitating lifelong learning, open learning opportunities and the recognition of prior learning and experience. Also, there is a reference to the ECVET system and its role in lifelong learning.

2.5.1 Lifelong learning open learning opportunities.

The higher education learning landscape is changing with the rapid development of more diversified and flexible learning opportunities –including blended learning, new forms of open online learning, Massive Open Online Courses (MOOCs), Open Educational Resources (OER), work-based learning, self-directed learning, individual learning pathways, continuing professional development. A growing number of
units or courses without pursuing a specific qualification. Higher education institutions are faced with the need to satisfy a diversified student group and provide opportunities for individual learning pathways and different modes of learning. Consequently, many are diversifying and offering educational components with innovative modes of learning and teaching for all, through new technologies and Open Educational Resources.

The strength of ECTS is that it can be used in all these lifelong learning contexts, applying the same principles for credit allocation, award, accumulation and transfer. In the same way as credits are allocated to component parts of programs, credits allocated for open learning and other modes of lifelong learning are based on the workload typically needed to achieve the defined learning outcomes.

Providers of all 'formal' (and
higher education institutions) quality assured higher education such as open learning are encouraged to use ECTS with the same transparent mechanisms as described in this Guide. This will significantly facilitate the transition between different modes of learning, recognition and transfer while increasing learner and stakeholder confidence in the outcomes of open learning.

Credits awarded for all forms of higher education including continuing and professional education may be recognised and accumulated towards a qualification or not, depending on

the desire of the student and/or the requirements for the award of the qualification. Some independent learners may only be interested in following an educational component without wishing to obtain a qualification. Still, the allocation and recording of credits may allow them to use these in the future if they want.

Documenting all learning achievements and awarding an appropriate number of ECTS credits at the level of the learning makes it possible for this learning to be recognized in a transparent, authenticated way so that the credits may contribute to a future qualification. Validation and recognition instruments in formal education should adapt to the developing of a more diversified, flexible education environment, acknowledging new forms of open learning made possible by technology. The correct use of ECTS will significantly improve and facilitate this process.

2.5.2 Recognition of prior learning and experience

Higher education institutions should be competent to award credits for learning outcomes acquired outside the formal learning context through work experience, voluntary work, student participation, independent study, provided that these learning outcomes satisfy the requirements of their qualifications or components. The recognition of the learning outcomes gained through non-formal and informal learning should be automatically followed by the award of the same number of ECTS credits attached to the corresponding part of the formal program.

As with formal education, the award of credits is preceded by an assessment to verify the achievement of learning outcomes. The assessment methods and criteria should be constructed to measure the achievement of the required learning outcomes at the appropriate level, without reference to specific learning activities or workload. For example, 'participation in classroom discussion' of the in the assessment. In contrast, the corresponding learning outcome teucting of 'cons arguments while interacting with a group' woul be appointed in each department or subject area, who should have the formal authority and training to award credits for learning outcomes acquired outside the formal learning context based on transparent criteria established and published by the Institution. It should be understood that they will be expected to report on and document, their decisions through regular reports to an appropriate committee (e.g. at departmental, faculty or institutional level).

Note: There is a wide range of assessment methods for recognising prior learning and experience. One of the assessment tools is a portfolio method. Portfolios include documents that learners have collected in order to reveal individual skills acquired in various ways. A portfolio takes into account a collection of materials that verify skills and knowledge acquired through previous experience in non-formal and informal learning. A portfolio includes references from employers and supervisors; it may include a performance appraisal, CV and other documents. By using a portfolio the assessor analyses a range of information that learners have provided. Learners may require help and advice when preparing their portfolios.

Institutions should develop recognition policies for non-formal or informal learning. These policies should include elements such as advice, feedback to learners on the results of the assessment and the possibility for learners to appeal. Institutions should also create facilities for advice, counseling and recognition of non-formal and informal learning. These may take different forms depending on national and institutional practices (e.g. they may exist within single higher education institutions or as joint centers for several institutio policies and practices should be published prominently on their websites.

Recognizing non-formal and informal learning helps make HEIs more socially inclusive. Widening access opportunities for learners from professional life and a range of non-traditional learning environments helps make lifelong learning a reality. Institutions should be incredibly open to the recognition of vocational education and training.

The process of awarding credit to non-formal or informal learning has four main stages:

1. Initial advice and guidance (what does the process involve for the learner, the credit limits for non-formal/informal learning; what are the costs, roles and responsibilities of learner and tutor/advisor, and different learning pathways to a qualification).
2. Support (reflective process; understanding learning outcomes; identifying own learning outcomes; evidence gathering and selection).
3. Recognition/assessment (assessment of the evidence of the achievement of learning outcomes and assessment criteria).
4. Award of credit (credit awarded through this process is of the same value as credit gained through formal learning).

2.5.3 ECVET

In April 2009, the European Parliament and the Council recommended the establishment of the European Credit System for Vocational Education and Training (ECVET) (2009/C 155/02).

ECVET is intended to facilitate the transfer, accumulation and recognition of assessed learning outcomes of individuals who are aiming to achieve a qualification in vocational education and training (VET). It is a new European instrument designed to foster more excellent permeability in VET as well as mobility of European learners and workers and give more flexible pathways for them to achieve mobility. The concept and principles of ECVET are tested and disseminated via pilot projects that are often supported by the Leonardo da Vinci program.

ECVET facilitates and supports students in shaping their learning pathway through the accumulation of credits – whether within a particular institution, from institution to institution, from country to country, and between different educational sub-systems and contexts of learning (i.e. formal, non-formal and informal learning), and helping them to build on their learning styles and experiences.

It is also based on the notion of 60 credits, but the allocation of credits is a different one. According to the technical specifications of ECVET, qualifications are described in terms of units of learning outcomes so ECVET is used to record and accumulate assessed learning outcomes without a conversion in credit points. A unit of learning outcomes is defined as

component of a qualification, consisting of a coherent set of knowledge, skills and . On the other hand, a credit for learning outcomes is *a set of learning outcomes of an individual which have been assessed and which can be accumulated towards a qualification or transferred to other learning programmes or qualifications* ". This means that an assessed unit of learning outcomes leads to obtaining a credit of learning outcomes. The credits thus describe what knowledge, skills and competences a learner who successfully passed the unit gained.

The number of ECVET points expresses the relative weight/significance of a unit. According to the ECVET Recommendation, the allocation of ECVET points is subject to the following approaches or a combination of them:

- Different stakeholders "weight" various units which are part of the qualification according to the relative outcomes for the labour market, for progression to other qualification levels or for social integration
- The complexity, scope and volume of learning outcomes in the unit (i.e. the complexity, scope and volume of knowledge) in relation to the learning outcomes of the overall qualification. Skills and competences in the unit are evaluated with regard to their share in the overall skills and competences of the entire qualification
- The effort necessary for a learner (estim learning time needed) to achieve the unit's required

Whichever method or combination of methods is chosen, the size of the unit should be reasonable –too small units could lead to fragmentation without proper understanding, and too large ones could impair mobility.

In Annex E there is a side by side comparison of ECTS and ECVET features.

3 ESG application guidelines

3.1 ESG basics

In 2005 the European Union for Quality Assurance in Higher Education (ENQA) prepared a proposal on quality assurance in the European Higher Education Area (ESG), in collaboration with European Students (ESU), the European Union of Higher Education Institutions (EURASHE), and the European Union of Universities (EUA). These standards and guidelines were adopted by the ministers responsible for higher education.

Significant progress in quality assurance and various Bologna key areas such as qualifications frameworks and the recognition and promotion of the use of learning outcomes contributed to the remodeling of education and teaching, focusing on learners. Recognizing this fundamental change, in 2012, E4 Group (ENQA, ESU, EUA, EURASHE) in collaboration with Education International (EI), BUSINESSEUROPE, and the European Quality Assurance Register for Higher Education (EQAR). The result of this cooperation was the revision of the ESG through an initial proposal to improve the clarity, applicability, usefulness, and scope.

The revision involved key organizations from both stakeholders and ministries. After several rounds of consultation, many comments, suggestions, and recommendations emerged. The Steering Group (SG) analyzed them and proceeded to formulate the ESG 2015. In May 2015, the Ministers of Higher Education in the European Higher Education Area adopted the ESG 2015. The following purposes provide a framework within which ESG can be used and implemented differently by different institutions, organizations, and countries.

• Defining a common framework for qua institutional level concerning learning and teaching.
• Ensuring the imtp of higher education in the European Higher Education Area.
• Support mutual trust to facilitate borders.
• Providing quality assurance informat

At the European level, the evaluation criteria of quality assurance agencies and their activities are provided by the ESG. This ensures that quality assurance bodies in the EHEA comply with the same set of principles. In addition, the procedures and processes are formulated to fit the purposes and requirements of their contexts.

The four principles that ESG relies on for quality assurance in the EHEA are the following:

• Higher education institutions are and commitment.
• Quality assurance responds to a variety of higher education systems, institutions, programs, and students.
• The development of a quality culture
• The needs and expec takeholders and society are taken account by quality assurance

3.2 Context, Scope, and Concepts

3.2.1 Context

Higher education is an essential element of socio-economic and cultural development as European societies' desire to rely more and more on knowledge is a given. At the same time, higher education must respond in new ways due to the growing demand for skills and competencies.

A significant change is needed in the provision of higher education, due to the response to diversity and growing expectations. The learning and teaching approach needs to be more student-centered, and competencies acquired outside of formal curricula need to be recognized.

Higher education institutions' mission now differs in their goals, ways of education, and cooperation, including the development of internationalization, digital learning, and new forms of delivery. Quality assurance is essen respond to these changes. At the same time, it ensures that students' qualifications and their experience in higher education remain at the forefront of institutional missions.

Regarding quality assurance in the European Higher Education Area (ESG), a vital goal of the standards and Guidelines for Quality Assurance is to contribute to a common understanding of quality assurance for learning and teaching across all stakeholders. The role they play in developing national and EEA-wide quality assurance systems and cross-border cooperation is also essential.

European higher education systems can demonstrate quality and increase transparency if they are involved in quality assurance processes. The importance of building mutual trust and better recognizing their qualifications, programs, and other benefits is also noteworthy.

The ESG is now used as a reference document for internal and external quality assurance systems in higher education institutions. Finally, the European Quality Assurance Register (EQAR) is responsible for registering quality assurance agencies that comply with the ESG.

3.2.2 Scope and Concept

The ESG are a set of standards and guidelines for internal and external quality assurance in higher education. The ESG are not standards for quality, nor do they prescribe how the quality assurance processes are implemented. Still, they provide guidance, covering the areas vital for the successful quality provision and learning environments in higher education. The ESG should be considered in a broader context that also includes qualifications frameworks, ECTS, and diploma supplements that also contribute to promoting transparency and mutual trust in higher education in the EHEA.

The focus of the ESG is on quality assurance related to learning and teaching in higher education, including the learning environment and relevant links to research and innovation. Also, institutions have policies and processes to ensure and improve the quality of their other activities, such as research and governance.

The ESG applies to all higher education offered in the EHEA regardless of the mode of study or place of delivery. Thus, the ESG are also applicable to all higher education, including transnational and cross-border provision. In this document, higher education in its broadest sense, including that which is not part of a formal degree program. Higher education aims to fulfill multiple purposes; including preparing students for active citizenship, for their future careers (e.g., contributing to their employability), supporting their personal development, creating a broad advanced knowledge base, and stimulating research and innovation.

Therefore, stakeholders, who may prioritize different purposes, can view quality in higher education differently, and quality assurance needs to take into account these different perspectives. While not easy to define, quality is mainly a result of the interaction between teachers, students, and the institutional learning environment. Quality assurance should ensure a learning environment in which the content of programs, learning opportunities, and facilities are fit for purpose.

At the heart of all, quality assurance activities are the twin purposes of accountability and enhancement. Taken together, these create tr
performance. A successfully implemented quality assurance system will provide information to assure the higher education institution and the public of the quality of the higher education institution's activities (accounta
recommendations on how it might improve what it is doing (enhancement). Quality assurance and quality enhancement are thus inter-related. They can support developing a quality culture that is embr

3.3 Scope of the current ESG for internal QA

3.3.1 Policy for quality assurance

Standard:

Institutions should have a policy for quality assurance that is made public and forms part of their strategic management. Internal stakeholders should develop and implement this policy through appropriate structures and processes while involving external stakeholders.

Guidelines:

Policies and processes are the main pillars of a coherent institutional quality assurance system that forms a cycle for continuous improvement and contributes to the institution's accountability. It supports the development of quality culture in which all internal stakeholders assume responsibility for quality and engage in quality assurance at all levels of the institution. To facilitate this, the policy has a formal status and is publicly available.

Quality assurance policies are most effective when they reflect the relationship between research and learning & teaching and take into account the national context in which the institution operates, the institutional context, and its strategic approach. Such a policy supports

- the organization of the quality assurance system;

departments, schools, faculties, and other organizational units as well as those of institutional leadership, individual staff members, and students to take on their responsibilities in quality assurance;

academic integrity and freedom and is vigilant against academic fraud;

guarding against intolerance of any discrimination against the students or staff;

the involvement of external stakeholders in quality assurance.

The policy translates into practice through various internal quality assurance processes that allow participation across the institution. How the policy is implemented, monitored, and revised is the institution's decision.

The quality assurance policy also covers any elements of an institution's activitie subcontracted to or carried out by other parties.

3.3.2 Design and approval of programs

Standard:

Institutions should have processes for the design and approval of their programs. The programs should be designed so that they meet the objectives set for them, including the intended learning outcomes. The qualification resulting from a program should be specified and communicated, and refer to the correct level of the national qualifications framework for higher education and, consequently, to the Framework for Qualifications of the European Higher Education Area.

Guidelines:

Study programs are at the core of the higher provide students with both academic knowledge and skills, including those that are transferable, which may influence their personal development and may be applied in their future careers.

Programs

are designed with overall program objectives that are in line with the institutional strategy and have explicit intended learning outcomes;

are created by involving students and other stakeholders in work;

benefit from external expertise and reference points;

reflect the four purposes of higher education of the Council of Europe (cf. Scope and Concepts);

redesigned so that they enable smooth student progression;

define the expected student workload, e.g., in ECTS;

include well-structured placement opportunities where appropriate;

are subject to a formal institutional approval process.

3.3.3 Student-centered learning, teaching, and assessment

Standard:

Institutions should ensure that the programs are delivered in a way that encourages

students to take an active role in creating the learning process, and that the assessment of students reflects this approach.

Guidelines:

Student-centered learning and teaching play an essential role in stimulating students' motivation, self-reflection, and engagement in the learning process. This means careful consideration of the design and delivery of study programs and the assessment of outcomes.

The implementation of student-centered learning and teaching

- respects and attends to the diversity of students and their needs, enabling flexible learning paths;
- considers and uses different modes of delivery, where appropriate;
- flexibly uses a variety of pedagogical methods;
- regularly evaluates and adjusts the modes of delivery and pedagogical approaches;
- encourages a sense of autonomy in the learner, while ensuring adequate guidance and support from the teacher;
- promotes mutual respect within the learner-teacher relationship;
- has appropriate procedures for dealing with students' complaints.

Considering the importance of assessment for careers, quality assurance processes for evaluation take into account the following:

- Assessors are familiar with existing testing and examination methods and receive support in developing their skills in this field;
- The criteria for and method of assessment, as well as criteria for marking, are published in advance;
- The assessment allows students to demonstrate the extent to which the intended learning outcomes have been achieved. Students are given feedback, which, if necessary, is linked to advising on the learning process;
- Where possible, assessment is carried out by more than one examiner;
- The regulations for evaluation take into account mitigating circumstances;
- Assessment is consistent, fairly applied to all students, and carried out following the stated procedures;
- A formal process for student appeals is in place.

3.3.4 Student admission, progression, recognition, and certification

Standard:

Institutions should consistently apply pre-defined and published regulations covering all phases of the student "lifecycle," progression, recognition, and certification.

Guidelines:

Providing conditions and support that are necessary for students to make progress in their academic career is in the best interest of the individual students, programs, institutions, and systems. It is vital to have fit-for-purpose admission, recognition, and completion procedures, mainly when students are mobile within and across higher education systems.

Access policies, admission processes and criteria must be implemented consistently and in a transparent manner. Induction to the institution and the program is provided.

Institutions need to put in place both processes and tools to collect, monitor, and act on information on student progression.

Fair recognition of higher education qualifications, periods of study, and prior learning, including the recognition of non-formal and informal learning, are essential components for ensuring the students' progress in their stu
recognition procedures rely on

- institutional practice for recognition being in line with the principles of the Lisbon Recognition Convention;
- cooperation with other institutions, quality assurance agencies, and the national ENIC/NARIC center to ensure coherent recognition.

Gradua tion represents the culmination of the stu
receive documentation explaining the qualification gained, including achieved learning outcomes and the context, level, content, and status of the pursued and completed courses.

3.3.5 Teaching staff

Standard:

Institutions should assure themselves of the competence of their teachers. They should apply fair and transparent processes for the recruitment and development of the staff.

Guidelines:

The teacher is essential in creating a high-quality student experience and enabling the acquisition of knowledge, competences, and skills. The diversifying student population and a stronger focus on learning outcomes require student-centered learning and teaching, and the role of the teacher is, therefore, also changing.

Higher education institutions have primary responsibility for their staff's quality and for providing them with a supportive environment that allows them to carry out their work effectively. Such an environment

- sets up and follows clear, transparent, and fair processes for staff recruitment and conditions of employment that recognize the importance of teaching;
- offers opportunities for and promotes the professional development of teaching staff;
- encourages scholarly activity to strengthen the link between education and research;

fosters innovation in teaching methods and the use of new technologies.

3.3.6 Learning resources and student support

Standard:

Institutions should have appropriate funding for learning and teaching activities and ensure that adequate and readily accessible learning resources and student support are provided.

Guidelines:

For a good higher education experience, institutions provide a range of resources to assist student learning. These vary from physical resources such as libraries, study facilities, and IT infrastructure to human support in tutors, counselors, and other advisers. The role of support services is of particular importance in facilitating students' mobility within and across higher education systems.

The needs of a diverse student population (such as mature, part-time, employed and international students as well as students with disabilities), and the shift towards student-centered learning and flexible modes of learning and teaching, are taken into account when allocating, planning, and providing the learning resources and student support.

Support activities and facilities may be organized in a variety of ways, depending on the institutional context. However, the internal quality assurance ensures that all resources are fit for purpose, accessible, and that students are informed about their services.

In delivering support services, the role of support and administrative staff is crucial, and therefore they need to be qualified and have opportunities to develop their competences.

3.3.7 Information management

Standard:

Institutions should ensure that they collect, analyze, and use relevant information for the effective management of their programs and other activities.

Guidelines:

Reliable data is crucial for informed decision-making and for knowing what is working well and what needs attention. Effective processes to collect and analyze information about study programs and other activities feed into the internal quality assurance system.

The information gathered depends, to some extent, on the type and mission of the institution. The following are of interest:

Key performance indicators;
Profile of the student population;
Student progression, success, and drop-out rates;
Students' satisfaction with their programs;

Learning resources and student support available;
Career paths of graduates.

Various methods of collecting information may be used. Students and staff must be involved in providing and analyzing information and planning follow-up activities.

3.3.8 Public information

Standard:

Institutions should publish information about their activities, including exact programs accurate, objective, up-to-date, and readily accessible.

Guidelines:

Information on institutions' activities is used for graduates, other stakeholders, and the public.

Therefore, institutions provide information about their activities, including the programs they offer and the selection criteria for them, the intended learning outcomes of these programs, the qualifications they award, the teaching, learning, and assessment procedures used, the pass rates, and the learning opportunities available to their students as well as graduate employment information.

3.3.9 On-going monitoring and periodic review of programs

Standard:

Institutions should monitor and periodically review their programs to ensure that they achieve the objectives set for them and respond to the needs of students and society. These reviews should lead to the continuous improvement of the program. Any action planned or taken as a result should be communicated to all those concerned.

Guidelines:

Regular monitoring, review, and revision of study programs aim to ensure that the provision remains appropriate and creates a supportive and effective learning environment for students.

They include the evaluation of:

The content of the program in the light of the latest research in the given discipline, thus ensuring that the program is up to date;
The changing needs of society;
The students' workload, progression, and completion;
The effectiveness of procedures for assessment of students;
The student expectations, needs, and satisfaction concerning the program;

The learning environment and support services and their fitness for purpose for the program.

Programs are reviewed and revised regularly involving students and other stakeholders. The information collected is analyzed, and the program is adapted to ensure that it is up-to-date. Revised program specifications are published.

3.3.10 Cyclical external quality assurance

Standard:

Institutions should undergo external quality assurance in line with the ESG on a cyclical basis.

Guidelines:

External quality assurance in its various for internal quality assurance, act as a catalyst for improvement, and offer the institution new perspectives. It will also provide information to assure the institution and the public of the quality of the institution's activities. Institutions participate in cyclical external quality assurance that takes account, where relevant, of the requirements of the legislative framework in which they operate. Therefore, depending on the framework, this external quality assurance may take different forms and focus at different organizational levels (such as program, faculty, or institution).

Quality assurance is a continuous process that does not end with the external feedback or report or its follow-up process within the institution. Therefore, institutions ensure that the progress made since the last external quality assurance activity is taken into consideration when preparing for the next one.

Annex A Bloo

The aforementioned approaches to writing learning outcomes are based on the work of Benjamin Bloom, who identified three domains of learning –cognitive, affective and psychomotor –each of which is organized as a series of levels or prerequisites. The three domains can be defined as follows:

Cognitive: it is the most widely used of the three domains. It refers mostly to knowledge structures and contains a classification (or taxonomy) of thinking behaviors from the simple recall of facts up to the process of analysis and evaluation [17].

Affective: it refers to the way we deal with things emotionally, such as feelings, values, attitudes, motivations, etc., and ranges from mere awareness through to being able to distinguish implicit values through analysis [18].

Psychomotor: it mainly emphasizes physical skills involving co-ordination of the brain and muscular activity and it prevails in areas like laboratory science subjects, health sciences, art, music, engineering, drama and physical education. Bloom and his colleagues never created levels in this domain, though other researchers later did, like Dave (1970)[19] and Simpson (1972)[20].

Each of these domains is further analysed in the following.

Cognitive domain

Bloom and his colleagues advanced their work mainly in the cognitive domain, as this is required in the majority of cases. They produced a hierarchical framework through one (learner) may build upon prior learning and upscale its knowledge. Apart from other purposes, it is used extensively to write learning outcomes providing the foundations for developers. Its ready-made structure, in conjunction with the provided (list of) verbs, facilitates significantly the writing of learning outcomes.

Bloom's taxonomy of cognitive levels (Bloom et al, 19564, Kennedy et al, 2006[21]) consists of six levels:

1. **Knowledge:** the ability to recall or remember facts without necessarily understanding them. Some of the action verbs used to assess knowledge are: *Arrange, collect, define, describe, duplicate, enumerate, examine, find, identify, label, list, memorize, name,*

[17] Anderson, Lorin W.; Krathwohl, David R., eds. (2001). A taxonomy for learning, teaching, and assessing: A revision of Bloom's taxonomy of educational objectives. Allyn and Bacon. ISBN 978-0-8013-1903-7.

[18] http://www.nwlink.com/~donclark/hrd/Bloom/affective_domain.html

[19] Dave, R. H. (1970). Developing and Writing Behavioural Objectives. (R J Armstrong, ed.) Tucson, Arizona: Educational Innovators Press.

[20] Simpson, E. (1972). The classification of educational objectives in the psychomotor domain: The psychomotor domain. Vol. 3. Washington, DC: Gryphon House.

[21] Kennedy, D., Hyland, A. and Ryan, N. (2006). Writing and using learning outcomes: a practical guide. Article C 3.4-1 in Eric Making Bologna Work (Berlin 2006: Raabe Verlag)

order, outline, present, quote, recall, recognize, recollect, record, recount, relate, repeat, reproduce, show, state, tabulate, tell.

2. **Comprehension**: the ability to understand and interpret learned information. Some of the action verbs used to assess comprehension are: *Associate, change, clarify, classify, construct, contrast, convert, decode, defend, describe, differentiate, discriminate, discuss, distinguish, estimate, explain, express, extend, generalize, identify, illustrate, indicate, infer, interpret, locate, paraphrase, predict, recognize, report, restate, rewrite, review, select, solve, translate.*
3. **Application**: the ability to use learned information (i.e. ideas and concepts) to solve problems in new situations. Some of the action verbs used to assess application are: *Apply, assess, calculate, change, choose, complete, compute, construct, demonstrate, develop, discover, dramatize, employ, examine, experiment, find, illustrate, interpret, manipulate, modify, operate, organize, practice, predict, prepare, produce, relate, schedule, select, show, sketch, solve, transfer, use.*
4. **Analysis**: the ability to break down information into components and understand organizational structure (i.e. look for inter-relationships). Some of the action verbs used to assess analysis are: *Analyze, appraise, arrange, break down, calculate, categorize, classify, compare, connect, contrast, criticize, debate, deduce, determine, differentiate, discriminate, distinguish, divide, examine, experiment, identify, illustrate, infer, inspect, investigate.*
5. **Synthesis**: may be defined as the ability to combine parts together. Some of the action verbs used to assess synthesis are: *Argue, arrange, assemble, categorize, collect, combine, compile, compose, construct, create, design, develop, devise, establish, explain, formulate, generalize, generate, integrate, invent, make, manage, modify, organize, originate, plan, prepare, propose, rearrange, reconstruct, relate, reorganize, revise, rewrite, set up, summarize.*
6. **Evaluation:** may be defined as the ability to judge the value of information for a given purpose or situation. Some of the action verbs used to assess evaluation are: *Appraise, ascertain, argue, assess, attach, choose, compare, conclude, contrast, convince, criticize, decide, defend, discriminate, explain, evaluate, grade, interpret, judge, justify, measure, predict, rate, recommend, relate, resolve.*

Bloom's taxonomy consists of the following six levels (Bloom et al, n co 19564, Kennedy et al, 2006[22]):

Examples: (**Active verb** – Bloom's taxonomy) + (**Concept of the knowledge domain**) + (**Condition**)	
Level 1: Knowledge	**Describe** the **7** main phases of an **information system development life cycle**.
Level 3:	**Construct** the **conceptual model of a database** using the **entity relationship**

[22] Kennedy, D., Hyland, A. and Ryan, N. (2006). Writing and using learning outcomes: a practical guide. Article C 3.4-1 in Eric Making Bologna Work (Berlin 2006: Raabe Verlag)

Application	model.

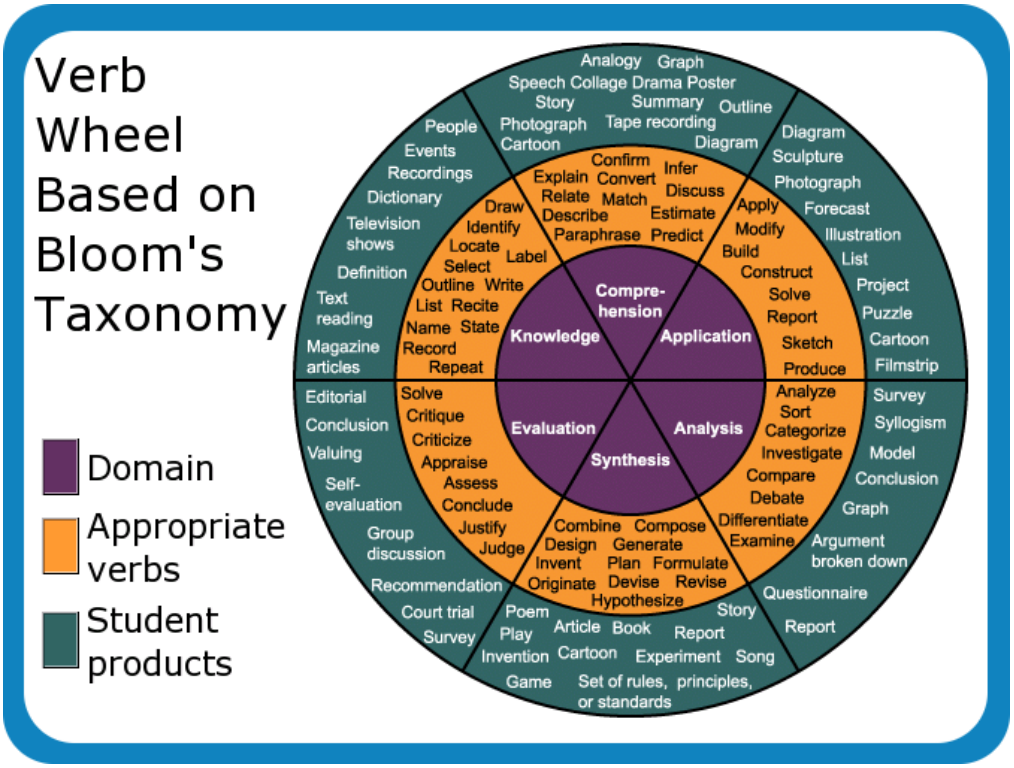

Figure 7. The verb wheel based on Bloom's ta
(Source:http://2.bp.blogspot.com/_337GUHQH0FY/SmpJpr5va5I/AAAAAAAABmU/UFiQn59g
IT8/s1600-h/bloomwheel.png)

When writing learning outcomes for the cognitive domain, it is suggested that:

One should try to include learning outcomes for all levels of the taxonomy.

One should try to avoid overloading the list with outcomes which are drawn from the lower levels of the taxonomy.

One ought not to try to address higher levels until those below them have been covered (the taxonomy is effectively serial in structure).

Affective domain

In order to describe the way in which we deal with things emotionally, Bloom and his colleagues developed five major categories5,[23]:

1. **Receiving**: refers to a willingness to receive information, e.g. the individual accepts the need for a commitment to service, listens to others with respect, shows sensitivity to social problems, etc. *Verbs / keywords: Acknowledge, ask, attentive, courteous, dutiful, follow, give, listen, understand*.
2. **Responding:** refers to the individual actively participating in his or her own learning, e.g. shows interest in the subject, is willing to give a presentation, participates in

[23] Verbs / keywords retrieved from _____.

class discussions, enjoys helping others, etc. *Verbs / keywords: Answer, assist, aid, comply, conform, discuss, greet, help, label, perform, present, tell*.

3. **Valuing:** ranges from simple acceptance of a value to one of commitment, e.g. the individual demonstrates belief in democratic processes, appreciates the role of science in our everyday lives, shows concern for the welfare of others, shows sensitivity towards individual and cultural differences, etc. *Verbs / keywords: Appreciate, cherish, treasure, demonstrate, initiate, invite, join, justify, propose, respect, share*.
4. **Organization:** refers to the process that individuals go through as they bring together different values, resolve conflicts among them and start to internalize the values, e.g. recognizes the need for balance between freedom and responsibility in a democracy, accepts responsibility for his or her own behaviour, accepts professional ethical standards, adapts behaviour to a value system, etc. *Verbs / Keywords: compare, relate, synthesize*.
5. **Characterization:** at this level the individual has a value system in terms of their beliefs, ideas and attitudes that control their behavior in a consistent and predictable manner, e.g. displays self-reliance in working independently, displays a professional commitment to ethical practice, shows good personal, social and emotional adjustment, maintains good health habits, etc. *Verbs / keywords: act, discriminate, display, influence, modify, perform, qualify, question, revise, serve, solve, verify*.

Psychomotor domain

As detailed earlier, the psychomotor domain mainly emphasizes physical skills involving co-ordination of the brain and muscular activity; in practice, it prevails in areas like laboratory science subjects, health sciences, art, music, engineering, drama and physical education. Bloom and his colleagues never created levels in this domain, though other researchers later did, like Dave (1970)19 and Simpson (1972)[20] did.

Dave (1970) proposed a hierarchy consisting of five levels:

1. **Imitation**: observing the behaviour of another person and copying this behaviour. This is the first stage in learning a complex skill.
2. **Manipulation**: ability to perform certain actions by following instructions and practicing skills.
3. **Precision**: ability to carry out a task with few errors and become more precise without the presence of the original source. The skill has been attained and proficiency is indicated by smooth and accurate performance.
4. **Articulation**: ability to co-ordinate a series of actions by combining two or more skills. Patterns can be modified to fit special requirements or solve a problem.
5. **Naturalization** : displays a high level of performan
Skills are combined, sequenced and performed consistently with ease.

Subsequently, Simpson (1972) developed a more detailed hierarchy consisting of seven levels[24]:

1. **Perception**: ability to use observed cues to guide physical activity. *Verbs: Choose, describe, detect, differentiate, distinguish, identify, isolate, relate, select*.
2. **Set (mindset)**: readiness to take a particular course of action. This can involve mental, physical and emotional disposition. *Verbs / keywords: Begin, display, explain, move, proceed, react, show, state, volunteer*.
3. **Guided response**: attempts at acquiring a physical skill, which lead to better performance. *Verbs / keywords: Copy, trace, follows, react, reproduce, respond*.
4. **Mechanism:** the stage where earned responses become more habitual and movements can be performed with some confidence and level of proficiency. *Verbs / Keywords: Assemble, calibrate, construct, dismantle, display, fasten, fix, grind, heat, manipulate, measure, mend, mix, organize, sketch*.
5. **Complex Overt Responses:** refers to physical activities involving complex movement patterns. Responses are automatic and proficiency is indicated by accurate and highly coordinated performance with a minimum of wasted effort. *Verbs / Keywords: Assemble, build, calibrate, construct, dismantle, display, fasten, fix, grind, heat, manipulate, measure, mend, mix, organize, sketch. These verbs / keywords are the sam*
   indicate that the performance is quicker, better, more accurate, etc.
6. **Adaptation:** at this level, skills are well developed and the individual can modify movements to deal with problem situations or to fit special requirements. *Verbs / keywords: Adapt, alter, change, rearrange, reorganize, revise, vary*.
7. **Origination:** creativity for special situations is possible because the skills are so highly developed. *Verbs / keywords: Arrange, build, combine, compose, construct, create, design, initiate, make, originate*.

[24] Verbs / keywords retrieved from Bloo .

Annex B The SMART & ABCD approaches for learning outcomes

The ABCD approach

Back on 1984, Mager[25] argued that learning objectives should be specific and measurable in order to guide appropriately instructors and learners. In this regard, he introduced the ABCD approach in writing them, which included four main elements: **A**udience, **B**ehavior, **C**ondition and **D**egree of mastery. The description for each is presented below[26].

Audience (A)	Determines who will master the outcome. A very common way to begin a learning outcome is: "Who? Who are your learners?" Typical questions are:
Behavior (B)	Identifies what a learner is expected to be able to perform as a result of achieving the learning outcome, or, in other words, how will the learner demonstrate achievement of the ou What do you expect the learners to be ab
Condition (C)	Describes the important conditions (if any) under which is to occur. Typical questions in will the learning occur? What will the learner be given or already be expected to know to accomplish learning?".
Degree of mastery (D)	Wherever possible, describes the criterion of acceptable performance by describing how well the learner must perform in order to be considered acceptable. Typical questions include "How much accomplished, how well will the behaviour need to be performed, and to what level?"

The reader should keep in mind the following when writing learning outcomes following the ABCD approach.

The *verb* used to describe a desirable behaviour in a learning outcome must come from / comply with Bloom's taxonomy (cognitive, affective, psychomotor domains). This verb must describe a behaviour that is observable. However, take into account that performance can be overt or covert:

> An overt performance can be observed directly, whether that performance is visible or audible.
>
> A covert performance cannot be observed directly; it may be mental, invisible, cognitive, or internal. A covert performance can be used as a learning outcome as long as there is a direct way of determining whether it satisfies the outcome.

The specification of *condition* should be detailed enough so that another competent person would recognize the desired performance. Typical questions include, "What will the learner be allowed to use?", "What will the learner be given?", "What conditions will the desired performance is expected to occur?" specifically should not develop?"

[25] Mager, R. F. (1984). Preparing instructional objectives, 2nd edition. Belmont, California: Pitman Learning.

[26] The ABCD Method of Writing Measurable Objectives. https://www.cusoeprofessionaleducation.org/uploads/2/9/5/8/29585257/writig_objectives_abcd2014.pdf

Indicators of degrees of mastery (performance) include the time limits, accuracy, quality, etc. By specifying the acceptable level of performance for each outcome, one has the means for determining whether an instruction is successful. Both the teacher and the learner would know the quality of performance they have to work for

Examples of well written outcomes are:

Given a verb in the present tense, the learner will be able to re-write the verb in future tense with no more than two errors in tense.

Given 2 hours of study, the learner will solve 4 out of 5 problems of bandwidth allocation.

Given a map of Europe, the learner will be able to list 5 major rivers in 2 minutes.

The SMART approach

SMART[27] stands for **S**pecific, **M**easurable, **A**ttainable (or **A**ction-oriented), **R**elevant, and **T**ime-Bound.

Specific	The learning outcome should be clear and well defined, describing the knowledge, skills and competences that a learner should be able to demonstrate following exposure to a learning activity
Measurable	Achievement of learning objectives can be measured through benchmarks or targets by specific evaluation methods during or after the session
Attainable (Action-oriented)	The objective includes an action verb that demonstrates change or acquisition of knowledge, skills or competences
Relevant	The objective reflects relevant expectations of knowledge, skills and competences acquisition/change given the conditions for instruction
Time-bound	The objective specifies a time frame in which learners are expected to achieve the learning objective(s)—usually by the end of the session

Examples of SMART learning outcomes are:

Following this session, participants will describe four measures that can protect against physical injuries in an Industry 4.0 cyber-physical system.

After attending the lecture and studying chapter 2, learners will list the three domains of Industry 4.0 application.

By the end of this course, the learner will become proficient in Microsoft Excel by creating financial spreadsheets to be used to conduct the IoT ready Information System ' s cfali anaiyses. The supervisor will evaluate his spreadsheets and written analysis.

[27] Anderson, L. & Krathwohl, D., et al. (2001). A Taxonomy for Learning, Teaching, and Assessing: a revision of Bloom's taxonomy of educational objectives, New York : Longman.

Annex C European Qualifications Framework

The European Qualifications Framework is meant to provide a common reference point for institutions operating within different national qualifications systems and not to replace these. It acts as a translation device to make national qualifications more readable across Europe, promoting workers' and learners' mobility between countries and facilitating their lifelong learning[28]. The EQF aims to relate different countries' national qualifications systems to a common European reference framework. Individuals and employers will be able to use the EQF to better understand and compare the qualifications levels of different countries and different education and training systems. Since 2012, all new qualifications issued in Europe carry a reference to an appropriate EQF level. The following table shows the description of the 7th level of EQF, in which the Master Programmes typical fall[28].

EQF Level 7	
Knowledge	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
Skills	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
Autonomy and responsibility	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
Examples	(UK) Master's degree, Postgraduate Certificate, Postgraduate Diploma, (Germany) Vocational university (Fachhochschule) Master's, Geprüfter tifiede Business Administrator); (Italy) Laurea Magistrale, Master universitario di primo livello (Spain) Licenciado or M (Portugal) Mestrado (Greece) NTUA Diploma

[28] https://en.wikipedia.org/wiki/European_Qualifications_Framework

Annex D ECTS grades conversion example

Italy *(Example of passing grades between 18 and 30 lode)*

18	19	20	21	22	23	24	25	26	27	28	29	30	30 lode
6.9%*	1.9%	5.7%	2.3%	6.0%	2.7%	11.3%	8.2%	9.0%	11.8%	12.3%	0.5%	15.7%	5.7%
100*	93,1	91,2	85,5	83,2	77,2	74,5	63,2	55	46	34,2	21,9	21,4	5,7

France *(Example of passing grades between 10 and 20)*

10	11	12	13	14	15	16	17	18	19	20
34.79%	18.59%	18.45%	12.05%	9.46%	3.65%	2.30%	0.43%	0.22%	0.06%	0%
100*	65,21	46,62	28,17	16,12	6,66	3,01	0,71	0,28	0,06	0

*Distribution of the grade within the reference group
*Accumulated percentage of students obtaining the grade or lower in red

From this example we see that,in this case, 30 lodein Italy (obtained by 5.7% of the students) can be converted to 15in France (obtained by 6.66%, which is closest to 5.7%). A grade below 25 becomes 10 in France. To sum up, ECTS grading table allows for simple, transparent interpretation and conversion of grades from one system or context to another, and therefore does justice to the level of academic performance of all learners. Used correctly, it bridges differentgrading systems as well as different cultures in the European Higher Education Area and beyond.

To use the ECTS grading table the following steps should be taken:

1. Identify the reference group for which the grade distribution will be calculated (normally all students of an ECTSstudy field per study cycle (e.g. Ba/Ma)but in some cases a wider grouping of students such as the institution itselfmight be chosen).
2. Collect all passing grades awarded over a period of (at least) two academic years for the reference group identified. Fail grades/marks are therefore not included.Only the final official grades/marks at the end of the academic years under consideration (i.e. after possible resits) are taken into account and the total number of exam results per grade should be calculated as well.
3. Calculate the grade distribution in terms of accumulated percentages for the reference group.
4. For every course unit, include the grading percentage of the student as compared to the reference group in every Transcript of Records/ Diploma Supplement.
5. Compare the percentage table of your reference group with your own. The corresponding position of each student within the 2 reference groups is compared. On the basis of thiscomparison, individual grades can be converted.

The firstfour steps in the procedure concern all programmes and are purely administrative tasks. The academic responsible for credit transfer may get involved in step 5.

Annex E ECTS/ECVET consistencies and inconsistencies

	ECTS	ECVET
Reference	Key Features, 2007, ECTS Users Guide, 2009	Recommendation of the European Parliament and the Council on the establishment of ECVEt, 2009 Get to know ECVEt better; Questions and answers
	BaSIC FaCtS	
Definition / Explanation	ECTS is a learner-centred system for credit accumulation and transfer based on the transparency of learning outcomes and learning processes. It aims to facilitate planning, delivery, evaluation, recognition and validation of qualifications and units of learning as well as student mobility. Credit (ECTS): Quantifying means of expressing the volume of learning based on the workload students need in order to achieve the expected learning outcomes of a learning process at a specified level.	ECVEt is a technical framework for the transfer, recognition and, where appropriate, accumulation of individual learning outcomes with a view to achieving a qualification. 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. "Credit for learning outcome (credit) means a set of learning outcomes of an individual which have been assessed and which can be accumulated towards a qualification or transferred to other learning programmes or qualifications 'ECVEt points' mean 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.
Qualification	Any degree, diploma or other certificate issued by a competent authority attesting the successful completion of a recognised programme of study.	A formal outcome of an assessment and validation process which is obtained when a competent institution determines that an individual has achieved learning outcomes to given standards.
Learning outcomes	Statements of what a learner is expected to know, understand and be able to do after successful completion of a process of learning The Framework for Qualifications of the European Higher Education Area defines them as Knowledge and understanding	Statements of what a learner knows and is able to do on completion of a learning process and which are defined in terms of knowledge, skills and competences that can be assessed and validated. The European Qualifications Framework (EQF) defines learning outcomes in terms of

	Applying knowledge and understanding Making judgements Communication skills Learning skills	Knowledge Skills Competences
WIDER CoNtEXt		
Lifelong learning	ECTS was designed for formal, higher education. In its current use, it is gravitating towards lifelong learning, which means that informal as well as non-formal settings can also be considered and incorporated. Thus ECTS, which is widely used in formal higher education, can be applied to other lifelong learning activities. Takes into account a typical ability of an average student in the design of the programme	A learner can achieve 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. Takes into account the diversity of the learners
Political context and governance	The Bologna Process attempts to harmonise the architecture of higher education and create the European Higher Education Area (EHEa), EHEA pillars: The Framework for Qualifications of the European Higher Education Area (QF EHEA) – involves ECTS, defines credit ranges & compatible national qualification frameworks European Standards and Guidelines for Quality assurance (ESG) – European Quality assurance Register (EQAR) LRC EHEA tools: ECTS Diploma Supplement Goal: portability of achieved qualification/parts of qualifications within EHEA, i.e. 47 countries in Europe; emphasis on global cooperation	Copenhagen Process – cooperation and transparency in a highly diversified system European qualification framework for lifelong learning (EQF) – credits/credit ranges not mentioned ECVET – European Credit for Vocational Education and Training European Quality assurance Reference Framework for Vocational Education and training Goal: enhanced transparency between the systems and mobility of the learners and students based on the readability of the learning outcomes described in terms of knowledge, skills and competences. 31 countries: 27 countries of EU and 4 associated countries: Iceland, Lichtenstein, Norway and Turkey.
ImPaCt		
Credits are	Allocated to entire qualifications or study programmes as well as their educational components/learning activities (e.g. modules, course units, dissertation work, work placements and laboratory work). Credit allocation	Allocated to units of learning outcomes

	to educational components is based on their weight in terms of the workload needed for students to achieve the learning outcomes in a formal context	
Impact	on the Degree Programme – or qualification respectively Modularisation of degree programmes Smoother recognition of the achieved qualification and/or its part Higher permeability in European higher education Better balance workload/content Structure and comparability: number of credits/workload per year, m o d u l e s ...) Design of the learning/teaching/training programme - improved curricula; improved organisation Improved recognition procedures Possible basis for recognition of prior learning on l e a r emancipation it gives learners more information about the degree programme and paths It offers information on the learning outcomes, which could be achieved It opens up space for more individualisation and specialisation and ensuing individually accentuated paths through the programme as well as flexibility It places more responsibility on the learne	on the qualification Qualification structured in units Number and size of the units Rules of combining units Rules and processes for the assessment, validation and accumulation of learning outcomes Design of the assessment, validation and accumulation (AVA) of outcomes processes (including learning outcomes achieved in formal, non-formal and informal learning) Enhanced transparency of VET qualifications in Europe
	FUtURE/VISIoN	
Point of departure	There is already a relatively long period of experience with implementation. Well embedded in the higher education. However, the system underwent several changes: from transfer to transfer and accumulation. At present transition from being based on curricula (allocated to	Pilot projects – implementation only starting Designed in a " m o d ea n d n flexible way Designed to accommodate the lifelong learning approach However, not yet implemented in the national VET systems.

	learning activities) towards the learning outcomes approach.	
Both systems in motion	Change from curricula driven model to learning outcomes driven model	At present only tested in the framework of pilot projects
Potential for future	Workload ≠learning outcomes Workload is associated with learning outcomes i.e. shift from an input reference oriented system to an output/ learning outcomes based system. The ECTS further specifies the relative weight of the learning activity within the degree programme. Learning outcomes methodology will enable ECTS to serve assessment and validation of results of prior learning (formal, informal, non- formal) Formalisation of non-formal and/or informal learning.	Learning outcomes ≠learning process (output reference oriented system) Designed with the potential to serve assessment andvalidation ofresultsofpriorlearning(formal, informal, non-formal) Formalisation of non-formal and/or informal learning