

FLORES

Offshore Renewable Energies
partnership in the Pact for Skills

Guidelines to promote innovative approaches in Life-Long Learning (LLL) for the Offshore Renewable Energies (ORE)

October 2023



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About this Report

Forward Looking at the Offshore Renewables will promote the core activity of the Large-scale partnership launching the Pact for Skills in the Offshore Renewable Energies (ORE) sector. FLORES will support the most committed stakeholders in the ORE, underpinning the success of the offshore renewable energy strategy with the stimulation of dedicated training offers. The partnership will promote the skilling process for the new jobs expected in the sector, estimated to account for between 20,000 and 54,000 new workers in the following five years and contribute to improve upskilling opportunities in the field of the actual ORE workforce.

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www.oreskills.eu

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Glossary and Acronyms

This glossary does not only provide official definitions, but also explanations based on recognized information sources.

Artificial Intelligence (AI)	Field of study devoted to making machines more ‘intelligent’. Intelligence is defined as the quality that enables an entity to function appropriately in its environment and with foresights about the future.
Basic Information and Communication Technology (ICT) Skills	The skills needed to use efficiently the elementary functions of information, and communication technologies to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the internet.
Big data	Field that treats ways to systematically extract and analyse information from datasets that are too large or complex to be dealt with by traditional data-processing software. In offshore renewables, the adoption of Big Data techniques is necessary due to huge numbers of data that are being recorded and are difficult to manage. Big Data is expected to mainly support managerial activities and real-time decision-making (e.g., optimizing logistics operations during the installation phase of an offshore project).
Energy storage	Set of methods and technologies used to store various forms of energy. The implementation of energy storage can provide further benefits to the offshore renewables sector. It can ensure the development and improvement of grid integration, as well as the integration of offshore renewables in energy network infrastructures. In addition, it supports the sector’s growth by facilitating the wide installations of large-scale offshore facilities contributing to the reduction of their operational costs.
European Qualifications Framework for lifelong learning (EQF)	Reference tool for describing and comparing qualification levels in qualifications systems developed at national, international, or sectoral levels. The EQF’s main components are a set of eight reference levels described in terms of learning outcomes (a combination of knowledge, skills and/or competences) and mechanisms and principles for voluntary cooperation. The eight levels cover the entire span of qualifications from those recognising basic knowledge, skills, and competences to those awarded at the highest level of academic, professional, and vocational education and training. EQF is a translation device for qualification systems.
European Quality Assurance Reference Framework for Vocational Education and Training (EQAVET)	The Framework is an instrument for improving the quality of VET systems. It provides a European-wide system to help Member States and stakeholders to document, develop, monitor, evaluate and improve the effectiveness of their VET provision and quality management practices. It can be applied at both system and VET provider levels adapted to the different national systems and used in accordance with national legislation and practice. It complements the work of the European Qualifications Framework (EQF) and the European Credit System for VET (ECVET).

<p>Key Competences for Life-Long Learning</p>	<p>The key competences identified by European Union that allow every citizen to adapt the changes in society are eight:</p> <ol style="list-style-type: none"> 1. Literacy competence 2. Multilingual competence 3. Mathematical competence and competence in science, technology, and engineering 4. Digital competence 5. Personal, social, and learning to learn competence. 6. Citizenship competence 7. Entrepreneurship competence 8. Cultural awareness and expression competence
<p>Maritime Alliance for fostering the European Blue Economy through a Marine Technology Skilling Strategy (MATES)</p>	<p>European Commission funded Erasmus+ project. The objective of the project is to develop a skills strategy that addresses the main drivers of change in maritime industry, in particular shipbuilding and offshore renewable energy. Both sectors are strongly linked and require new capacities to succeed in an increasingly digital, green and knowledge- driven economy.</p> <p>More information on the project is available at www.projectmates.eu.</p>
<p>Offshore Renewable Energy (ORE)</p>	<p>This term includes the offshore wind, wave, and tidal energy, osmotic and OTEC (Ocean Thermal Energy Conversion). Generally used to designate Offshore Wind energy - MATES uses this term to refer also to Ocean Renewable energy, which includes four different energy segments: Tidal energy, Wave energy, Osmotic energy, OTEC (Ocean Thermal Energy Conversion).</p>
<p>Pact for skills (P4S)</p>	<p>P4S is a shared engagement model for skills development in Europe provided by the European Commission. Companies, workers, national, regional, and local authorities, social partners, cross-industry and sectoral organisations, education and training providers, chambers of commerce and employment services all have a key role to play. The key principles are promoting culture of life-long learning for all, building strong partnerships, monitoring skills supply/demand, and anticipating skills needs and working against discrimination and for gender equality and equal opportunities</p>
<p>3D printing</p>	<p>Group of technologies where a 3-dimensional object is created through the superimposition of layers of material. 3D printing is expected to radically transform the industrial sector by reducing capital expenditures and the demand for human resources. It will also introduce time-saving procedures into manufacturing, facilitating the use of more cost-efficient materials.</p>
<p>Vocational education training (VET)</p>	<p>Sometimes simply called vocational training or VET. It is the training in skills and teaching of knowledge related to a specific trade, occupation, or vocation in which the student or employee wishes to participate. Vocational education may be undertaken at an educational institution, as part of secondary or tertiary education, or may be part of initial training during employment, for example as an apprentice, or as a combination of formal education and workplace learning.</p>

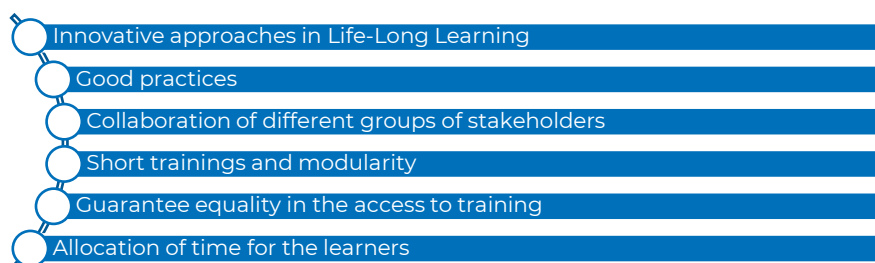


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1 Introduction

The objective of these guidelines is not only to stimulate dedicated training offer for the ORE sector, but also to promote innovative approaches in LLL (Life-Long Learning) and good practices for the syllabus design and teaching activities In ORE (Offshore Renewable Energy). Some of the keys in these guidelines' development are the followings:



The teaching activities and trainings should not only be of high quality but also accessible to everyone. They must also be designed to be valuable and practical from a LLL approach in order to stimulate student's interest in them.

1.1 Life-Long Learning (LLL)

The **definition of Life-Long Learning (LLL)** according to European Union it is: "All learning activity undertaken throughout life, which results in improving knowledge, know-how skills, competences and/or qualifications for personal, social and/or professional reasons."

Nevertheless, LLL it is also about innovation giving to the learner new tools to push up against the boundaries of what is already known, with the capacity to invent new concepts and to seek new understanding related to existing realities. The European Parliament¹specified that learning it is not limited to a single phase in life such as school years, but also happens in different contexts during the course of a lifetime. It is also not limited to formal education, but to non-formal and informal education.

The ORE sector it is part of this rapidly changing world that calls for opportunities to learn through out life. In these Guidelines, not only have some goods practices been developed, but in addition some specific topics and types of training are considered in order to build a LLL aligned approach. It is necessary to consider the specific needs of the ORE sector that involve the necessity to retrain workers from other sectors, such as the shipbuilding or onshore wind sector, for example. The approach required to consider such changes depends on the student or learner level.

The life-Long Learning concept is closely connected to motivation. Due to the wide range of learners in the ORE sector (from students to workers looking to re-skill), it is essential to understand their different and motivation approaches:

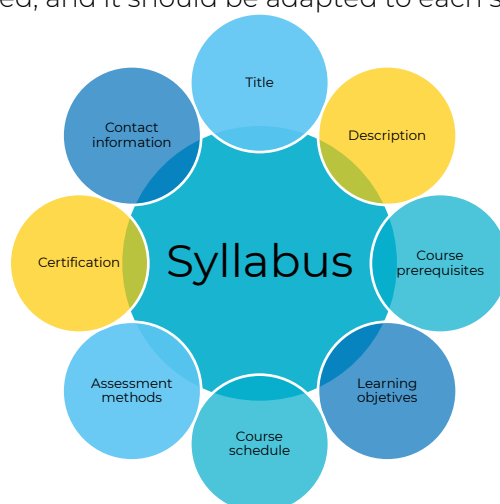
Strengthening the motivation to learn for the young
<ul style="list-style-type: none"> • Active and project-based learning • A wide range of vocational education programmes • Opportunities to combine classroom learning with learning in work settings

Motivating adult learners
<ul style="list-style-type: none"> • The needs for appropriate teaching methods • The need for flexibility in scheduling and practicalities of adult learning • The importance of targeting adults who are hard to reach

¹ Text based on European Parliament definition of Long-Life Learning. Available in [European Parliament | Lifelong learning \(europa.eu\)](https://www.europarl.europa.eu/learning)

1.2 Syllabus design

A syllabus may be either a document or be designed in a multimedia format that presents the content, structures, and expectations of an educational training. It provides a comprehensive guide for teachers and learners with essential information establishing a well-structured framework enabling an understanding of what to expect of the course and allowing both students and teachers to manage their responsibilities effectively. It usually includes the course title and description, the learning objectives, the course schedule, the assessment methods, the type of certification available, the course prerequisites, the contact information and other essential components that ensure effective teaching and learning. The required information to be included in syllabus design depends on the type of training that is offered, and it should be adapted to each specific case.



Designing an understandable and accessible syllabus is crucial not only for inclusion but also to ensure student engagement in the course.

The syllabus gives students a first impression about what to expect from the course, and it can significantly influence their choice to continue studying or not. Consequently, an effective introduction at the beginning of the course is crucial for capturing students' attention and attracting their interest. Some of the ways to attract learners are²:

- Provide basic information.
- Specify prerequisite knowledge at the beginning of the course.
- Detailed introduction or trailer
- Use of introductory or welcoming lectures
- Issue of certificates or funding to encourage participation.

A useful way to humanize the pre-course contact is to send a welcome letter to each student (emails are more likely to be accessed from a mobile phone than a computer). Because of easy access to a network connection from a smartphone, designing mobile-friendly instructional content has become an essential component of inclusion. This welcome letter should therefore include a link or embedded welcome video or image: context is an important component of designing inclusive communications.

During the design of the syllabus, it should take into consideration that LLL programs should be developed in line with the rapidly evolving technological landscape of ORE. It could be very useful to involve industry experts in curriculum design to ensure relevance and practical applicability of the content.

² Based on the analysis made by Billy Tak-ming Wong in the article "Factor leading to effective teaching of MOOCs"

1.3 EQAVET approach

Aiming to assure a quality improvement training design, it might be useful to follow the EQAVET approach quality cycle, based on four phases:



Descriptors and indicators might be developed in order to plan and implement improvement actions, evaluate the results and effectiveness of the improvements implemented that add value to the learning experience.

1.4 Collaboration between training providers and stakeholders

Promoting the development of skill ecosystems, by intersecting points for industry, academia, and research, could contribute to improve the coordination of efforts from the most relevant stakeholders in the training processes.

In 2020 the European Commission launched the Pact for Skills, a shared engagement model for skills development in Europe, and it is an example of collaboration among companies, workers, authorities, social partners, cross-industry and sectoral organisations, education and training providers, chambers of commerce and employment services. The objective is to take concrete action to upskill and reskill people in Europe by inviting public and private organisation and one of the key principles is to promote the culture of life-long learning (LLL) for all.

In 2021, an ORE sectoral partnership was established with regard to European Skills Agenda, and it was called **Pact for skills- Offshore Renewable Energy (P4S-ORE)**. This Partnership aims to stimulate a dedicated training offer, promoting re-skilling and up-skilling of the workforce, availability of training itineraries which intersect with other sectors, providing suitable preparation for new staff and measures for attracting talent and making a clear contribution to promoting strong labour standards.

One of the proposed lines of action in Pact for skills is to find financial opportunities to support the investments of companies in up-skilling and re-skilling activities for their employees. This objective might be achieved through collaboration between different parts, that could be the parts shown in the following graph:



2 Good practices

The following good practices should be considered if aiming to create an environment that encourages LLL (Life-Long Learning) and innovation in the **rapidly evolving field of ORE** (Offshore Renewable Energies).

Nowadays, in educational trainings, it is common to include equality practices, nevertheless, in innovative trainings, the practice of inclusivity must be addressed.



While the practice of equality focuses on ensuring that all individuals or groups are treated in the same way and have the same opportunities and access to resources, inclusivity goes beyond mere equality and aims to create environments where all individuals or groups, regardless of their differences, are not only treated fairly but also actively welcomed and accommodated. Inclusivity recognises that people have different backgrounds, abilities, and perspectives and consider this diversity needs to be taken into account in order to build an appropriate learning environment.

In education, an inclusive approach emphasizes in providing personalized support and resources to the whole range of students, ensuring they can participate fully in the learning process, acknowledging their unique needs and embracing the differences. The aim it is to achieve a truly **inclusive learning environment**.

On the one hand, quantifying the diversity of the learners, through questionnaires or other methods, could help to measure the level of inclusion in the training. Some of the **characteristics or datapoints to consider** are:

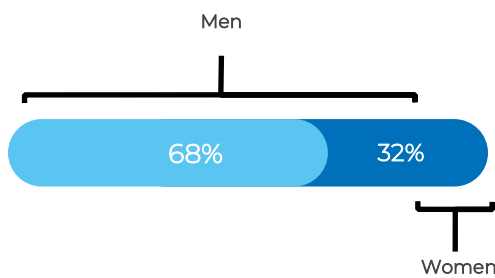
- Age
- Visible and invisible disability, including mental health and neurodiversity.
- Ethnicity
- Gender identity, expression, and reassignment
- Pregnancy and maternity/paternity
- Caring responsibilities
- Marital or civil partnership status
- Religion or belief
- Sexual orientation
- Culture
- Citizenship status
- Language and accent
- Political opinion
- Family status and socio-economic circumstances
- Physical appearance



On the other hand, understanding diversity could help to prevent discrimination and to reach real inclusion by understanding the obstacles that these individuals or groups of people could face in their learning, training, and professional life.

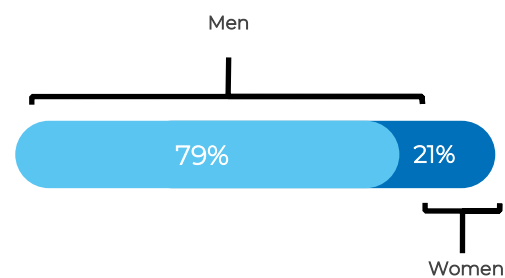
Although inclusivity is always an important concept in education, in **ORE sector**, where there is a strong movement towards social responsibility, it is especially relevant to take inclusion into consideration. Achieving diversity in ORE sector is crucial to make the energy production system inclusive and sustainable. When societies become more inclusive and achieve greater fairness, their economies become more robust and resilient.

Current data suggests that there is still a long journey ahead to achieve real inclusion. One example is renewable energy sector gender gap, where women are underrepresented in the workforce, and this is especially significant in wind energy sector:



Workforce gender representation in renewables energy sector.

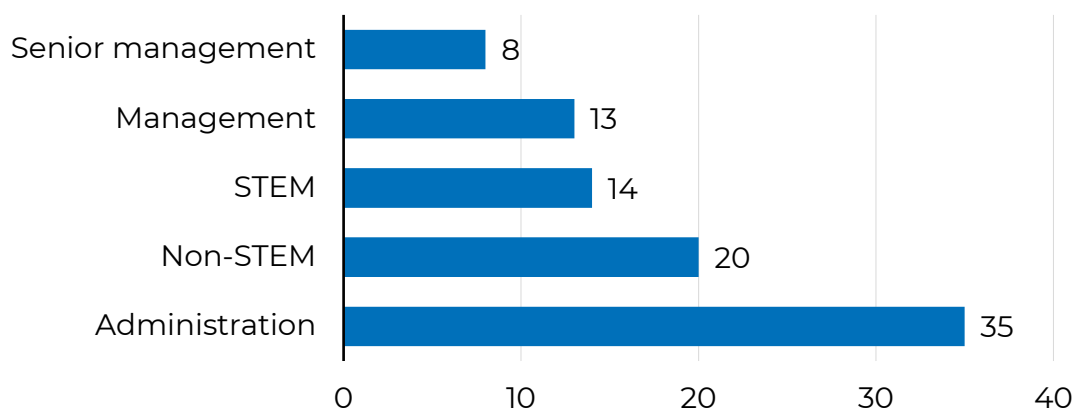
Source: European Commission (2023). Pact for skills for the renewable energy sector <https://pact-for-skills.ec.europa.eu/system/files/2023-04/20230321%20-%20ORE%20skills%20partnership-%20Declaration%20%28%29.pdf>



Workforce gender representation in wind energy sector.

Source: IRENA (2020). Wind Energy: A Gender Perspective https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jan/IRENA_Wind_gender_2020.pdf

Furthermore, the female representation in wind energy sector is even lower in senior management roles and higher in administration roles suggesting gender barriers:

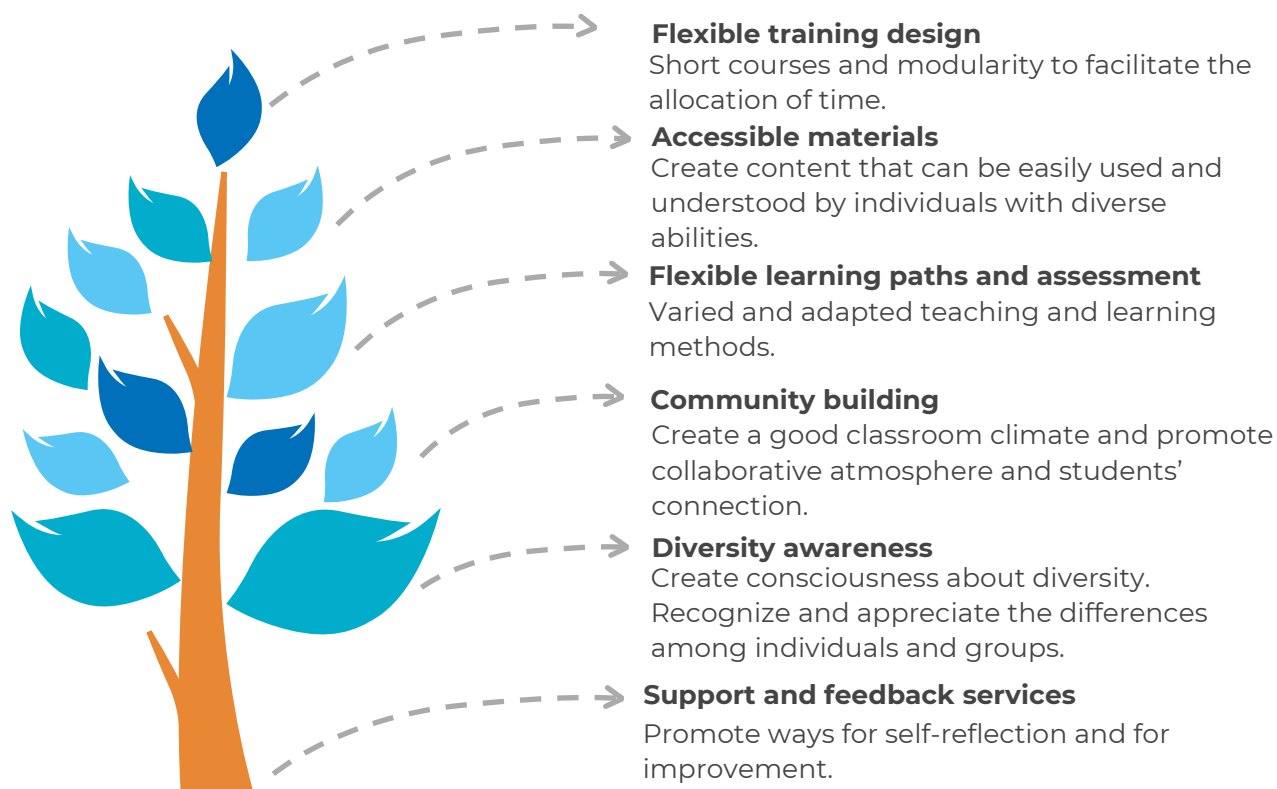


Percentage of women by role in the wind energy sector

Source: IRENA (2020). Wind Energy: A Gender Perspective https://www.irena.org/media/Files/IRENA/Agency/Publication/2020/Jan/IRENA_Wind_gender_2020.pdf

2.1 Inclusive practices

With the purpose of create truly inclusive trainings, some inclusive practices should be taken into consideration:



In the following sections, various inclusion practices will be explained. At the end of each section, key questions will be included for facilitating the self-assessment during the creation of training materials.

2.1.1 Flexible training design

One of the issues regarding to trainings it is their **accessibility** to them. To guarantee the **equality of access**, it is recommended to allow flexibility in trainings, **facilitating the allocation of time** for the employees or students to get trained. In conclusion, the objectives are:

1. To promote access to everybody
2. To allow flexibility in trainings

In an online gender survey made by IRENA (International Renewable Energy Agency) in 2019³, 71% of respondents, asked to select key measurements to improve women's engagement in deploying renewables for energy access, answer that **access to training** and skills development programmes. should be a top priority.

Short trainings and **modularity** are good examples of facilitators with these two requirements. In addition, the choice of the appropriate type of training and teaching methods for each target group of learners is also important. The use of technology

³ The data was obtained from a report developed by IRENA (International Renewable Energy Agency) based on a multistakeholder survey that attracted close to 1500 respondents from 144 countries working for private companies, government agencies, non-governmental, organisations, academics institutions, and other entities.

provides flexibility in course delivery, allowing students to access materials and participate remotely if it is necessary.

In addition, it is fundamental to develop modular courses and credentials that allow learners to acquire specific skills and competencies in a **flexible and stackable manner**, enable them to tailor their learning pathway. This accessibility should be developed beyond mere access to the training: it is necessary not only to attract diverse learners, but also to be able to retain them in the training and give them the capacity to promotion. Furthermore, accessibility It is also about enhancing an inclusive approach, ensuring inclusiveness and diversity in offerings, and making them accessible to individuals from diverse backgrounds, skill levels and demographics.

Key questions on validation. Has the training a flexible design?

- Is the course content, resources, and activities accessible at any time?
- Can participants progress at their own speed?
- Is there flexibility in deadlines and assessment schedules?
- Is there a guidance on time management for students?
- Are there reminders for learners to be motivated to complete the training?
- Are live sessions or webinars recorded and available for later viewing?

2.1.2 Accessible materials

Provide training materials in multiple formats, such as text, audio, infographics, and video, to accommodate different learning preferences and accessibility needs (accessible for learners with visual impairments, deaf or hard of hearing, motor disabilities, special learning needs or neurodiversity).

It is fundamental to use clear and concise language, avoiding jargon and providing enough explanations when introducing new concepts to ensure understanding for all participants. A well-organized set of materials helps students to get oriented in the course. Here are some relevant suggestions:

- Use introductory materials and indicators “Start here”.
- Use descriptive titles and small sections with clear headings.
- Provide instructions and links to help resources.
- Make content visible and attractive.
- Left alignment for the paragraphs is preferred: it is more readable and accessible

Furthermore, it really matters to create materials accessible from different devices (computer, mobile, printable, downloadable). M-learning refers to the use of mobile devices to support the teaching-learning process, and it has some characteristics that contribute to inclusion: the mobility they allow, the ubiquity (they can be used at almost any time and place), the connectivity and the low cost.

Another action that can be taken is to open the course content, or part of it, to the general public and not just for the course students. This effort facilitates the creation of networked knowledge or proves valuable for future reference, promoting at the same time accessibility and Life-Long Learning.

Key questions on validation. Are the materials truly accessible?

- Are learning materials easily available to find for participants?
- Is the content available in multiple formats such as text, audio, and video?
- Is the text legible and well-structured?
- Are the materials well organized and have they links to help resources?
- Are images and multimedia content accompanied by text descriptions?
- Are videos or audio content transcribed?
- Is there consideration for linguistic diversity in materials? Are they translatable?
- Are materials online, downloadable, and accessible from different type of devices? Are they open to the general public?

2.1.3 Flexible learning paths and assessment

It is fundamental to consider that not all learners are comfortable with the same approach to learning: different students have **different learning styles**. Due to this fact, flexible learning pathways should be developed, taking into consideration **varied teaching-learning methods**, and reviewing pedagogical choice. This is also key for providing **multiple means of engagement**, helping students to remain motivated.

Furthermore, providing opportunities for self-directed learning helps students to develop a meaningful learning aligned with LLL approach.

The modern educational approaches and methods as gamification provide good opportunities to increase engagement and motivation, however, different individual requirements and needs should be considered. For example, not all the students like gamification, or apply it in the same way: some prefer to collaborate in groups, some do not like competition, some others love to be part of it. It is essential not forgetting to put the **student needs into the centre** in order to personalize the training and make it truly inclusive for each student. In the same vein, training instructors and designers need to be ready to **provide accommodations**, such as extended time for assessments, to individuals with specific needs or disabilities.

Flexibility in assessment should allow multiple forms of assessment. Nevertheless, it is important to find a balance between flexibility and reliability looking for the way to have a useful process to evaluate (and if such is the case, to provide valid certification) but also to pay attention to the different needs of each student.

Key questions on validation. Are the learning path and the assessment flexible?

- Is the assessment flexible, using multiple forms of assessment for the individual needs of each learner?
- Does the training provide a range of learning methods?
- Are participants allowed to progress at their own pace?
- Are special needs taken into account in terms of accommodations?

2.1.4 Community building

Influencing a good classroom climate might enhance student learning. One way to create this climate is to create a community with a shared identity which allows members to develop their place in the group, to clearly understand their role, and see how they fit into the larger group thus promoting collaboration.

There are different tools for building a community:

- Use icebreakers to create a sense of community.
- Use a platform or provide tools for discussing learning materials.
- Incorporate group discussions tools (forum, chat rooms or social networking sites)
- Promote collaborative projects.

Key questions on validation. Is the training promoting community building?

- Are there opportunities and tools for interaction and collaboration?
- Is there a forum, chat rooms or social networking sites?
- Does the instructor promote collaborative projects?
- Do the learners feel comfortable and belonging while learning?

2.1.5 Diversity awareness

Enhancing social acceptance, eliminating prejudice, and promoting the benefits of diversity in our society are among the key objectives of the European Union.

With this purpose, some specific steps or actions are suggested:

- ❖ **Inclusive language and media:** consciousness in developing of texts or media election are required, avoiding spreading stereotypes or to use an offensive language

in course materials and interactions. It is essential to use language that is inclusive for all gender identities, cultures, and backgrounds. Some software platforms as Microsoft Word provide automatic tools to recognise and propose corrections for different cases as age bias, cultural bias, disability bias, ethnic slurs, gender bias, gendered pronouns, gender-specific language, mental health bias, racial bias, sexual orientation bias, socioeconomic bias. A good approach to achieve this goal could be using the *Guidelines for the promotion of gender equality and inclusiveness in the training contents*⁴, taking into account that gender inclusive language should be checked in any translation of the materials.

- ❖ **Diverse talent representation.** Diversity is not usually represented in materials or media in trainings. Gender and ethnic diversity are still underrepresented, and this is an implicit message that learners are receiving promoting stereotypes. An example to avoid could be the general picture of a woman doing an administrative work while a man is doing a technical work in a senior management role.
- ❖ **Cultural sensitivity.** One way to ensure cultural sensitivity it is to provide translations to all student's languages, including minority languages. This action is aligned with regional approach emphasized in Pact for Skills.

Key questions on validation. Is the training an example of diversity awareness?

- Is the language inclusive and free from stereotypes in contents and interactions?
- Are we using software tools to correct biases in our materials?
- Are translations to learner's mother tongues provided?
- Is diversity (gender, age, ethnicity, etc.) represented through contents?
- Is the training aligned with regional approaches for diversity and inclusivity?

2.1.6 Support and feedback services

Aiming to provide constructive feedback that helps students improve, instructors should encourage self-reflection, allowing participants to monitor their own learning. Feedback tools for students should be provided not only during the training but also after, asking them about inclusivity and be willing to adjust based on their inputs.

On the other hand, support services are also necessary with the purpose to facilitate tutoring, counselling, and accessibility. It is essential to provide email and contact information and office hours with teachers' availability. It could be useful to create a forum for students to express their questions and concerns, promoting peer assessment and allowing the teacher to respond publicly for solving common questions.

Key questions on validation. Are there enough support and feedback services?

- Is there an accessible communication channel for learners to reach tutors?
- Is there a low instructor-to-learner ratio?
- Is there technical support available for any technology-related issue?
- Is there a designated point of contact for questions, assistance, and support?
- Are there opportunities for self-assessment and reflection?
- Are there check-ins or progress updates to participants to know their progress?
- Is feedback from participants collected and used it to make improvements?
- Does the training offer additional resources or references to explore more?

2.2 Innovative approach


Aiming to improve the traditional teaching and learning process, it is fundamental to incorporate learner-centred pedagogies that emphasize problem-solving, critical thinking and real-world applications, fostering a deeper understanding of complex ORE concepts through the embracing of creativity and empowerment by technology.

⁴ CETMAR, 2022. Guidelines for the promotion of gender equality and inclusiveness in the training contents, adapted from the "Decalogue of good practices for gender equality in ocean literacy". Results of the projects ICONO and DITMEP (www.ditmep.eu/)

Nevertheless, innovation in education involves not only introducing new and effective ways of teaching and learning engagement but also assessing the effectiveness of these practices in improving learning process.


Beyond the concept of innovation, it is essential to choose the correct and adapted pedagogical methods. Some innovative pedagogical methods and some innovative tools are detailed below:

Flipped classroom




- **Traditional teaching is reversed.**
- Learners previously study the learning materials (through videos, readings or other approaches) and after that, they go to a community space, that could be a physical space or online, and engage in discussions or problem-solving activities with the support of the teacher or instructor.
- Promote **time optimization** in class by allowing teacher to meet the special needs of each learner.

Gamification




- Introduce **game elements**, such as competition, rewards and achievements
- **Improve engagement** and make learning more enjoyable.

Project Based Learning (PBL)




- Involves learners into **contextualized projects** that address real-job problems or challenges. They learn in an **active and meaningful** way.
- Especially useful to apply in ORE sector, developing not only a hard skills but also some of the **soft skills** required.

Cooperative learning



- ❖ Working groups could impact on learning in a positive way, combining different learning paths and promoting students **to encourage and help each others**.
- ❖ This method should be structured based in order to work properly, specifying the number of students in the group and the specific **roles** to reach the objectives.

Artificial Intelligence (AI) integration



- ❖ Integrating IA could **personalize learning experiences**, providing **instant feedback**, and adapting the process to individual students needs.

Last but not least, and despite the innovative pedagogical methods exposed, it really matters to define some practices to avoid because they may not be innovative:

- Traditional expositive teaching without interactive elements or adaptations
- Incorporating technology without clear pedagogical goals or without improving the learning experience
- Single learning style approaches without consideration to diverse learning needs and preferences

Although case studies and simulations and also service-learning could be considered pedagogical methods or tools, they will be presented in an independent sector of the guidelines with and especial treatment due to the usefulness that these both approaches could contribute to ORE sector trainings.

2.3 Case Studies and Simulations

Applied learning projects are directly related with modern methodologies as **Problem-Based Learning (PBL)**, these interactive trainings present real-world scenarios, allowing students to apply their knowledge and problem-solving skills.

Due to the fact that the offshore environment is not easily accessible for training, it is crucial to provide virtual environments not only to put knowledge into practice but also for doing this work by collaboration with other students. Incorporating **emerging technologies**, such as Virtual Reality (VR), Augmented Reality (AR), simulations, robots, interactive online platforms, virtual and remote laboratories, or others could enhance the learning experience and provide hand-on training opportunities.

Furthermore, emphasizing the provision of these resources to students to enhance their understanding of phenomena, gives them the opportunity to test their own knowledge and to understand the operation of complex systems and the deepening of technical principles. This approach is aligned with the proposed lines of action in Pact for skills, in which is mentioned not only the importance of exploring the use of test sites for training purposes to stimulate the ORE working contexts but also the use of virtual reality and mobile simulators combined with on-site practices.

This approach of integrating practical projects and case studies that mirror real-world challenges is closely aligned with the characteristics necessary for ORE sector, where conditions are changing and unforeseen and where soft skills are essential. Besides, such realistic scenarios could be very useful to support the conversion of onshore to offshore workers.

2.4 Service-learning

Service learning is an educational approach that combines learning processes with community service addressing real community needs and promoting a meaningful and purposeful learning experience.

This approach could be applied to ORE trainings, identifying relevant needs or challenges of the sector aligned with the curriculum. It might prove beneficial for the students to integrating hands-on projects or fieldwork in the training course.

Furthermore, service-learning might be an opportunity to stimulate collaboration between stakeholders in ORE sector. This experience could foster community engagement.

Considering some relevant identified needs in ORE sector these activities are suggested:

- **Environmental awareness initiatives.** Different community engagement projects could be developed, disseminating information about offshore renewable energies. Involving community in this process with the aim of having some social impact.
- **Evaluation of social and environmental impacts from a regional approach.** Considering some kind of collaboration with local and regional community to collect concerns, worries or needs related to ORE sector and analyse them.
- **Collaboration in the creation of accessible materials.** Students could be encouraged to transcribe videos or to record audio for make a text accessible for future students with special needs, while they are reviewing their own knowledge acquisition.
- **Collaboration in the translation of materials.** Learners could be also translating some contents or materials while they are studying, providing education or content to people from diverse backgrounds, promoting representation in minority languages

and facilitating the inclusion of regional or specific sectors that could not access this information before due to language barriers.

- **Research focus projects.** Integrating research projects into LLL trainings might encourage innovation and the exploration of new areas of interest and the use of new technologies in the ORE sector that could be used in the future in real ORE projects.

The list above shows just a few general suggestions, based on some of the needs defined in Pact for Skills, as skills related to community engagement, outreach, and organisation, as well as coaching for local communities on adopting sustainable behavioural change. Nevertheless, the activities should be adapted to the individual context, topic, type of training and other relevant considered variables. It would be advantageous to review the needs of the ORE sector in order to offer genuinely useful and meaningful services.

2.5 Monitoring and evaluation

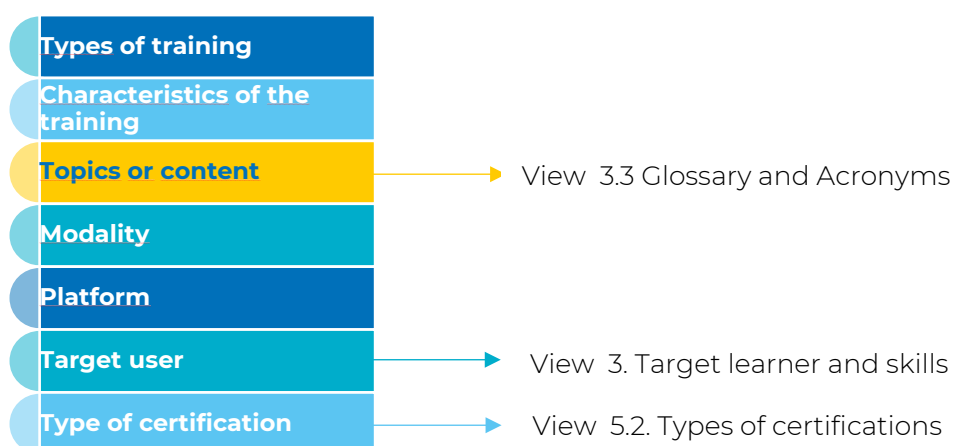
Teaching practices, contents and syllabus design shall be evaluated through regularly monitoring the **impact of the trainings**, collecting feedback not only from learners but also from teachers and industry partners to redefine and improve the offered trainings. This is aligned with four phases of EQAVET approach: planning, implementation, evaluation, and review.

Furthermore, it may be advantageous to perform quantitative analysis to correlate different student's variables and their level of participation, assessing the real inclusion and accessibility of the training.

2.6 Categories

A categorisation was made in an attempt to define the various characteristics that a training program could have, during the design process of these guidelines, different categories were collaboratively chosen to organize the different features of the training programs.

These categories will be considered in the section "4. Types of training", although, in some categories there are specific sectors developed to help guidelines users to find specific information:



A diagram is shown down below as a guide and an abstract of the content of this categories:



Types of training

- MOOCs and MOOCs variations
- Blended learning
- Microcourses and NOOCs
- Workshops and bootcamps
- Other

Characteristics of the training

- Short
- Modular
- Use of test sites
- Use of virtual reality
- Use of mobile simulators

Topics or content

- Decarbonisation
- Remote control
- Data analytics
- Big data
- Automation and advanced robotics
- Energy storage
- Additive manufacturing
- Diving
- Welding
- Others

Modality

- Online synchronous
- Online asynchronous
- On-site
- Hybrid or blended

Platform

- Website
- Training platform
- Company platform

Target user

- Students
- People working at the ORE industry
- Other groups

Types of certification

- Conventional credentialing options
- Microcredential
- Open badges and digital artefacts
- Statement of participation

3 Target learner and skills

In order to design the training, it is crucial to know not only WHO is the target learner but also WHAT it is necessary to transfer and HOW it should be done.

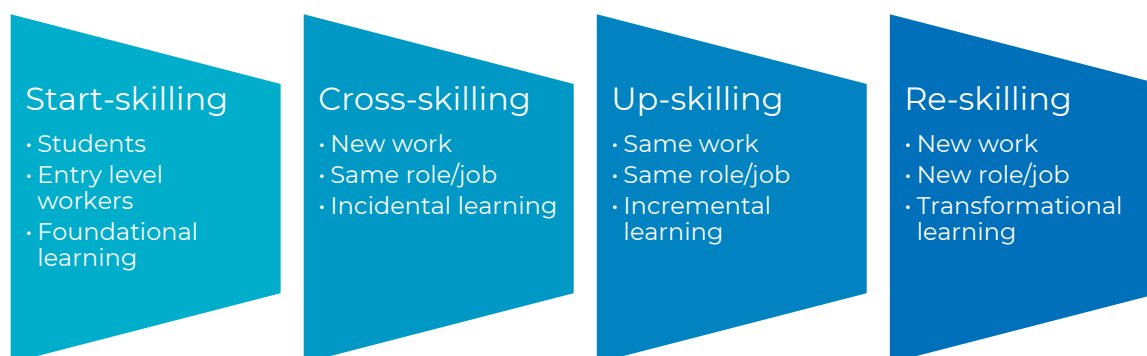
It is fundamental to identify the target learner because different profiles of student have different needs in the development of skills. Some of the **potential profiles in ORE sector** are:

1. **Students.**
2. **Existing ORE sector workers.** Workers who already belong to the sector but need to develop new skills, for example digital skills to use new software.
3. **Workers coming from other sectors:**
 - 3.1. **From maritime industry**
 - 3.2. **From shipbuilding and ship-repair industry.** In Europe there is an aging workforce that needs multi-skilling education and training approaches and methods.
 - 3.3. **From onshore renewal energy sector.** They have existing technical capacities and skills from onshore segment, and they need specific adaptations to offshore.
 - 3.4. **From other offshore sectors.** For example, offshore oil and gas workers have skills and knowledge related with large offshore platform and rig constructions that resist wind and wave actions and other extreme and harsh weather conditions and these abilities are transferrable to the offshore wind sector.

This categorization of target learner constitutes is general for the ORE sector. However, depending on the topic developed in the training and the type of training, a deeper categorization of the target user could be developed.

3.1 Skilling processes

The following graphic shows how different needs are related to different profiles. Training design should be done considering the type of skilling and the learners needs and previous capacities:



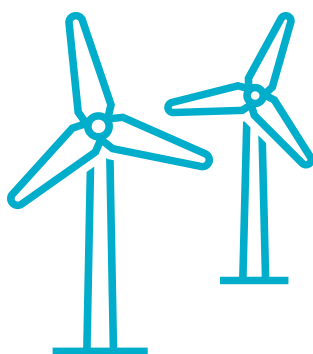
One of the proposed lines of action in the Pact for Skills in ORE sector is to increase the number of apprenticeships in the ORE industry, involving practitioners from different disciplines (science, engineering, but also ITC, telecommunications laws, among others). With this purpose, it is fundamental to develop not only start-skilling processes but also cross-skilling, up-skilling, and re-skilling processes.

Furthermore, according to the MATES analysis, for the 27,5% of companies it is difficult or very difficult to fill the job positions they offer). With the aim of training, the workforce demands, quickly and effectively, particular emphasis should be placed on:

- ❖ **Up-skilling**, due to the uncertainty that currently exists as to how the ORE sector will grow in future decades and to address the emerging skills gaps.
- ❖ **Re-skilling**, by reason of existing sets of skills that with high transferability from other sectors and due to the high demand of employees.

3.2 Hard skills and soft skills in ORE

To be able to define the relevant topics in ORE, it is necessary to recognise the skills required. Skills can be categorized as hard and soft:



Hard skills

Specific, teachable abilities or knowledge that are quantifiable and directly job-related.

Examples:

- *computer programming*
- *data analysis*
- *foreign language proficiency*



Soft skills

Interpersonal skills, less tangible and less job-related than hard or technical skills but also important.

Examples:

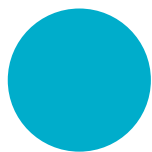
- *Communication*
- *Teamwork*
- *Adaptability*
- *problem solving.*

The MATES analysis of skills gaps results revealed that both, hard and soft skills are equally important.

3.3 Topics based on training needs.

Topics or content in trainings are chosen by the training providers, nevertheless, it is useful to consider a needs-based approach, identifying the skills gaps in the sector with the purpose of offering useful and meaningful trainings.

In the MATES review of Pact for skills, it is highlighted the training needs in ORE-related skills for **electro-mechanics, assembling, health and safety, construction diving and welding**. The most important gaps related with hard skills and soft skills refers to:



Hard skills

Project management skills

Engineering skills

- Electrical
- Structural
- Adaptation for decarbonisation in ORE maritime operations

Operational and maintenance skills

- Electro-mechanics
- Assembling
- Construction
- Welding
- Diving

Digital skills

- ICT skills
- Remote control
- Data analysis
- Smart device handling

Offshore specific skills

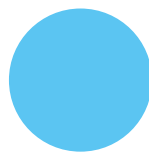
- Working at sea
- Working at heights
- ORE technologies and their main principles

Health and safety skills

Project design and planning skills

- Engineering design
- 3D design and visualization
- Numerical modelling

Language skills



Soft skills

- Creative thinking and innovation
- Critical thinking
- Decision-making
- Self-direction
- Problem-solving
- Foresight
- Good communication competences
- Self-investment mentality
- Multidisciplinary approach
- Collaboration competences
- Flexibility and adaptability
- Team management
- Leadership and responsibility
- Productivity and accountability
- Negotiation skills
- Environmental awareness

Furthermore, five emerging trends were identified related with ORE sector:

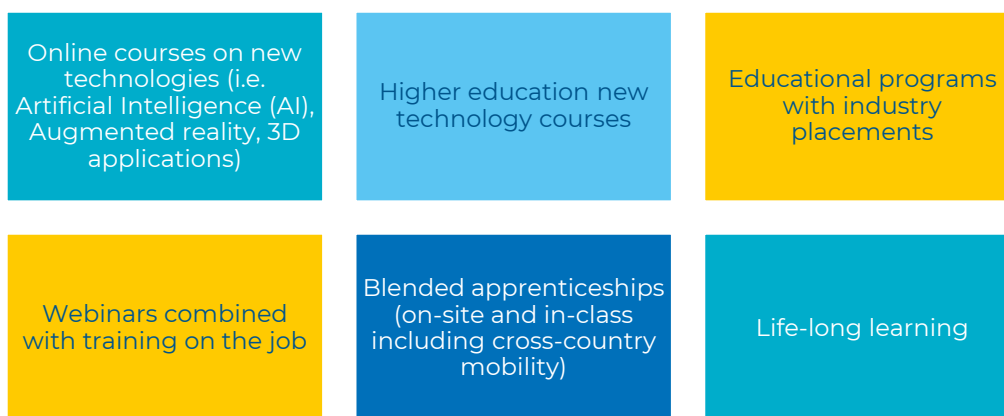
1. Smart grid and smart sensors
2. Big data
3. Automation and advanced robotics
4. Energy storage
5. 3D printing

According to the MATES analysis, other topics are also of increasing importance: adoption of a SMART approach (Smart, Measurable, Attainable, Relevant and Time-bound) in project management, big data analytics and artificial intelligence (with several aspects however requiring standardization such as for example data storage), robotics, mechanics, and cartography and oceanography.

The mentioned skills and areas are a suggestion based on evidence, nevertheless, the ORE industry is constantly developing and changing, facing new challenges and needs. Topics should be adapted to the skills required and other categories not mentioned in this text could be taken into account, as for example cybersecurity, marine operations, offshore site investigations (marine geology, environmental, geophysical, and geotechnical investigations) or other new technologies.

4 Types of Training

The document “Foresight scenarios identifying futures skills, needs and trends” launched by MATES in 2020, analyse future scenarios and occupations, skills, competences, and training needs for the ORE sector and mentions some of the **most effective educational trainings identified** for the trends where re-training will be required:



Most of these educational trainings identified fulfil the requirements of flexibility, stackable manner and modularity defined in the good practices.

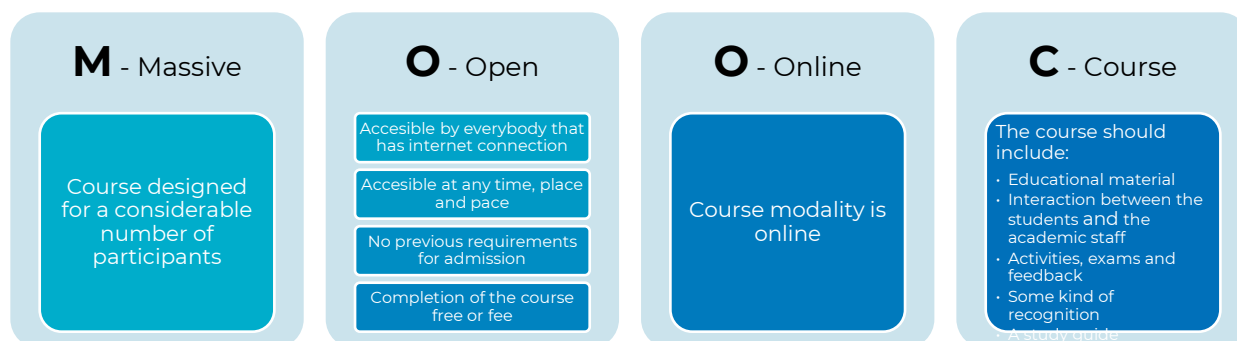
With regard to training modalities, the approach of the classification is varied among authors. One possible classification it is: online, on-site or hybrid training solutions:

- ❖ **Online training** refers to virtual and remote training. It can be synchronous or asynchronous.
- ❖ **On-site training** refers to in-person or face-to-face learning programmes.
- ❖ **Hybrid training** refers blended learning initiatives that combine online and on-site training as a part of the same training programme.

4.1 Massive Online Open Courses (MOOCs)

Massive Online Open Courses (MOOCs) are offered to a **large number of participants**, they are **online** and is **no fee for enrolment**. Regarding to the learning structure, these courses are included in the **non-formal learning** group due to the **not rigid structure** and not standardized evaluation. In consequence, getting global recognition is not as straightforward as in the case of formal learning.

The meaning of each letter and Its Implications are shown in the chart below⁵:



⁵ Chart from article “Current state of MOOC recognition in Europe”(Santiago Caamaño et al., 2021)

MOOCs are usually designed to be asynchronous; nevertheless, some synchronous possibilities could be implemented as webinars or live sessions, discussions or activity that take place at a specific scheduled time.

Currently, many universities have their own platform in order to offer MOOCs, but there are also different platforms that provide a virtual environment for MOOC's trainings, open to companies (to offer up-skilling and re-skilling courses) and universities (to offer start-skilling courses). Some of the most known platforms are:

- Future Learn (UK)
- FUN (France)
- Miríadax (Spain and Ibero America)
- Coursera
- edX
- Udacity
- Khan Academy
- Canvas Network
- Udemy
- The Open University

MOOCs participation is usually free, with a state of participation included. Sometimes the certification (as a certificate of assessment completion) is provided without a fee, but on other occasions they have to be paid.

The target learners are multiple, from higher education and university students to people already working in the industry looking for upskilling, cross-skilling, or reskilling.

4.2 Variations of MOOCs

Since the emergence of MOOCs, various variations have been emerging. They are classified in the chart below, remarking the differences with standard MOOCs:

Type	Massive Open Online Courses (MOOCs)	Small Private Online Course (SPOCs)	Extended or Traditional MOOC (xMOOCs)	Connectivist MOOC (cMOOC)
Target user	Large Audience. Open and accessible to a large number of learners	Similar to MOOCs but designed for a smaller more targeted audience	Similar to MOOCs	Similar to MOOCs.
Main characteristics and pedagogical approach	Often feature video lectures, interactive quizzes, discussion forums and assignments Offered by universities, institutions, or online platforms.	They could be called COOC (Corporative Open Online Courses)	More traditional educational approach, often resembling a structured course found in a traditional classroom setting. Typically consist of video lectures, quizzes, and assignments.	Focus on a more connectivist approach to learning, emphasizing the creation of networks and connections between learners. Often designed to encourage collaboration, discussion, and exploration of diverse resources

Type	Massive Open Online Courses (MOOCs)	Small Private Online Course (SPOCs)	Extended or Traditional MOOC (xMOOCs)	Connectivist MOOC (cMOOC)
Platform	Offered by universities, institutions, or online platforms.	Offered by educational institutions for their own students or specific group of learners.	In most cases offered by known platforms like Coursera, edX and Udacity	
Level of interactivity and other differentiating features	They usually do not have strict entry requirements --> accessible to a diverse range of learners.	More personalized interaction and engagement (compared to MOOCs) due to the smaller class size	These courses emphasize structured learning paths and assessments	The learning experience is often more decentralized, with participants taking an active role in shaping the course content through their interactions

In addition to this categorisation, all kind of MOOCs can be categorised by the **desired degree of flexibility**:

- **Fixed-time MOOCs** have specific start and end dates, and learners progress through the course material as a cohort. These courses offer a sense of community and shared experience among participants, as everyone follows the same schedule.
- **Self-paced MOOCs** allow participants to enrol and begin the course at any time. There are no set start or end dates, and learners can complete the course at their own pace. This format offers greater flexibility but might lack the sense of community found in fixed-time MOOCs. This type of MOOCs is sometimes called SPOOCs (Self-Paced Open Online Course).

4.3 Blended training

Offering a mix of online, hybrid and in-person learning formats could be a good solution to accommodate the diverse needs of learners, including professionals, students and those transitioning to the ORE sector.

Blended trainings allow adaptation of the activities not only if mobility restrictions are requested (as occurred during COVID pandemic) but also for learners with limited a temporary or permanent mobility impairment (e.g., due to a broken leg).

4.4 Microcourses and NOOCs

Both microcourses and NOOCs, are variations of online courses designed to offer small trainings focused on really condensed and specific topics or skills. They are usually offered for free and individually, nevertheless, they can be also part of a larger educational program. NOOCs are a derivation of MOOCs, but instead of massive, nano, small: “Nano Open Online Courses”.

Designed to be completed in a short time (usually few hours), microcourses and NOOCs provide quick and targeted learning experiences.

Furthermore, due to their specific content, they are usually offered to a small target audience. They are accessible and flexible because they are suitable for fast or on-the-go learning, such as through mobile phones. They are a good option for workers with difficulties of allocation of time, looking for cross-skilling, up-skilling, or re-skilling.

4.5 Workshops and bootcamps

Both, workshops and bootcamps are practical trainings focused on hands-on or practical knowledge or skills acquisition. They offer a guided learning experience that looks for acquire a new technical skill or to gain proficiency in a particular subject, usually supporting learners with an expert on the field. Due to this fact, they are especially suitable for up-skilling and re-skilling in the ORE sector.

While bootcamps usually offer intensive and focused training programs of short duration (often a few weeks), workshops are usually more casual and shorter (few days or hours).

4.6 Other types of training or tools

There are other tools that they do not usually constitute a type of training itself, but they could be considered tools, or learning activities that could be provided inside other kind of training.

4.6.1 Video lessons

Video lessons create a personal connection and improve understanding through explaining complex materials visually. Insights from experts in different fields could be considered, e.g., TedTalksX. Other platforms as Masterclass are not focused on the industry field but it provides different subjects as "Problem solving" or "Scientific Understanding".

4.6.2 Webinars

Webinars are live and synchronous online seminars that cover specific topics. They often include presentations, discussions, and Q&A sessions, allowing participants to engage with experts and peers. They are not formal trainings itself, but they could be a good way to upskilling through networking. They can be combined with training on the job.

4.6.3 Podcasts and Audio Learning

Nowadays, several audio platforms offer short lessons and discussions that can be listened to on-the-go making them suitable for busy learners as workers who need to up-skilling but do not have enough time. Audios are portable and easy to listen while multitasking.

There are several examples of uses:

- ❖ **General podcast apps:** Ivoox, Stitcher, Google Podcasts, Spotify, and Apple Podcasts
- ❖ **Audiobooks apps:** Audible and Librivox
- ❖ **Educational podcast platforms:** Coursera Audio Lectures, TED Talks Audio

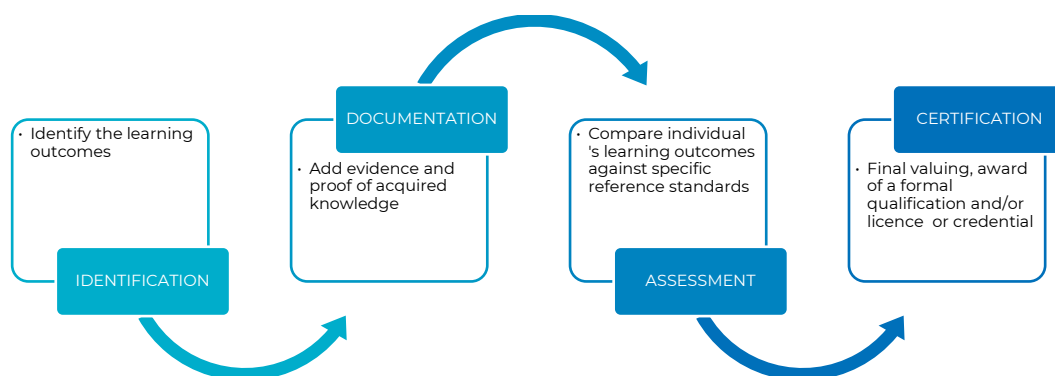
5 Validation process and formal qualification

There is no one-size-fits all approach to validate learning outcomes. A wide range of individual conditions must be catered for. Validation should make **individuals aware of their existing knowledge, skills, and competences**, making them **visible to others** so that the individual is able to take the next step in their **life-long learning** and employment careers.

There is no agreement on how to achieve the mentioned requirements, neither how to measure the knowledge, how the assessment should be performed and what are the requirements for the certification. Furthermore, each individual training might consider the more appropriate options to the target learner and the context. The four stages of validation process, some tools, and ideas to provide reliability to the process and a classification of certifications will be provided down below aiming to facilitate the training validation design.

5.1 Four stages of validation process

The four-phase model adapts the concept of validation to different contexts and diverse purposes, and it is a good process for taking into consideration the individual requirements and circumstances of the learner. These four phases are:



Some **tools and instruments** used for validation are shown below:

Type	Reliability and validity and related issues	Scalability and cost	Main relevance to stages of validation
Self-assessment	- Validity and reliability can be questioned	- High scalability - Low cost	Identification
Fixed response / Multiple choice	- Support standardization and reliability - Might limit individual adaptation	- High scalability - Low cost	Assessment Certification
Written texts	- Reliability limited (subjective assess) - Limited validity - Some standardisation is possible. - Room for contextual adaptation	- Limited scalability - Low cost - Evaluators need to be well trained	Assessment Certification
Dialogue based / interviews	- Validity depends on interviewer competence. - Can capture contextually dependent and tacit skills	- Limited scalability - Cost intensive. - Evaluators need to be well trained	Identification Assessment

Type	- Reliability and validity and related issues	- Scalability and cost	Main relevance to stages of validation
Simulation and controlled job practice	<ul style="list-style-type: none"> - Supports validity. - Potentially strong reliability - Potentially strong reliability captures contextually dependent and tacit skills 	<ul style="list-style-type: none"> - Potentially scalable - Cost intense 	Assessment Certification
Portfolio of evidence	<ul style="list-style-type: none"> - Flexible - Combinations of evidence strengthen both validity and reliability 	Scalable but flexible	Identification Documentation Assessment Certification
Reports from others	<ul style="list-style-type: none"> - Reliability might increase with many observers. - Validity might depend on the number of reports 	<ul style="list-style-type: none"> - Scalable - Low cost 	Identification Documentation Assessment Certification

Not always the most flexible and accessible tool is the most reliable and valid one, which is why it could be useful to use a combination of multiple assessment tools, thus also allowing students to express their learning achievements in different ways. The optimal goal would be to find an accessible and adapted method that also provide reliability.

Furthermore, with the objective of avoiding fraud and to guarantee the success of the formal online validations it is mandatory to verify the person's identity, assuring that another person or a robot is not performing the test.

5.2 Types of certifications

In an attempt to make individuals aware of their existing knowledge, skills, and competences and to communicate the evidence to others, it is useful to offer a formal qualification with the completion of the training.

A **formal qualification** or **formal outcome (certificate, diploma, or title)** it is an official document, which records the achievements of an assessment process. It is issued by a competent authority which has determined that the learner has achieved Learning Outcomes to given standards and possesses the necessary knowledge, know-how, skills and/or competences. A qualification confers official recognition of the value of learning outcomes in the labour market and in education and training.

The formal outcome or certificate could be different shapes or designs, from conventional credentialing options (as a traditional diploma) to alternative credentialing like Microcredentials. It should be mentioned that there is not yet an effective competences and skills management framework specific for the ORE sector to support the main stages in the job market and career management. Some member states have their own initiatives and particularities not only in the credentialing process, but also in the way to understand and to recognise validation. Due to this reason, it could be useful to analyse and adapt each training to the national context and, beyond it, it might prove also beneficial to link the certification to available standards as the European Qualifications Framework for lifelong learning (EQF), to ESCO standards and to the 8 Key Competences. This is aligned with the idea of disaggregating parts into smaller units making it not only easy to learn but also easy to recognise and validate. Below, in the following sections, some of the credentialing options or type of certificates are shown.

5.2.1 Conventional credentialing options

Traditional credentials options range from a certificate to a diploma, accredited by the educational institution. It usually includes basic student information such as their full name

and national identification number, the date it was issued, the duration of the training (usually in hours) and the title of the training.

These conventional certifications are limited due to the fact that they are not specific, not stackable, and difficult to verify and to share.

5.2.2 Microcredentials

The European Commission defines microcredentials as a proof of learning outcomes that a learner has acquired following a short learning experience. These learning outcomes have been assessed against transparent standards. Microcredentials are owned by the learner, can be shared, are portable and may be combined into larger credentials or qualifications. They are underpinned by quality assurance following agreed standard. The proof is contained in a certified document that lists⁶:

- The name of the holder
- The achieved learning outcomes
- The assessment method
- The awarding body.
- The qualifications framework level and the credits gained (then applicable)

Microcredentials are not objectives but tools and means to give value to shorter trainings, providing **evidence of practical, flexible, on-demand and short learning experiences**. They could be a recognition of small learning units or modules. Their **stackable** characteristic is a really good solution to encourage learning and motivate individuals in the developing of a **life-long learning experience**.

Furthermore, microcredentials are aligned with ORE sector needs due to the fact that they serve to address new and emerging skills. These modular credentials can certify learning in areas in development where formal qualifications are limited or do not yet exist. They are complementary to traditional training systems, increasing the ability to **respond to quick changes in ORE labour market**.

There is a **Common Microcredential Framework (CMF) developed** by the European MOOC Consortium consisting of FutureLearn (UK), FUN (France), Miríadax (Spain and Iberoamérica), EduOpen (Italy), iMoox, and OpenupEd, the European Association of Distance Teaching Universities (EADTU). The CMF uses the European Qualification Framework (and other national qualification frameworks of recognised universities) to provide high-quality courses that award academic credit. The European Qualifications Framework (EQF) is a common European reference framework whose purpose is to make qualifications more readable and understandable across different countries and systems.

5.2.3 Open badges or digital artefacts

Designed to certify a certain educational achievement, digital badges are visual representations of skills or accomplishments earned in various learning environments. They are called “open badges” when they follow an open standard, making it easily shareable and verifiable online.

Badges are not only used for representing accomplishments but also for motivating learner participation and interaction. They could be goal-setting facilitators: badges can help to identify goals, improve commitment and receiving feedback.

5.2.4 Statement of participation

A statement of accomplishment for the completion of a training it is very common after completion of MOOC's training, but it is not an official accreditation. This is usually a free certificate given by the training providers to the learners in order to indicate that the participant performed a set of activities, and it includes the name, the teacher signature, and some data about the course.

⁶ Based on “Microcredentials: a new upskilling trend”(Pouliou & Zahilas, 2022)

6 Training design process

With the objective of facilitating the choice of the appropriate training design, an example of simple flow is presented as a guide for decision-making.



Once this planning it is done, and following the four phases of EQAVET approach, the training could be implemented in order to evaluate it and reviewed it going back to first step. It is crucial to check in each step to see if the design and implementation are based on good practices and inclusion. In order to verify this process, it could be useful to answer and review the key questions mentioned in 2.1. Inclusive practices.

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