SHORE WINNER

Excellent VET synthesis Roadmaps

Deliverable 2.2 | Report

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Executive Summary

The current report presents a consolidated analysis of the Vocational Education and Training (VET) landscape concerning the rapidly evolving Offshore Renewable Energy (ORE) sector across five SHOREWINNER project partner countries: Portugal, Spain, Italy, Greece, and Cyprus. Drawing from previous comprehensive national analyses, this synthesis identifies critical skills mismatches, assesses current VET offerings, and outlines strategic roadmaps developed by each national Centre of Vocational Excellence (CoVE). The aim is to lay a robust foundation for subsequent project activities geared towards developing a highly skilled, adaptable, and future-ready workforce capable of driving the Offshore Renewable Energy sector's growth. --

The analysis across all five CoVEs reveals a shared understanding: while the ORE sector holds immense potential for energy transition and economic development, existing VET systems require significant enhancement to meet its specialized demands. A common thread is the current VET offering´s - tendency towards general renewable energy, onshore applications, or broader maritime/engineering fields, with a notable scarcity of dedicated, offshore-specific curricula. This gap is particularly evident in practical, hands-on training aligned with the unique operational environment of offshore installations, including adherence to internationally recognized safety standards such as those - from the Global Wind Organization (GWO).

Across the national roadmaps, a consistent set of challenges and needs within the VET offer has been highlighted. A predominant finding is the significant lack of VET programmes explicitly tailored to the ORE sector. Existing courses, while providing foundational knowledge in engineering or general renewables, frequently fall short in covering crucial offshore-specific technologies such as floating platforms, subsea cabling, and mooring systems, as well as specialized maintenance and distinct operational protocols. This leads to a notable skills mismatch, encompassing both hard and soft competencies. Critical hard skills gaps include advanced engineering disciplines (electrical, structural, and offshore-specific), digital competencies essential for the modern ORE industry (such as data analytics, AI, IoT, digital twins, and blockchain), predictive maintenance techniques, and proficiency in specific technical roles like specialized welders, divers, and installation and O&M technicians for offshore environments. Equally vital are soft skills, with a consistent demand across all regions for enhanced critical thinking, problem-solving abilities, effective communication and collaboration, adaptability in a dynamic sector, and, in some contexts such as - Spain, improved English language proficiency.

Furthermore, current VET delivery methods are often perceived as overly theoretical, underscoring a pressing need for more immersive, work-based learning opportunities. This includes a call for more internships, apprenticeships, access to real-world projects, and the integration of simulation-based training, including Virtual and Augmented Reality, to replicate complex offshore conditions. While the importance of effective collaboration between VET providers and ORE industry stakeholders is widely acknowledged, such partnerships often remain ad hoc. This disconnect results in curricula that are not fully aligned with current industry needs, limited employer engagement in programme design, and insufficient opportunities for both students and teachers to gain practical exposure to the sector. Compounding this, educators and trainers themselves often lack up-to-date, specialized knowledge and practical experience in the ORE sector, which can hinder their ability to deliver cutting-edge training and necessitate continuous professional development. Finally, various barriers related to inclusion and accessibility were identified, including gender

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diversity challenges with the underrepresentation of women in technical roles, geographical disparities leading to urban-centric training facilities, lingering perceptions of VET compared to higher education, and the need for more accessible pathways for diverse learner groups.

In response to these identified gaps, the national CoVE roadmaps collectively propose a multi-faceted and strategic approach to bridge the divide between current VET provisions and the ORE sector's demands. A central pillar of this strategy is the comprehensive modernization and development of curricula. All CoVEs emphasize the urgent need to either create new, or substantially update existing, VET curricula to incorporate robust ORE-specific modules. This involves integrating GWO-aligned safety training as a standard, embedding essential digital skills, and ensuring coverage of emerging offshore technologies. Specific proposals include the establishment of specialized VET qualifications, the development of targeted specialization courses, and the introduction of elective modules focused on ORE within broader VET programmes.

To address the pedagogical shortcomings, a universal recommendation is to enhance practical and work-based learning opportunities. This will be achieved through a concerted effort to increase industry internships, apprenticeships, access to simulation labs, and field-based learning experiences, thereby providing learners with the hands-on skills vital for the ORE sector. Concurrently, fostering systemic and strengthened VET-industry linkages is deemed crucial. This involves proactive measures to ensure curriculum co-design with ORE companies, facilitate guest lectures from industry experts, establish mentorship programmes, and ultimately guarantee the ongoing relevance of training programmes to industry needs. The creation of advisory boards, comprising representatives from industry, is a commonly proposed mechanism to achieve this alignment.

Recognizing the diverse needs of learners, the roadmaps also advocate for more flexible and inclusive training pathways. This includes the promotion of modular training approaches, the development and recognition of micro-credentials to allow for stackable learning, and the wider adoption of blended learning models that combine in-person and online delivery to enhance flexibility and accessibility. Furthermore, specific measures are prioritized to promote gender equality within the sector and to ensure that training programmes are accessible and welcoming to all underrepresented groups. Finally, the strategic importance of cross-border collaboration is underscored. Leveraging the SHOREWINNER network for initiatives such as joint curriculum development, the sharing of best practices in teaching and assessment, the standardization of qualifications to enhance mobility, resource pooling for high-cost facilities like simulation labs, and facilitating learner and educator exchanges are - identified as a critical enabler for achieving VET excellence and fostering a harmonized approach to ORE skills development across the partner countries.

The combined insights from Cyprus, Greece, Italy, Spain and Portugal offer a practical and well-defined structure. The suggested proposals will directly shape the creation of innovative educational materials. Furthermore, the highlighted possibilities for international partnership will be crucial for collaborative learning initiatives. By systematically tackling these requirements, the SHOREWINNER project seeks to substantially improve the standard, applicability, and adaptability of vocational education and training in the offshore renewable energy sector. This will ultimately lead to a competent, competitive and resilient workforce capable of advancing Europe's environmental sustainability goals.

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List of Acronyms and Abbreviations

Term	Definition
AI	Artificial Intelligence
AR	Augmented Reality
ART	Advanced Rescue Training
ASIME	Asociación de Industrias del Metal y Tecnologías Asociadas de Galicia (Galician Association of Metal Industries and Associated Technologies)

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BST	Basic Safety Training
BTT	Basic Technical Training
CAD	Computer-Aided Design
CAPEX	Capital Expenditure
CoVE	Center of Vocational Excellence
CTEs	Specialized Technology Centres
CTeSP	Higher Professional Technical Courses
CyQAA	Cyprus Agency of Quality Assurance and Accreditation
DGES	Directorate General for Higher Education
DGRM	Directorate-General for Natural Resources, Safety and Maritime Services
ECVET	European Credit System for Vocational Education and Training
EEZ	Exclusive Economic Zones
EGE	Energy Managers
EI-ERO	Estratégia Industrial para as Energias Renováveis Oceânicas (Industrial Strategy for Oceanic Renewable Energies)
EMS	Energy Management System
ENEI	National Strategy for Smart Specialization
EQF	European Qualification Framework
ESCO	European Skills/ Competences, Qualifications and Occupations
ESI	European Skills Index
ESIF	European Structural and Investment Funds
EU	European Union
FCT	Formación en Centros de Trabajo (Workplace training module)
FLORES	Forward Looking at the Offshore Renewables
GWO	Global Wind Organization
HE	Higher Education
HEI	Higher Education Institution
HPC	High-Performance Computing
HRDA	Human Resources Development Authority
HSE	Health, Safety, and Environment
ICT	Information and Communication Technology
IFTS	Istruzione e Formazione Tecnica Superiore - Higher Technical Training and Education
INCUAL	Instituto Nacional de las Cualificaciones (Natial Institute of Qualifications)
IoT	Internet of Things
IRATA	Industrial Rope Access Trade Association
ITS	Istituti Tecnici Superiori - Higher Technical Institutes
LA	Learning Outcome
MATES	Maritime Alliance for fostering the European Blue Economy through a Marine Technology Skilling Strategy
MRD	Marine Renewable Devices
MSP	Marine Spatial Planning

NECP	National Energy and Climate Plan
NOS	National Ocean Strategy
NQF	National Qualifications Framework
O&M	Operation and Maintenance
ORE	Offshore Renewable Energy
OW	Offshore Wind
OWE	Offshore Wind Energy
P4S-ORE	Pact for Skills for Offshore Renewable Energy
PAER	Plan for Offshore Renewable Energy
PC	Professional Courses
PNEC	National Energy and Climate Plan 2030 (Portugal)
POEM	Planes de Ordenación del Espacio Marítimo (Marine Spatial Planning)
PRR	Recovery and Resilience Plan
PRS	Professional Performance Standards
PSOEM	Maritime Spatial Planning Situation Plan
R&D	Research and Development
RE	Renewable Energy
ROVs	Remotely Operated Vehicles
SCC	Specific Curricula Courses
SMEs	Small Medium Enterprises
SNQ	National Qualifications System
SPOWIND	Spatial Planning for Offshore Wind Industry Development
STEM	Science, Technology, Engineering and Mathematics
ToT	Training of Trainers
TSC	Technologial Specialisation Courses
UC	Skills Units
VET	Vocational Education and Training
VR	Virtual Reality
ZLT	Technological Free Zones

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1 Introduction

1.1 Purpose of the Deliverable

The primary purpose of D2.2 is to present cohesive national roadmaps, developed by each Centre of Vocational Excellence (CoVE), that identify critical skills mismatches and detail necessary improvements to current VET offerings. These improvements encompass course content, learning outcomes, delivery methods, feedback quality -, and measures for enhanced inclusion and accessibility. The resulting roadmaps are action-oriented, translating in-depth analysis into clear strategic directions. They serve as the essential foundation for subsequent SHOREWINNER project activities, directly informing the development of innovative VET curricula and resources (WP3), guiding transnational cooperation and mutual learning (WP4), and supporting broader project dissemination and sustainability efforts (WP5).

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2 National Roadmaps of the CoVEs

2.1 Portugal

2.1.1 Results and recommendations - analysis of ORE sector needs and trends

This section highlights the main findings and strategic recommendations that emerged from analysing sectoral needs and trends in offshore renewable energy in Portugal. This analysis is part of deliverable D2.1, which was completed within the scope of the project. -

One significant outcome of this work is the identification of critical workforce gaps and the necessity of strengthening human capital. Addressing these skills gaps - is essential to ensure that the national workforce is prepared and that it - supports the sector's sustainable growth.

2.1.1.1 Offshore Wind Energy

Offshore wind energy is crucial in helping Portugal achieve energy independence and meet its carbon neutrality targets, as specified in various legal regulations and policies. This form of energy generation has several advantages: offshore wind - is typically more intense and consistent, and experiences - less turbulence. Additionally, offshore wind projects do not compete significantly with land-based - activities, have a limited visual impact, and offer - an environmentally friendly alternative to fossil fuels.

The regions with the strongest winds in Portugal include Viana do Castelo and Leixões in the north, Figueira da Foz in the centre, and Sines in the country south. Horizontal axial turbines are the primary technology utilized for offshore wind energy.

The Industrial Strategy and Action Plan for Renewable Electric Ocean Energy (EI-ERO) estimated that Portugal could install wind farms with an output of 1.4 to 3.5 GW in locations up to 40 meters deep. Additionally, there is potential for another 40 GW in areas between 40 and 200 meters deep. Floating-- turbines are the most suitable option to fully harness the considerable offshore wind potential -.

2.1.1.2 Existing Projects

Portugal has one significant operational offshore renewable energy project and some initiatives and pilot projects:-

- Windfloat Demo1[1]
  It was a WindFloat technology project consisting of a 2 MW wind turbine at 6 km off the coast of Aguçadoura, Póvoa de Varzim. It was a three-column semi-submersible platform, stabilized dynamically and statically and anchored to the seabed by gravity and friction using conventional catenary moorings, designed for offshore wind exploration in deep waters (>40 m).
- The WindFloat Atlantic project
  It is a wind farm with pre-commercial stage technology located 20 km off the coast of Viana do Castelo in an area 100 m deep. The wind farm consists of three turbines, each with 8.4 MW of power, based on WindFloat floating platforms, each 30 m high with 50 m between columns. The wind farm was connected to the grid in 2020 and is currently operational.

[1] The first floating wind pilot in Portugal

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- Two testing zones
  These are Aguçadoura Ocean Lab for Future Technologies and Viana do Castelo Pilot Zone, used to study bathymetry, soil, and resource characteristics.

2.1.1.3 Plans and Policies

Portugal has established a comprehensive set of plans and policies to promote the deployment of offshore renewable energy (ORE), with a particular focus on floating offshore wind. This initiative aligns with EU´s climate targets and the - national´s energy strategy:

- Roadmap for Carbon Neutrality 2050 (01/07/2019)[2]
- The plan outlines Portugal's strategy to achieve carbon neutrality by 2050, aligning with the EU's climate goals. It provides a detailed decarbonization pathway across key sectors, focusing on energy transition, innovation, and economic transformation.
- PNEC - National Energy and Climate Plan 2030[3] (10/07/2020)
  Portugal's energy and climate policy for the next decade aims for a carbon-neutral future by prioritizing renewable energy and improving energy efficiency. It targets a 55% reduction in greenhouse gas emissions by 2030 compared to 2005 and aims for renewable energies to comprise 51% of gross final energy consumption by 2030. Additionally, the policy promotes electrification and diversification of energy sources using local resources, with goals of 6,300 MW of renewable capacity by 2025 and 10,400 MW by 2030.
- Marine Spatial Planning MSP (2019)
  It is developed by Directorate-General for Natural Resources, Safety and Maritime Services, DGRMT[4] (2019). It designates specific zones for ocean energy development and is governed by the Planning and Management of the National Maritime Space. This initiative is part of the National Ocean Strategy (NOS), established in 2021, which includes an Action Plan outlining over 180 specific measures to be implemented by 2030.
- Decree-law 67/2021[5]**,** for ZLT- Technological Free Zones[6] (2021)
- National Strategy for the Sea 2021-2030 (2021)
  As a target it sets 370 MW of offshore wind and waves by 2030 and 1.3 GW of offshore wind by 2050.
- National Strategy for Smart Specialization 2030[7] (ENEI 2030)
  It is a strategic framework to prioritize public interventions in Portugal, focusing on R&D and innovation policies. The strategy outlines seven priorities based on the unique characteristics of Portugal, which are digital transition, green transition, materials, systems, and production technologies; society, creativity, and heritage; health, biotechnology and food; forests, ocean, and space; financial instruments for all thematic priorities.

[2] Roadmap for Carbon Neutrality 2050
[3] National Energy and Climate Plan 2030
[4] DGRM
[5] decree-law 67/2021
[6] Technological Free Zones
[7] National Strategy for Smart Specialization 2030

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- Inter-ministerial working group[8] (dispatch no. 11404/2022[9] on September 2023)
  The goal is to construct power plants that generate electricity from renewable ocean sources. In the first phase, up to 3.5 GW of capacity should be established at Viana do Castelo, Leixões, and Figueira da Foz, with a total of 10 GW planned by 2030.
- A competitive model for the offshore wind market was proposed, starting with a three-month pre-qualification phase. The plan includes a network architecture using the National Transport Grid, which would incorporate high-voltage substations on seabed platforms to connect offshore farms to the onshore grid efficiently.
- Finally, a strategy to develop an offshore wind industrial chain is recommended, considering both national and international contexts.
- Allocation Plan for Offshore Renewable Energy (PAER[10]).
  Based on the analysis conducted by the interministerial working group, the DGRM has prepared the PAER: this plan will automatically update the Maritime Spatial Planning Situation Plan (PSOEM[11]) and designate potential areas for the commercial exploitation of offshore renewable energy. A specific Geoportal[12], managed by the DGRM, has been developed to support the plan. The preferred regions for installing new proposed areas have been identified by applying various criteria, which include energy resources, conflict with other uses, environmental impacts, bathymetry, slope, pre-existence of synergies, and expressions of interest. The preferred regions are Viana do Castelo (2 lots with a capacity of 1 GW each), Leixões (1 lot with a capacity of 0.5 GW), and Figueira da Foz (4 lots with a capacity of 2 GW each); they can accommodate 3.5 MW per km^2, and each lot is assumed to have an installed power of 500 MW.
- Study of Nova School of Business and Economics[13]

  This study evaluates the socio-economic impacts of a promised 10 GW offshore wind programme in terms of production, added value, employment and other associated impacts: it results that the implementation of the 10 GW will add 8% to the Portuguese GDP in 2022; the indirect and induced effects represent more than 75% of this value. Moreover, the total lifetime output per GW of future work capacity to be installed is 5,417 million euros. The added value is estimated at 1,941 million euros, and the number of jobs to be created is calculated at 41,860. The overall effect per GW of capacity on value-added during the investment phase (CAPEX) is 903 million euros, and the overall impact on employment is 19,085 jobs. Upon full implementation, the cumulative 10 GW programme is expected to generate an annual value-added impact of 400 million euros and contribute to the employment of 9,000 people, assuming only O&M.

2.1.1.4 The Government Action

The Portuguese government has adopted a strategic and ambitious agenda to accelerate the energy transition, scale up offshore renewable energy, and achieve its carbon neutrality goals. The next decade will be - crucial, with - national plans guiding concrete - actions.

[8] inter-ministerial working group
[9] 11404/2022
[10] PAER
[11] PSOEM
[12] Geoportal
[13] Study Nova School of Business and Economics

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The goal in the near future is to:

- Launch of Offshore Wind Auctions (2024–2025)
- Upgrade key ports, such as Sines, Leixões, and Viana do Castelo, to enhance offshore wind logistics and assembly
- Strengthen the electric grid and interconnections to accommodate large-scale offshore energy production
- Prioritize floating offshore wind development, given Portugal's deep coastal waters
- Facilitate integration with green hydrogen production and support industrial decarbonization efforts
- Enhance vocational education and training (VET) related to offshore energy
- Promote partnerships between industry and academia
- Establish a CoVE through SHOREWINNER.

2.1.1.5 Recommendations Analysis

Portugal has established strong regulations that promote the growth of renewable energy, such as wind and solar power. These rules facilitate investment in clean energy sources. The country aims to protect the environment by transitioning to cleaner energy and has set ambitious goals to support this initiative.

Plans are in place to develop subsea interconnectors - linking Portugal to other countries, enabling the sharing of renewable energy. Designated areas have been set aside where energy projects can be developed safely, ensuring the protection of nature.

Many people advocate for renewable energy because of a - commitment to the planet. These efforts also create jobs, support local businesses, and provide opportunities for activities like eco-tourism and fish farming.

Economic instability and changes in government policies can impact the renewable energy sector. Additionally, the relatively small domestic market may limit investment opportunities. The industry relies heavily on foreign investment and funding from the European Union, which can introduce risks.

Global economic factors, such as fluctuations in technology costs, supply chain disruptions, and competition from other regions, including the Canary Islands and northern Spain, also affect the renewable energy market. Furthermore, renewable energy projects may pose risks to marine ecosystems and disrupt bird migration patterns, while high-priority conservation areas can restrict the locations available for renewable energy development.

In Table 1 we summarise the recommendations:

Table 1. Analysis of ORE sector technologies (CoVE PT)

Category	Key insights	Recommendations
Policy & Regulation	Strong regulatory framework supports wind and solar power growth; promotes clean energy investment	Maintain regulatory stability; simplify licensing procedures; ensure long-term policy coherence
Environmental Strategy	Clear goals to transition to clean energy and protect the environment; safe zones established for energy projects	Strengthen environmental impact assessments; continue zoning based on

		ecosystem sensitivity; monitor marine impacts
Infrastructure & Trade	Plans for international ocean-based energy connections (e.g., offshore grid links)	Accelerate development of cross-border infrastructure; explore strategic energy exports
Societal Support	Public support driven by environmental values; creates jobs and opportunities in eco-tourism and aquaculture	Promote community engagement; develop training for green jobs; support local enterprises tied to offshore energy
Economic Challenges	Vulnerability to policy shifts, limited domestic market, and dependence on EU funding	Diversify funding sources; develop national investment incentives; promote market certainty for investors
Geopolitical Risks	Global supply chain volatility, tech cost fluctuations, and regional competition (e.g., Canary Islands, northern Spain)	Strengthen local supply chains; invest in innovation to stay competitive; foster regional cooperation
Ecological Concerns	Potential impact on marine life and bird migration; constraints from conservation areas	Develop marine spatial plans integrating biodiversity protection; adopt mitigation strategies in project design

2.1.2 Identification of improvements in the VET offer

2.1.2.1 Evaluation of course content, learning outcomes, and delivery methods

The current Vocational Education and Training (VET) system in Portugal is known as the SNQ (National Qualifications System) (National System of Qualifications[14]);. It represents - a comprehensive framework of VET structures, instruments, and modalities aligned with the European Qualifications Framework (EQF). VET should be a crucial tool in enhancing employability, promoting social inclusion, and fostering economic development. In the following Table 2 the main existing Portuguese VET programmemes are reported.

Table 2. VET programmes in Portugal

Website	Organization name
www.refernet.pt	ReferNet Portugal
www.dgert.gov.pt	Directorate-General for Employment and Industrial Relations
www.dge.mec.pt	Directorate-General for Education
www.dges.gov.pt	Directorate-General for Higher Education
www.portugal.gov.pt	Government web portal
www.anqep.gov.pt	National Agency for Qualification and Vocational Education and Training
www.iefp.pt	Institute for Employment and Vocational Training
www.catalogo.anqep.gov.pt	National catalogue of qualifications
www.qualifica.gov.pt/	Qualifica programmeme
www.garantiajovem.pt	Youth guarantee
www.ine.pt	National Institute for Statistics

[14] National System of Qualifications

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Portugal's VET system focuses on practical experience and theoretical knowledge: many programmemes offer apprenticeships or internships, which allow students to gain hands-on experience, make professional connections, and tackle real-world tasks, through a practical and more engaging learning approach. VET courses can be divided into professional Courses (PC) for young people, Technological Specialisation Courses (TSC), and other Specific Curricula Courses (SCC), classified from level 2 to level 5 according to NQF levels. The PC and TSC (CET in Portuguese) courses offer training programmes at levels 4 and 5 designed to help professionals gain qualifications in the marine economy, energy, and environmental sectors. As examples for level 4 the following courses exist:

- Photovoltaic Solar System Installer Technician
- Wind turbine Installation Technician
- Thermal Renewable Energy Systems Installer Technician
- Aquaculture Technician
- Environmental Management Technician
- Specialist in Energy Management and Control (level 5)

At level 5, Higher Professional Technical Courses (CTeSP in Portuguese[15]) are overseen by the Directorate General for Higher Education (DGES); there are currently 11 CTeSP courses in Renewable Energies across 10 institutions and organic units. Public institutions offer 8 of these courses, and private ones provide 2. Moreover, EPATV, a Portuguese partner, is a key member of the Sectoral Council for Qualifications in the Energy and Environment field, bringing its expertise to the forefront.

In Portugal, specific certified academies offer double and even triple certification programmes that are recognized nationally and internationally. These professional training courses aim to develop specific skills for various areas and industrial sectors, as shown in Table 3.

Table 3. Specific certification training available in Portugal

Course	Description	Duration
Rescue at heights	Rescue at Heights training enables the acquisition of the necessary rescue knowledge and skills from professionals responsible for emergency interventions when working at heights.	8h
Working at heights	Working at Heights training enables you to acquire the knowledge and safety skills required for accident-free performance at work at heights.	8h
Power Climber Wind	The Power Climber Wind – Service Lift Operation training is intended to enable the professional operator of this equipment with all methods of use and safety.	4h
Advanced Blade Repair	The Advanced Blade Repair training aims to develop the advanced technical knowledge and skills required to perform complex and structural rotor blade repairs.	80h

[15] CTeSP

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Tower Repair	WTG Tower Repair training aims to develop knowledge and skills that enable preventive and corrective maintenance to be performed on the corrosion protection of metal structures in wind turbines.	24h
Blade Inspection and Repair	WTG Blade Inspection and Repair training aims to develop the knowledge and skills that enable the inspection and repair of minor laminate and cosmetic damages on rotor blades.	40h
IRATA Level 1	IRATA – Industrial Rope Access Trade Association introduces the most internationally recognized rope access certification programme. This association represents over 70% of the rope access technicians worldwide. IRATA level 1 training enables the development of knowledge and skills that allows the safe execution of rope access and positioning works under the supervision of a level 3 technician.	40h
IRATA Level 2	IRATA – Industrial Rope Access Trade Association introduces the most internationally recognized rope access certification programme. This association represents over 70% of the rope access technicians worldwide. IRATA level 2 training allows the development of skills to perform, in maximum safety, complex works of access, positioning and rescue by ropes, under the supervision of a level 3 technician.	40h
IRATA Level 3	IRATA – Industrial Rope Access Trade Association introduces the most internationally recognized rope access certification programme. This association represents over 70% of the rope access technicians worldwide. IRATA level 3 training enables the development of the skills of highly experienced rope access technicians and supervisors which will be capable of planning, executing and supervising rope access teams and operations.	40h
ACCESUS	Accesus training enables the development of technical skills in the installation and operation of Modublade II suspended platforms designed for the transport of persons, in compliance with general rules of use and specific safety standards.	8h
ACTSAFE – End User	ActSafe Training – End User is mandatory for all who operate and/or work with ActSafe powered ascenders, ensuring safety from basic use to rescue.	4h
Power Climb Wind	The Power Climber Wind – Service Lift Operation training is intended to enable the professional operator of this equipment with all methods of use and safety.	4h
SQYFlex TG Blade Access Platform Operator (Category 3)	To equip participants with the knowledge and skills to install and operate the SQYFlex TG Blade Access suspended platform safely and within the manufacturer's recommendations and guidelines.	16h

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Some of these courses follow the Global Wind Organization (GWO)'s common international standards for safety training and workforce development, which ensure safe work environment; by complying with GWO standards and criteria, certified training providers are considered competent and proficient. The following courses are certified by the GWO and are available in the catalogue of Portuguese VET centres; some of these modules can be combined to form a course or taken separately. In Portugal, 11 GWO-certified companies can offer the courses in Table 4.

Table 4. Courses with GWO requirements

Courses	Requirements
Basic Safety Training – BST	• Working at Heights • First Aid • Fire Awareness • Manual Handling • Sea Survival
Enhanced First Aid – EFA	• Enhanced First Aid
Advanced Rescue Training - ART	• Hub, Spinner and Inside Blade Rescue • Nacelle, Tower and Basement Rescue • Single Rescuer: Hub, Spinner and Inside Blade Rescue • Single Rescuer: Nacelle, Tower and Basement Rescue • Advanced Rescue Training Standard
Crane and Hoist – CH	• Crane and Hoist Basic User • Crane and Hoist Inspection and Maintenance • Crane and Hoist Standard
Basic Technical Training – BTT	• Basic Technical Training – Mechanical • Basic Technical Training – Electrical • Basic Technical Training – Hydraulics • Bolt Tightening
Blade Repair – BR	• Blade Repair – BR • Slinger Signaler/Rigger Signal Person
Lift User – LU	• Lift User
Control of Hazardous Energies Standard	• Pressure Fluid Safety • Electrical Safety for Qualified Person
Wind Limited Access Standard	• Wind Limited Access Standard Onshore • Wind Limited Access Standard Offshore

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2.1.2.2 Assessment of training programme feedback and effectiveness

Reviews were conducted in the offshore renewable energy (ORE) sector- to gather feedback and opinionsTable 5- from professionals, higher education HE teachers, VET trainers and students, as reported in Table 5.

Table 5. Feedback from interviews in ORE sector (CoVE PT)

Interviewed	Characterisation	Opinion
Professionals and directors	Most work in early stage, such as pre-planning/research, project management, and operations and maintenance, but also in the supply chain in the marine renewable energy value chain. On the other side, the later stages of the value chain, such as recommissioning and decommissioning, present a gap in the number of workers.	Many believe engineers, technicians, designers, and health and safety professionals need higher education. In contrast, jobs like installers and divers typically require less education, often just a high school diploma or vocational training. A survey showed that 87% of respondents said their companies had job openings, and 57% found it hard to fill these positions. Professionals argue that school programmes should include real business practices and organizational behaviour. They suggest adding project management and promoting critical thinking to the curriculum.
VET and HE teachers	Higher education institutions primarily offer higher-level programmes (levels 5 to 8), focusing on careers like engineering and health and safety. Vocational training centres provide lower-level programmes (levels 3 and 4), emphasizing careers such as technician, installer, diver, and shipyard operator. Key teaching activities in offshore renewable energy include operation, maintenance, pre-planning/research (12%), and project management (4%). Study programmes cover various technologies, including EMS, energy storage, automation, and robotics, while tools like simulation software (MatLab), programmeming languages, and CAD software are commonly used. However, educational programmes have a notable lack of emphasis on blockchain, materials science, data	Most respondents expressed the need for access to industry experts to enhance their training programmes, and 48% noted that they require access to industry workshops. There are challenges that limit effective training and teaching promotion: the main challenge is student engagement, followed by limited opportunities for practical training and a lack of resources, equipment and specialized facilities for training; other challenges are aligning programmemes with current standards and regulations, limited engagement from employers, the misalignment of academic and industry needs, the access to real projects, some logistical issues in organizing internships or placements. Trainers pointed out that there is also a need for more training centres and vocational schools.

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	analytics, offshore wind energy, tidal, and wave energy technologies	
Students	44% are pursuing a bachelor's degree, 27% are working towards a master's degree, and 29% are enrolled in vocational schools. Most respondents are engineering students at the university. 58% are interested in pursuing a career in renewable energy, but many students feel that their current education does not prepare them well for a career in the sector.	They think the best technologies that best fit into their career are onshore solar energy (40%), hydropower (28%), offshore wind energy (16%) and onshore wind energy (12%). The challenge most faced by students is the lack of practical training in the curricula, which could be overcome through the support from the institutions, by internship placements, career counselling, industry networking opportunities, scholarships and funding.

The surveys conducted among industry professionals and VET and HE teachers reveal gaps in the hard skills of their employees and students; from the perspective of industry professionals, digital skills are the primary gap that needs to be addressed, specific offshore skills rank second, indicating that the main issue with employee skills lies not in specialized offshore knowledge but in digital proficiency. In contrast, teachers and trainers believe that students possess poor knowledge of offshore skills, with engineering skills also being a concern; they think digital skills are already sufficiently developed among students. Both groups agree that health and safety skills are generally well-covered. The results of the interviews demonstrate that there is a need for commitment between educators, industry and policy makers to renew programmemes that meet the needs and expectations of companies.

2.1.2.3 Identification of barriers and enhancements for inclusion and accessibility

The main objective of the National Qualifications System National System of Qualifications[16] (SNQ) is to provide education and training to promote equal opportunities and support the integration of vulnerable groups. As a result, all government-regulated VET programmes are accessible to vulnerable groups. Additionally, specific initiatives aim to enable vulnerable groups to access lifelong learning and other education and training opportunities. These initiatives include:

a) Portuguese language courses,
b) basic competencies courses,
c) special measures for those with disabilities.

The Portuguese courses (a) for non-native speakers (PLA[17]) are designed to meet the learning needs of migrant citizens, facilitate their social integration, and assist them in finding employment. These courses are offered by public schools, VET centres, and Qualifica centres in collaboration with the High Commission for Migration and are aimed at migrants who are 18 years old or above. Basic competencies courses (b) target adults with low-level qualifications, providing literacy, numeracy, and information and communication

[16] National System of Qualifications
[17] Ordinance No 782/2009 (*Portaria No 782/2009, de 23 de julho*).

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technology training[18]. They typically last between 150 and 300 hours. Initial and continuing VET courses[19] are created to help people with disabilities (c) gain qualifications[20] that will assist them in finding employment, maintaining their current jobs, and advancing in their careers.

The system aims to remove barriers to participation for learners from vulnerable groups or disadvantaged socioeconomic backgrounds. Financial support is available for learners through allowances, grants, and scholarships, targeting inactive or unemployed learners. The operational programme for human capital and the operational programme for social inclusion and employment include financial support for VET learners, which they receive through VET providers.

Another difficulty regards the gender inequality, which can be seen in various occupations and sectors: this is particularly relevant in education, where engineering tends to be associated with men. One way to overcome this inequality is to promote "inclusive education that encourages the interest of all children in STEM (Science, Technology, Engineering and Mathematics) from an early age, regardless of gender". It is, therefore, necessary to change habits regarding the stimulation and exposure children receive.

2.1.3 Development of actions to deliver labour-market relevant skills

2.1.3.1 Updating training offerings for ORE sector

Emerging renewable energy production technologies have increased the demand for specific skills and qualifications in the labour market, also increasing challenges.

In 2021 the European Union established the Pact for Skills for Offshore Renewable Energy (P4S-ORE)21 partnership, which aims to support the successful implementation of the offshore renewable energy strategy by promoting targeted training programmes to enhance labour skills, offering training pathways that overlap with other sectors, ensuring proper preparation for new employees, implementing measures to attract talent, and contributing to the promotion of strong labour standards.

A report presented in 2023 in Europe[22] highlights several areas with a shortage of qualified personnel, including construction workers, healthcare staff, metalworkers, mechanics, and electricians. The skills shortage is also evident in the green transition, where there is a predicted lack of skilled labour to fill job vacancies. It is estimated that an investment of between 1.7 billion euros and 4.1 billion euros is necessary for retraining, reskilling, and upskilling; this investment could lead to the creation of between 198,000 and 468,000 additional jobs across various sectors[23]. To address the shortage of skilled labour, Portugal has sought to fill these gaps through the Recovery and Resilience Plan (PRR) under NextGenerationEU. For instance, there has been investment in establishing 365 Specialized Technology Centres (CTEs) in industry, digital technology, IT, and renewable energy.

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[18] Launched by Ordinance No 1100/2010 (*Portaria No 1100/2010, de 22 de outubro*) and changed by Ordinance No 216-C/2012 (*Portaria No 216-C/2012, de 18 de julho*).
[19] Decree-Law No 108/2015, Article 6 (*Decreto-Lei No 108/2015, de 17 de junho*).
[20] For instance the qualification of people with disabilities (*qualificação de pessoas com deficiência e incapacidade*): https://www.iefp.pt/qualificacao-de-pessoas-com-deficiencia-e-incapacidade
[21] https://www.marineboard.eu/pact-skills-offshore-renewable-energy
[22] https://op.europa.eu/webpub/empl/esde-2023/index.html
[23] https://op.europa.eu/webpub/empl/esde-2023/index.html

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In addition to the creation of CTEs, Portugal has been making other efforts, as evidenced by the increase in the European Skills Index[24]. The European Skills Index (ESI) from Cedefop - the European Centre for the Development of Vocational Training, assesses the performance of European skills systems and the improvements they have achieved over time. The index is based on three skills pillars: development - the country's vocational education and training activities; activation – education to work transition indicators and labour market activity rates; matching - degree to which skills are successfully used and how effectively they are received in the labour market. Portugal's index for 2022[25], compared to 2020, rose two points from 41 to 43 (out of 100). In 2024, Portugal's ESI score increased[26] to 45 out of 100, with notable changes in the scores for various pillars. Overall, while all countries have improved their scores, these results indicate that there is still considerable progress to be made in Portugal's development systems and Europe as a whole[27].

Emerging offshore renewable energy production technologies require developing and recruiting professionals with specific skills and qualifications in Portugal and Europe. However, challenges have arisen due to a lack of these necessary skills and qualifications in the labor market.
An interview was conducted with companies specializing in this field and with associations involved in vocational training. When asked about the readiness of the Portuguese market regarding training, technical skills, and technological expertise, several qualifications and competencies were identified:

- Welding, blade repair, installation, metal cutting, mechanical forming, navigation;
- Shipbuilding and metalworking;
- Vocational training in technical areas such as electricians and locksmiths;
- More specific content in offshore wind energy installation, operation and maintenance courses;
- Training to work in remote locations (floating platforms).

The following functions and competencies were noted, as well as the technical competencies that require enhanced qualification or skill improvement:

- Welders and engineers with skills in electrical systems, automation and control;
- Specialization in working in a maritime environment is essential, and even deeper specialization in the offshore wind components;
- Shipbuilding but with a focus on energy, maritime project management, digitalization and AI with applications in the maritime environment (both in terms of construction and O&M), maritime and oceanic environmental engineering, naval mechanical engineering, electrical engineering of energy systems with a naval and oceanic focus;
- Professionals: Fitters, welders, machinists and electricians. Higher: Mechanical (mechanical and marine) and electrical engineers;
- Naval engineers, mechanical engineers, civil/structural engineers, materials engineers, electrical/telecommunications/instrumentation engineers and designers;
- Specialization courses for assets with higher education and specialized vocational training for EQF levels 4 and 5.

[24] https://www.poch.portugal2020.pt/pt-pt/Noticias/Paginas/noticia.aspx?nid=973
[25] https://www.cedefop.europa.eu/en/projects/european-skills-index-esi
[26] https://www.cedefop.europa.eu/en/tools/european-skills-index?y=2024
[27] https://www.cedefop.europa.eu/en/tools/european-skills-index?y=2024

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Table 6 below shows more in detail the various technical and non-technical skills and qualifications in high demand for a technician within the ORE sector.

Table 6. Skills needed in a wind system technician/installer

Skills	Description
Notions of	Wind energy; Mathematics; Technical drawing; Chemistry; Physics; Pneumatics and hydraulics; Applied mechanics; Electricity; Automation; Aerodynamics; Health and safety; Environmental protection; Quality (standardisation and certification); IT from the user's point of view.
Knowledge of	Organisation, planning and work scheduling; Wind power system installation project; Measuring equipment (characteristics and applications); Wind power system testing and monitoring processes; Operation and regulation of wind power system components; Materials technology (mechanical characteristics, metal alloys, plastic materials and welding technology); Wind power system technology; Communication and interpersonal relations.
In-depth knowledge of	Design of small-scale wind power systems; Installation of wind power systems; Repair and maintenance of wind power systems; Standards and procedures applicable to the installation, maintenance and repair of wind power systems.
Expertise	Plan and organize the work; Design small-scale wind power projects; Understand wind power system installation projects; Identify the necessary equipment, accessories, and installation conditions; Know the materials and methods for installation, maintenance, and repair; Recognize the phases of work and related activities; Follow health and safety standards; Understand the principles of wind power systems; Use installation techniques for wind power systems; Know the materials, their behavior, and required equipment; Use measuring and control equipment for installation and diagnosis; Apply wind power system testing techniques; Identify problems in wind power systems; Use repair techniques for detected issues; Apply maintenance techniques for wind power systems; Record work using technical documents.
Behaviour	Interact appropriately with others involved in the installation, maintenance and repair process in order to respond to service requests; Integrate health and safety standards and procedures in the course of their professional activity; Decide on the most appropriate solutions for resolving technical problems; Adapt to new technologies.

Portugal is experiencing a significant shortage of qualified individuals. In 2023, the percentage of unfilled positions rose to 81%, up from 46% in 2018. This increase in vacancies is largely due to applicants' lack of qualifications and a low number of candidates applying for these roles.

2.1.3.2 VET curricula and qualifications proposals

The proposals seek to address the skills gap in the ORE sector by aligning VET programmes with industry demands, fostering workforce development, and ensuring a future-ready blue economy.

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To significantly contribute to the green and digital transition, CoVE PT is expanding its national structure. This expansion involves engaging national representatives from industry, commerce, educational institutions, and professional training programmes that can provide specialized training in offshore energy. This training will be aligned with the needs of the local ecosystem. Taking into account the strengths and challenges unique to the sector in Portugal, the Portuguese CoVE will focus its efforts on the areas outlined in Table 7.

Table 7. Topics of CoVE's PT focus

Topics	Description
Offshore wind farms	Portugal's extensive coast and the experience gained from a pilot project off its coast create favourable conditions and offer valuable experience for the future installation of floating wind farms, but specialized training will be required, including engineering knowledge and maritime skills specifically designed for offshore operations.
Specific offshore programmes	A curriculum that emphasizes the acquisition of specialized competencies in offshore operations, such as platform fabrication, turbine technology, the engineering of platform electrical systems, cable management, onshore infrastructure development, and port logistics.
Collaboration between stakeholders	Promoting cooperation between key players in the sector, including policymakers, industry representatives, and education and training providers, is essential to align policy objectives, business needs, and worker expectations.
Engaging the population	Promoting the maritime sector to young people is crucial for attracting a skilled workforce and informing the general population to address existing questions and opinions.
Soft skills in critical thinking and problem-solving	The sector requires initiative from professionals when it comes to critical thinking and problem-solving in order to address any potential issues that may arise in the operating environment.
Revising education and training curricula	To better align with the actual requirements of the industry.

For 2025 three major objectives are defined by CoVE PT:

Objective 1 - Strengthen cooperation within the national and international consortium.

According to the Programme of activities and services there will be meetings monthly, quarterly and annual. These meetings aim to strengthen cooperation between partners, the preparation, development and monitoring of scheduled activities and their deliverables, sharing information and initiatives that may be related to the ORE sector; they are dynamized through channels of digital communications and the use of the platforms of the SHOREWINNER project and social networks, reaching a wider audience.

Objective 2 - Development of the network and organization of events

The establishment of partnerships with key entities, both at industry and regulatory level of the sector, is fundamental to the good pursuit of the objectives that SHOREWINNER proposes. In 2025 some initiatives are expected in the form of workshops, training design sessions and, participation in transnational events to which the SHOREWINNER consortium can add information, knowledge and partnerships.

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Objective 3 - Dissemination and enhancement of professional training in offshore renewable energies It includes the review and design of curricula for EQF 3-5 and EQF 6-7 level qualification, as well as the training of trainers and the development of pedagogical resources. The work of curriculum design will have to involve the participation of industry and regulators.

Portugal organizes VET programmes that provide graduates with a special quota for accessing higher education institutions. Additionally, polytechnic institutions offer short-cycle programmes known as Higher Professional Technical Programmes (CTeSP), through which graduates receive a diploma as a higher professional technician. However, this is not equivalent to a higher education degree. All VET programmes lead to double certification, encompassing educational and professional credentials.

There are also inclusive programmes for adult education and training designed to support learners who wish to complete their lower or upper-secondary education or obtain a professional qualification.

Regarding the SHOREWINNER CoP, the VET system's existing strengths ensure that the SHOREWINNER training programmes are high-quality, relevant, adaptive, and responsive to the needs of both trainers and trainees. The methodological approach will be defined throughout the project, considering its life cycle and the agreements with partners.

The target audience may include individuals such as trainers, trainees, current workforce members, and researchers, as well as organizations, including VET providers, research organizations, industry clusters, business associations, and public bodies in the education sector. Additionally, international and umbrella organizations, such as trainers' associations and European hubs in the ORE sector, will also be part of the target audience and the general public.

2.1.3.3 National CoVE workshop

A series of national and regional workshops are proposed as part of the CoVE PT mission to strengthen vocational excellence and support the transition to offshore renewable energy in Portugal. These workshops serve as collaborative spaces where educators, industry representatives, policymakers, and learners gather to identify needs, share knowledge, and co-design solutions to address the skills challenges within the offshore renewable sector.

The Table 8 displays the events organized by CoVE PT that have occurred or are already scheduled.

Table 8. Workshops and events (CoVE PT)

CoVE events	Main info	Programmeme
20TH SEPTEMBER 2024	Launch event (E6.1) at ISEP, Porto (F2F) Duration 2:30h Organisation: P.Porto Participants: 51	SHOREWINNER project presentation CoVE Portugal presentation SHOREWINNER CoP development CoP Stakeholders presentation
11TH APRIL 2025	Co-Design/ Design Thinking session (E2.1) at Culturgest, Lisbon (F2F)	SHOREWINNER project presentation

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	Duration: 3:30h Organization: APREN Participants: 75	APREN Award Debate on Education and skills for workforce Round table and Q&A
29th MAY 2025	VET Excellence Workshops (E2.6), at ISEP, Porto (F2F) Duration: 4h Organization: EPATV, P.Porto	Workshop for the International Day of Energy Debate on Communities of Energy and Offshore Energy Q&A with professionals
5th JUNE 2025	Participation of SHOREWINNER project in FINA - Blue Business Innovation Fair, Lisbon (F2F) Duration: all-day Organization: CoVE PT	The FINA unites companies, academia, investors, project promoters, start-ups, and entrepreneurs interested in innovation in the blue economy.

2.1.4 Opportunities for cross-border collaboration

Through possible practical and significant initiatives, the Portuguese CoVE will significantly and practically contribute to the SHOREWINNER CoP:

- **Skills analysis:** Assessing the qualifications and skills required in the field as well as activities of interest hosted by outside parties
- **Modular training programmes**: co-design programmes focused on offshore wind, floating platforms, marine logistics, and HSE, aligned with EQF and ECVET standards
- **Dissemination and Networking Events:** Organizing events, including webinars and workshops, with the aim of sharing information about the sector with various target groups. These events will also encourage community engagement and help foster connections among different stakeholders
- **Transnational Mobility for Learners and Trainers:** establish Short-term exchange programmemes for VET students to participate in practical training or internships in other countries
- **Training of Trainers (ToT) hubs**: set up Teacher Training Academies where educators can receive advanced offshore technical and didactic training
- **Organization of thematic events:** Organizing events in educational institutions enables direct interaction between students and offshore renewable energy professionals. This provides students with practical experience using technology and equipment in this industry
- **Companies' involvement:** Organizing study visits to platform construction sites and industry companies, creating internship programmes with ORE sector firms, encouraging students to engage in practical aspects of the field, and providing them with firsthand experience in real-world operational scenarios.
- **Curricula and regulation update:** Launch initiatives involving businesses and academic institutions to keep them informed about updates to laws and regulations and to revise curricula to reflect current realities.

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2.2 Spain

2.2.1 Results and recommendation analysis of ORE sector needs and trends

Released in December 2021 by the Ministry for the Ecological Transition and Demographic Challenge, *The Spanish Roadmap for the Development of Offshore Wind and Marine Energies*[28] outlines a strategic vision to establish Spain as a European leader in these renewable technologies. The plan sets ambitious targets for offshore wind and marine energy deployment, aiming to drive economic growth, create jobs, and reduce greenhouse gas emissions (see Table 9). Aligned with the EU's marine renewable energy strategy, the roadmap was developed through extensive stakeholder consultation.

The roadmap's core goal is to position Spain as a hub for technological innovation and environmental leadership in marine renewables. To achieve this, it defines key strategic actions:

- **Advancing technological innovation:** Spain seeks to lead global R&D efforts in offshore wind and marine energy through dedicated investment in research, development, and demonstration projects.
- **Strengthening the domestic supply chain:** By fostering a robust industrial base, the roadmap aims to create high-quality jobs and enhance Spain's competitiveness in offshore wind and marine energy technologies.
- **Streamlining regulatory frameworks:** Simplifying permitting processes and improving regulatory conditions will accelerate project deployment.
- **Ensuring environmental sustainability and public engagement:** The plan highlights the importance of local community involvement and sustainable marine energy development.

By implementing these strategies, Spain aims to achieve:

- **Expansion of renewable energy capacity:** Targets include 1–3 GW of floating offshore wind capacity and up to 60 MW of marine energy technologies in a pre-commercial phase by 2030.
- **Economic growth and job creation:** Offshore wind and marine energy development will stimulate investment, generate employment in manufacturing, installation, and operation, and attract foreign capital.
- **Reduction in greenhouse gas emissions:** Greater use of marine renewables will support Spain's decarbonization efforts and climate commitments.
- **Enhanced energy security:** A diversified energy mix will reduce reliance on fossil fuels and improve national energy independence.
-

[28] https://www.miteco.gob.es/content/dam/miteco/es/ministerio/planes-estrategias/desarrollo-eolica-marina energias/enhreolicamarina-pdf_accesible_tcm30-538999.pdf

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Table 9. Targets by 2030 of the Roadmap for Offshore Wind and Marine Energy in Spain

Sectors	2030 Targets	References 2030
Offshore wind energy	1 – 3 GW	5 – 30 GW floating globally 7 GW floating at the European level 60 GW (fixed and floating) at European level
Marine energy	40 – 60 MW	10 GW at a global level 1 GW at European level

Through this roadmap, Spain aims to lead the transition towards a sustainable and competitive marine energy sector, reinforcing its role in the global renewable energy landscape.

There are five marine demarcations defined in the roadmap. The Noratlantic Maritime Demarcation encompasses the marine environment under Spanish sovereignty or jurisdiction stretching from the northern maritime boundary with Portugal to the boundary with France in the Bay of Biscay. This zone represents a critical segment of Spain's Atlantic coastline, characterized by significant ecological diversity and strong potential for offshore renewable energy, particularly in regions like Galicia (Figure 1).

In contrast, the Canary Maritime Demarcation refers to the marine areas surrounding the Canary Islands, also under Spanish jurisdiction. Owing to their insular and remote nature, the Canary Islands offer a unique context for testing and deploying marine technologies, especially floating offshore wind, in deep waters.

Both demarcations are strategically important for Spain's energy transition goals. While the Noratlantic region offers proximity to continental infrastructure and industrial centres, the Canary Islands provide an ideal setting for early innovation and experimentation due to their geographic and energy system characteristics.

Figure 1. Five marine demarcations defined in the Roadmap for Offshore Wind and Marine Energy in Spain (CoVE SP)

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Galicia has participated in the manufacturing of several commercial offshore wind projects and also has designated exclusive zones with high development potential for the offshore wind sector. Galician shipyards and industries have been instrumental in manufacturing components for OW projects across Europe. The local expertise in constructing support structures for wind turbines and offshore electrical substations has positioned Galicia as a key player in the offshore wind supply chain.

The roadmap includes a measure "*Measure 3.6: Early Development of Offshore Wind Deployment in the Canary Islands*" which emphasizes the strategic role of the Canary Islands as a testing ground for energy transition technologies and policies. By initiating offshore wind projects early in this region, the goal is to not only pilot innovative renewable energy solutions but also to stimulate local employment, strengthen social cohesion, and enhance competitiveness. Additionally, it seeks to foster a market for emerging renewable energy technologies, particularly those linked to strategic sectors within the Blue Economy. The Canary Islands are thus positioned as a key region in Spain's with exclusive zones with high development potential for the offshore wind sector.

The approval of the *Maritime Spatial Planning (POEM)* lays the foundation for offshore wind energy development in the Canary Islands, between other demarcations, with the aim of providing the region with renewable energy through the installation of Spain's first offshore wind pilot projects.

This opportunity will not only enhance the local supply chain, leveraging the expertise of specialized local companies, highly skilled professionals, and extensive knowledge derived from the naval repair and oil & gas industries, but it will also generate significant employment and economic growth for the islands due to the scale of these projects.

In this context, the participation of local businesses is essential to the success of these projects. Local companies should be involved in all phases, from construction and installation to maintenance, management, and logistics, ensuring that the region fully capitalizes on the benefits of offshore wind energy development being local training and capacity building a key milestone to support the OW development in the islands as well as channelling local benefits and territorial development.

In terms of the existing capacity to support the development of the offshore wind industry in the Canary Islands, it is important to highlight that one of the key sectors in the archipelago is currently the oil and gas sector and the maintenance of offshore units and offshore support vessels as one the main services provided. Many skills from this sector could be transferred to offshore wind energy.

Given that wind turbines have not yet been locally manufactured in the Canary Islands, there are certain opportunities for local support in some components, such as mooring systems or parts of floating platforms. The strategy "Estrategia de las energías renovables marinas de Canarias"[29] includes Action A.6.7 – Specialization in Training – pointing that given the expected deployment of marine technologies, this action aims to ensure the availability of qualified personnel in the Canary Islands to support all stages of the

[29] https://www.gobiernodecanarias.org/energia/descargas/SDE/Portal/Planificacion/Estrategias/D6_Estrategia_EnergiasRenovablesMarinas.pdf

administrative, installation, and operational processes related to these technologies. The action involves developing specialized academic programmes in marine energy by integrating relevant courses and training cycles into the Canary Islands' educational system. These will include modules in engineering and science degrees and master's programmes, aligned with the EU Skills Agenda. The timeline is 2021 – 2030.

Currently, investors who have shown interest in the archipelago have emphasized that the preferred solution for future floating wind farms is the semi-submersible platform. Additionally, all indications suggest that the turbines will have a capacity ranging between 15 MW and 18.5 MW, although some developers may opt for lower-capacity technologies. Understanding the approximate dimensions and weights of the infrastructures to be installed is crucial to identifying barriers and opportunities in terms of local content and training. The activities of assembly, installation, operation, and maintenance are opportunities for the inclusion of local labour and, consequently, for specialized training.

As indicated in the Galician Offshore Wind Industry[30] report from ASIME and Xunta de Galicia, Galicia's industry boasts a well-established business presence, fully equipped to meet the demands of the offshore wind value chain, which is deeply connected to the metal industry and its related technologies. Galicia counts with the Galician Energetic Institute (INEGA) which has expertise in ORE, since it led the European project EnergyMare, which carried out an analysis of the marine potential along the entire European Atlantic coast. The project also examined existing technologies, as well as the regulatory, socioeconomic context and the impact of the development of marine energy sources. Furthermore, a Galician Offshore Wind Energy Observatory was stablished, serving as a forum for dialogue, collaboration and analysis, aiming to find coexistence and compatibility between the potential development of offshore wind energy in Galicia and existing activities, with special attention given to maritime and fishing sectors. This observatory is composed by the Galician government, the fishing sector and the industrial sector, with INEGA coordinating the technical secretariat.

With five major ports featuring state-of-the-art facilities, along with the expertise of its shipyards and companies, Galicia has positioned itself as a leading international offshore wind hub.

Galician companies have extensive experience in manufacturing components and various types of offshore wind foundations, including substations, monopiles, jackets, and floating platforms. Notably, three of the five floating wind farms in Europe utilize technology and components fabricated in Galicia.

The local expertise to the offshore energy sector goes from engineering and development of technical studies, wind turbine and blade manufacturing, production of components and structures, fixed and floating foundations, operation and maintenance of offshore wind farms and support vessels.

The preceding analysis is, however, subject to the inherent uncertainties surrounding the implementation of Royal Decree 962/2024, which regulates the production of electricity from renewable sources in offshore installations in Spain.

The decree establishes a competitive bidding process for awarding the economic regime, the grid connection allocation, and the offshore site lease. However, the ministerial order specifying the bidding rules, the

[30] https://asime.es/wp-content/uploads/2024/04/CATALOGO-GALICIAN-OFFSHORE-WIND-INDUSTRY-2023_web.pdf

evaluation criteria, and designated areas has yet to be published. The government has indicated that the ministerial order is now expected in 2025, with some sources specifying late 2025, despite previous indications of an early 2025 release.

As indicated in the interviews elaborated by the Spanish CoVE in SHOREWINNER's D2.1, the offshore renewable energy sector is undergoing rapid growth, but it faces critical challenges related to workforce readiness and skills alignment. The demand for professionals capable of managing operations and maintenance tasks in offshore wind farms is rising sharply, particularly in regions like Galicia. There, the development of up to 62 wind farms could require around 6,000 skilled workers—underscoring a significant shortfall in qualified personnel.

Among the most pressing needs is the lack of adequately trained technical workers, such as welders, offshore vessel crew, and maintenance staff. There is also a widespread deficiency in specialized training programmes; current vocational and academic pathways often fail to address the specific needs of the ORE sector. Updates to curricula, more practical training approaches, and dedicated training for trainers are urgently needed.

Key skill areas include both hard and soft competencies. On the technical side, predictive maintenance, project management, health and safety, digital skills (including blockchain), and offshore-specific capabilities like underwater cabling or the installation of jackets and piles are in high demand. Equally important are soft skills such as communication, collaboration, flexibility, initiative, and English language proficiency—which remains a barrier in Spain.

The sector also continues to struggle with issues of gender and age diversity. Women and younger workers are notably underrepresented, particularly in technical and leadership roles. Addressing this imbalance through inclusive career pathways and greater visibility of diverse role models is essential for unlocking the full potential of the workforce and driving innovation.

Collaboration between educational institutions and industry is a recurring challenge. There is often a mismatch between what vocational and university programmes offer and what companies need. This misalignment is worsened by outdated training content and limited access to real-world practice environments. Stronger coordination and communication are needed, supported by "hinge institutions" like clusters, to bridge the gap between education and employment. International cooperation and knowledge exchange with related sectors, such as oil and gas, also offer valuable learning opportunities.

To make careers in ORE more attractive in Spain, competitive compensation, flexible working conditions, and increased investment in public awareness are crucial. Establishing standardized training and certification frameworks will ensure mobility across regions and enhance professional recognition. Dual vocational training models and shared facilities—such as simulation labs and maritime safety centres—are vital to better prepare the future ORE workforce and meet the sector's ambitious growth targets.

A summary of the diagnosis indicated in D2.1 for the CoVE Spain to bridge some of the gaps and needs identified through the interviews are listed below.

1. Key challenges identified:

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- Lack of practical experience and soft skills in training programmes.
- Need to keep curricula updated to better reflect real-world demands.

2.Industry perspective:

- Companies seek technically skilled workers who can also collaborate effectively and handle unexpected situations.

3.VET providers' concern:

- Acknowledge the disconnection between classroom learning and workplace realities.

4.Proposed solutions by the CoVE Spain:

- Mobility between institutions: Promote student and teacher exchanges to foster collaboration and knowledge sharing among VET and higher education institutions.
- Stronger industry collaboration: Align training programmes with industry needs and increase field-based learning through internships or practice programmes.
- Re-skilling and up-skilling: Develop accessible training pathways for professionals from other sectors or backgrounds to enter the ORE field.
- Dissemination and outreach: Raise awareness of ORE opportunities through events and initiatives targeting all age groups, including primary and secondary school students.

The Spanish VET centres have an important role to support the growth of the ORE sector in Spain pointing the recommendations listed above.

2.2.2 Identification of improvements in the VET offer

2.2.2.1 Evaluation of course content, learning outcomes, and delivery methods

a. Overview about the current VET offer in Spain.

Previous Erasmus+ projects such as MATES[31] and FLORES[32] have been instrumental in mapping and identifying training programmemes related to renewable energies, particularly within the offshore wind and marine energy sectors. These initiatives have focused on aligning educational offerings with industry needs to ensure a well-trained workforce capable of supporting the energy transition. Both projects have not only catalogued existing training opportunities but also proposed innovative educational approaches to address the evolving needs of the Offshore Renewable Energy (ORE) sector.

The FLORES project has identified 37 training programmemes directly related to offshore renewables. Of these, eight are master's programmemes (EQF Level 7), while the remainder are short training courses. Therefore, there is not a VET completely focused on the ORE sector. However, taking into account the skills needed in that sector such as electricity, mechanics, hydraulics, logistics, mounting or maintenance; it is possible to identify, just in the Galician region, 38 VET programmemes ranging from EQF Levels 3 to 6 that count with this sector, despite there are not related to ORE or marine sectors.

[31] https://www.projectmates.eu/
[32] https://oreskills.eu/

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Regarding to current professional qualifications or professional certificates in Spain there are two VET programmemes related to wind power:

- **ENA816_2 Assembly and Maintenance of Wind Power Installations**, Professional Qualification – Level 2 (EQF 4): There is no corresponding Professional Certificate. It is composed of three Learning Outcomes or PRS (current Professional Performance Standards).
- **ENA193_3 Management of the Assembly and Maintenance of Wind Farms**, Professional Qualification – Level 3 (EFQ 5): This qualification will lead to a Professional Certificate (Grade C) (pending official definition by INCUAL) and currently it is composed by 5 Learning Outcomes.

Hence, it can be concluded that, in Spain, the VET offer for the ORE sector is not specifically developed. Among all the previous VET programmemes, it is worth highlighting the VET in Renewable energies (EQF Level 5) because it is the only one with wide contents about onshore wind energy and shallow contents in offshore wind energy (as detailed in the next section). In the following sections, the contents, learning outcomes and delivery methods of this training related to the ORE sector are going to be analysed in detail.

b. Evaluation of course content.

VET in Renewable energies (EQF Level 5 and 2.000 h) has two subjects about wind energy and a transversal subject slightly related to ORE:

- Wind farm assembly management (192 h). Mainly focused on onshore wind energy.
- Operation and maintenance of wind farms (193 h). Mainly focused on onshore wind energy.
- Renewable energy systems (160h). Introduction to almost every kind of renewable energy.

This training includes, through the aforementioned subjects, some contents related to ORE. The contents of those subjects are the following:

- Wind farm assembly management (192 h). The contents of this subject are:
    - Characterization of assembly processes in offshore wind farms:
        - Location and environmental impact of offshore wind farms.
        - Differences with onshore wind farms.
        - Foundations, anchorages and base platform.
        - Access system.
        - Configuration of the installation.
        - Energy evacuation system, conductors, and measurement and control equipment.
        - Methodology for the assembly of wind turbines and offshore wind farms: Assembly organization, planning techniques, assembly procedures.
    - Risk assessment of offshore wind farms:
        - Risks associated with access to and evacuation of offshore wind turbines. Safety recommendations.
        - Risk for assembly an offshore wind farm.
        - Risks of commissioning and energizing an offshore wind farm.
        - Risks and safety actions in maintenance in an offshore wind farm.
        - Risks of hazardous substances and materials present in offshore wind energy facilities.
        - Risk prevention measures in offshore wind farms and their associated systems. Weather forecasting and information. Navigation safety. Specific emergencies at sea.

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- Operation and maintenance of wind farms (193 h). The contents of this subject are:
    - Application of emergency and first aid protocols in wind farms:
        - Emergency plan in onshore and offshore wind farms.

- Renewable energy systems (160h). The contents of this subject are:
    - Characterization of marine energy systems:
        - Origin of wave energy.
        - Potential of wave energy, tidal energy and ocean thermal energy.
        - Classification of devices for capturing ocean energy.
        - Costs of using wave energy, tidal energy and ocean thermal energy.
        - Technology used in estuaries and dikes and in marine current turbines.
        - Open-cycle, closed-cycle and hybrid-cycle systems for harnessing ocean thermal energy.

Although the curriculum of the Advance VET in Renewable Energies covers different energy sources, it is clear that specific content related to offshore renewable energies has been integrated. These modules reflect an effort to provide training in emerging areas such as offshore wind energy and other technologies related to the energy harnessing of the marine environment.

c. Evaluation of learning outcomes.

This section evaluates both existing wind energy professional qualifications and vocational education and training.

c.1. Professional qualification:

- **Professional Qualification – Level 2 (EQF 4)**: The learning outcomes or PRS (current Professional Performance Standards) are the following:
    - ECP2723_2 Assemble wind power installations.
    - ECP2724_2 Maintain wind power installations.
    - ECP2519_2 Perform basic occupational risk prevention functions.

Presence of Offshore Wind Energy in this Professional Qualification:

The professional qualification ENA816_2 **includes offshore wind energy** in a specific and detailed manner in relation to the assembly and maintenance of installations, particularly in the following Performance Standards:

- UC2723_2 – ECP2723_2 Assembly: Includes a professional performance (RP4) — one of seven — dedicated exclusively to ORE:
    - Assembly of offshore wind installations, including wind turbines, accessories, and control and regulation systems.
    - Operations in port and at sea, considering the type of foundation.

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- Technical testing, stowage, transport, assembly, and electrical connection under specific marine conditions.

  - UC2724_2 – ECP2724_2 Maintenance: Includes a professional performance (RP4) — one of six — dedicated to:
    - Preventive and corrective maintenance of offshore wind farms.
    - Meteorological and logistical conditions at sea.
    - Maintenance of offshore substations.

- **Professional Qualification – Level 3 (EQF 5)**: The learning outcomes or Skill Units (UC, Spain) are the following:
  - **UC0615_3**: Develop wind energy installation assembly projects.
  - **UC0616_3**: Manage the commissioning and operation of wind energy installations.
  - **UC0617_3**: Manage the maintenance of wind energy installations.
  - **UC0618_2**: Prevent occupational risks and act in emergency situations in wind farms.
  - **UC0619_2**: Assemble and maintain wind energy installations.

Upcoming update (from 2025 onwards):

  - **ECP0615_3** Manage the construction and assembly of wind energy installations.
  - **ECP0616_3** Manage the commissioning and operation of wind energy assets in coordination with control centres.
  - **ECP0617_3** Manage the maintenance of wind energy installations.

Presence of Offshore Wind Energy in the Level 3 Qualification ENA193_3 "Management of the Assembly and Maintenance of Wind Farms":

The **ENA193_3** qualification is currently focused exclusively on **onshore wind energy and** offshore is **not** considered as a specific objective, therefore no skills to this environment are developed.

Based on this analysis, could be recommended to consider the **development of a Level 2 (EQF3) or Level 3 (EFQ4)** certificate **specifically for Offshore Wind Energy**, in order to meet growing labour market demand, serve as a complement to other training, and formally recognize specific professional skills. This qualification would lead to a Grade C in the new Spanish VET law.

c.2. Advance VET in renewable energies (EQF Level 5):

In this section, the learning outcomes for the three mentioned subjects of the VET in Renewable energies are evaluated.

- Wind farm assembly management (192 h). It contains two learning outcomes, out of eight, related to offshore wind. These learning outcomes are:
  - LA3. Characterises the assembly processes specific to offshore wind farm projects, highlighting their differences compared to onshore installations, with the following evaluation criteria:
    - Define the special features of offshore wind farms.
    - Recognise the differentiating elements of an offshore wind facility.

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- Distinguish specific energy evacuation systems.
- Relate assembly procedures and techniques used in foundations, anchoring, and assembly.
- Identify the human resources required for the different assembly stages.
- Apply specific safety measures for offshore facilities.

  - LA7. It assesses the risks of offshore wind farms, considering the specific characteristics of their installation and environment, according to the following evaluation criteria:
    - Define the risks associated with access to and evacuation of offshore wind turbines.
    - Assess the risks for the different professional activities performed during the wind turbine assembly.
    - Detail the risks for the different professional activities performed during the wind turbine commissioning and energization of an offshore wind farm.
    - Define the specific maintenance activities in an offshore wind farm.
    - List the risks of hazardous substances and materials present in offshore wind energy facilities.
    - Define the risks and prevention measures in each work.

- Operation and maintenance of wind farms (193 h). It does not contain any learning outcomes, out of eight, related to offshore wind. The learning outcomes are about wind energy in general or onshore wind energy. In any case, as explained in the contents section, offshore wind farms are briefly mentioned to learn about emergency plans.
- Renewable energy systems (160h). Contains one learning outcome, out of nine, related to offshore renewables in general, where an introduction about tidal or wave power is done. This learning outcomes is:

  - LA4. Recognises the systems for harnessing marine energy, with an assessment of existing technologies. Which contains the following evaluation criteria:
    - Understand the potential of wave energy, tidal energy and ocean thermal energy.
    - Classify devices for capturing ocean energy.
    - Identify environmental impacts associated with the use of wave and tidal energy.
    - Recognise systems used in estuaries and dikes.
    - Recognise the technology used in ocean turbines.
    - Identify open-cycle, closed-cycle, and hybrid systems for harnessing ocean thermal energy.
    - Use technical documentation to estimate costs associated with the use of wave energy

d. Evaluation of delivery methods.

Concerning the Advanced VET in Renewable Energies, the Royal Decree 385/2011, which regulates it, states that modules should follow a theoretical-practical approach, combining both methodologies. A lot of tasks are practical such us interpreting schemes, assembly or operation and maintenance of installations. Therefore, a significant number of practical hours are expected. However, given the difficulty of carrying out full-scale wind turbine assembly or maintenance activities, each training centre adapts the implementation according to its available resources.

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Until now, a Workplace Training Module (*FCT*) of 380 hours was included at the end of the training, but students could do this internship in any renewable energy company, not necessarily in a wind energy company.

One of the major challenges for wind energy VET programmemes, from the perspective of work-based learning, has been the difficulty of placing students in operational wind farms under internship agreements. A task that has proven extremely difficult up to now.

With the implementation of the new VET Law (Organic Law 3/2022) in Spain, the Workplace Training Module (*FCT*) disappears and the Dual training is introduced in all the VET offer (for Grade C, Professional Certificates and for Grade D, Vocational Training Grades), introducing several hours in every subject to be done in the work centres. This allows company-based training phases from the early stages of the programmeme. Thus, at least 25% of the total VET hours must be formation in the work centre, having a maximum of 75% in the formation centre. For example, for a 2.000 h VET, 500 h will take place in the work centre.

However, despite these advances, access to wind turbine generators at wind farms remains a critical challenge, particularly for offshore wind activities, and may hinder the full practical immersion of students unless specific collaboration frameworks with industry are established.

e. Conclusions and strategic recommendations.

Based on the current training programmes described in the previous sections, the **main conclusions** and **strategic recommendations** to enhance the relevance of future ORE training initiatives are summed up in the following Table 10:

Table 10. Main conclusions and recommendations to enhance relevance of future ORE initiatives (CoVE SP)

Key Findings	Strategic Recommendations
VET programmemes in offshore renewable energy (ORE) is limited in Spain, with few dedicated programmes. ORE is generally embedded in broader energy curricula.	**Develop dedicated ORE programmemes**, particularly in the Vocational Education and Training (VET) system, to address existing gaps. Proposals in following items
Existing VET modules mainly focus on general renewable energy or onshore wind. ORE-specific content is scarce.	**Update and diversify curricula** by including specific content on offshore wind and emerging technologies, based on labour market needs. Proposals in following items
Pedagogical approaches are largely theoretical, with unclear implementation of teaching methods across institutions.	**Define clearer pedagogical guidelines** to ensure effective integration of theory and practice in line with industry requirements.

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Students and Stakeholders highlight lack of specific training in -ORE	**Expand opportunities for work-based learning and practical training**, both inside and outside the educational environment.
ORE topics in VET are mostly related to installation/maintenance of onshore wind farms. Coverage of offshore content is partial.	**Broaden and/or update modules to better reflect offshore contexts**, including the specificities of marine environments.

2.2.2.2 Assessment of training programme feedback and effectiveness

The feedback collected shows that, although Spain's Vocational Education and Training (VET) system has a **solid foundation**, there are still **significant areas for improvement** in order to meet the training needs of the **marine renewable energy sector** effectively.

Key recommendations include:

- Strengthening specialised technical content,
- Increasing practical training in real-world contexts,
- Promoting dual learning models,
- Establishing regular and systematic communication channels between industry and educational institutions.

Additionally, the following priorities have been identified:

- Enhancing **continuous professional training for teachers** in emerging technologies and active learning methodologies,
- Developing **strategies to reduce the gender gap** and **promote diversity** within the sector.

The following sections will explore these two last points in greater depth, analysing **barriers** and proposing **improvement strategies** to foster inclusion.

2.2.2.3 Identification of barriers and enhancements for inclusion and accessibility

This section analyses existing challenges related to inclusion and accessibility in VET programmes, proposing targeted interventions to improve equitable access for diverse learner groups, including underrepresented populations (Table 11).

Table 11. Challenges related to inclusion and accessibility in VET programmes (CoVE SP)

Barriers	Description
Lack of gender and diversity representation	There is an inequality of gender representation and diversity as well in general, and there is no visibility of people who are racialized or of different ethnic backgrounds. Women and younger people are underrepresented, particularly in technical and leadership roles. Lack of models to follow and lack of visibility of existing referent people.

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Limited geographical access	Vocational training in renewable energies is offered in a small number of centres, which limits access to people with difficulties in geographical mobility (poorly connected rural areas, lack of public transport networks and not belonging to their own vehicle, care of dependent people and other reasons). Making a greater implementation in the distance training offer could mitigate this limitation.
Digital and technological gap	Some people, for example, those who want to update their skills or improve them (reskilling or upskilling) may see their full participation limited by the lack of digital skills or by not having access to an internet connection. This gap could be widened among groups considered digital illiterate.
Language barrier	Marine renewable energies are a global sector that is totally internationalized, so having an average knowledge of both written and spoken English is necessary. Therefore, we identify language as one of the barriers to access the sector.
Gender bias in the perception of the studies and trades	The bias present in certain studies and professions, traditionally considered as associated with a specific gender, influences the choice of training according to gender. Some occupations related to the scientific and technological field, as well as professional areas linked to industry, construction and new technologies, have historically been associated with gender roles that reinforce the stereotype of being "men's professions". Although there has been an increase in the enrolment of men in traditionally feminized training cycles, there is no equivalent increase in the participation of women in those considered masculinized.
Occupational segregation by gender in technical professional families	A total of 44% women holds administrative positions (compared to 13.8% men). In contrast, in technical posts with average qualifications, men account for 62.3% of the jobs, while women only occupy 24.2%. In the specific case of the wind energy sector, the presence of women is low in management positions while higher in administrative roles, confirming existing gender barriers
Over qualification segregated by gender	In the sector linked to the energy transition, there is a gender gap in terms of qualifications, with the case that the percentage of women with higher education doubles that of men in all medium- and low-skilled occupations.

Some proposals for improvement of inclusion and accessibility are shared in Table 12 below:

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Table 12. Proposals for improvements of inclusion and accessibility (CoVE SP)

Proposals for improvement	Description
Quantify the diversity of the student body	Quantifying the diversity of the student body is relevant to identify which are the unrepresented groups, and thus be able to analyse what the current barriers are in access to education. Some of the questions that can be analysed to measure the level of inclusion of a training are: is there heterogeneity in ages or are only certain age profiles represented and why? Are people with functional diversity accessing and staying in the training? What barriers do they face? In this way, various characteristics could be analyzed: age, visible or non-visible disability, including mental health and neurodiversity, ethnic diversity, identity, gender expression and reassignment, pregnancy, maternity or paternity, responsibilities for caring for dependents, marital status, place of residence (rural or urban, isolated or unisolated geographical location, etc.), religion, sexual orientation, citizenship status, Language and accent, family situation and/or socioeconomic circumstances and physical appearance or divergence from normative standards.
Analysis of needs for profiles not represented	Analize what the needs of underrepresented sectors are, opening paths for inclusion and increasing diversity in the sector.
To make visible those people who break with the social norm expected of them according to their gender condition, or other stereotyped conditions in the sector	Initiatives to make visible the possibility of diversity of people in the marine renewable energy sector, such as the dissemination of presentation videos showing various roles played by people of different genders, as examples to follow (FLORES Project). These actions help show that diversity in professional roles is valid and necessary, regardless of gender or other professional characteristics.
Promote teacher training and awareness on issues of inclusion, equality and gender equity	Promote the training and awareness of teachers so that they become aware of the importance of inclusion and gender equality and avoid reproducing existing stereotypes in practice and in the teaching-learning process.
Pay attention to teaching materials on gender and diversity	Analize learning materials, from language to images, to prevent them from fostering gender or other workplace stereotypes. Example: often the people represented in the materials are men and under a standard of normativity (Caucasian, without visible diversity, normotype in terms of body size, etc.), break this

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	stereotype by creating didactic materials with observable diversity.
Work from an early age on the elimination of social, gender or other prejudices about certain occupations and/or professional families	It is essential to start working from an early age to eradicate social prejudices related to gender and other stereotypes that are associated with certain occupations and professional families, such as those of technical vocational training families or those related to engineering, profiles in demand in the RE sector. This implies an approach that is not limited exclusively to VET centres and universities but also covers previous educational levels such as primary and secondary education. In this way, it can be promoted from the initial formative stages that young people are freed from the barriers imposed by social and gender prejudices in their academic and professional decisions.
Retain diverse talent and female talent	One of the keys to retaining diverse talent and especially female talent in sectors where they are underrepresented is to create safe and inclusive workspaces. Listening to the needs of these groups, encouraging work-life balance, and providing an environment that supports the professional development of all people, regardless of gender or identity, are crucial strategies to ensure their permanence.
Offer competitive salaries	Offering competitive salaries not only attracts and retains talent but also ensures that the work of all professional people is valued. A fair wage facilitates access to people from more disadvantaged socio-economic backgrounds, as well as to other traditionally excluded profiles, such as people with functional diversity, migrants or dependents. Guaranteeing decent wages promotes equal opportunities and contributes to labour inclusion, reducing economic and social barriers to access and stay in jobs.
Compensate time away from home with extended periods at home	To promote work-life balance, the basic option is to compensate for time away from home with extended periods at home, especially for people who spend part of their day at sea (as is common in the MRD sector). This measure, already widely implemented in the sector, not only contributes to work-life balance, but also improves the quality of life of workers, as well as contributing to creating an inclusive work environment that values the balance of the worker.

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2.2.3 Development of actions to deliver labour-market relevant skills

As explained before, Vocational Education and Training has been recently updated in Spain with Organic Law 3/2022, of March 31, whose regulation of the Vocational education and training system is developed in Royal Decree 659/2023, of July 18 and whose fundamental vision is summarized in Figure 2.

With the new law different Grades appear. These Grades do not differ in level but in duration. The most popular VETs are the ones of Grade D and comprises 2000h, mainly aimed at students without work experience. VET specialization courses, Grade E, provide complementary training for those who already hold a VET qualification Grade D (2000 h), mainly in emerging fields. The length of the VET specialization courses, varies widely, ranging from 300 h to 900 h, depending on the complexity of the field in which they are delivered. The most common duration is about 600 h. Grades A, B and C are related to microtrainings and microcredentials, focused on people with previous work experience who want to update their knowledge and skills and follow with their lifelong learning.

Figure 2. New vocational training model (Ministry of Education, Vocational Training and Sports) (CoVE SP)

2.2.3.1 Updating training offerings for ORE sector

The offshore renewable energy sector is dynamic and changing. It has advanced fast in recent years, and needs are changing at the same pace. There have been major improvements in the technical aspect, and it is very difficult to accurately predict the needs of the coming years.

Therefore, after analysing the results of the surveys, as well as the existing training programmes in our country, it is concluded that teaching needs to be made more flexible and adapted to the needs of the sector. Thus, a static programme that meets current needs is not developed, but rather a living training programme that can be updated and evolved more easily over time.

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In addition, as explained in section 2.2.2, there are several existing VETs (2000 h) related to renewable energies, electricity, hydraulics or mechanics which have a basic knowledge very powerful for the ORE sector workers. So, just a specialised training supplement in offshore is required.

It seems that developing a new 2000h VET focused exclusively on marine renewable energies would require a considerable effort and would generate training that shares a significant portion of its content with the current Advanced VET in Renewable Energies among other existing VETs.

For this reason, CoVE Spain proposes to analyse two possibilities: VET specialization courses and an elective subject within the VET in Renewable Energies.

VET specialization courses can be a very useful tool to adapt and update existing training offerings to the needs of the sector. Depending on their complexity, the specialization course may be Intermediate Level (EQF Level 4, Level 2 in Spain) or Advanced Level (EQF Level 5, Level 3 in Spain).

An elective subject of offshore wind energy (about 90 h) within the VET in Renewable Energies also fulfil the ability to adapt to the sector development.

Combining these two options with other like shorter training programmes, such as Grade A, Grade B or Grade C VETs, would provide the necessary flexibility for ORE trainings. Thus, the offer covers both people without previous experience and workers.

Hence, two specialization courses (one aimed at intermediate level and the other at advanced level) and an elected subject are proposed for the field of offshore renewable energy. A first analysis of the proposal elected module is going to take place in the next paragraph, as update of the existing offer. A first analysis of the proposal VET specialization courses is going to take place in the next section 2.2.3.2 as VET curricula and qualification proposal. A detailed analysis of the learning outcomes, contents and resources will take place at WP3. These courses will likely produce modules/subjects that can be offered under the microcredentials framework to facilitate the incorporation of lifelong learning.

The elected subject will have a duration of 90 h (in accordance with the implementation of the new VET law in Spain). It will take part in the second year of the Advanced VET in Renewable Energies. Its name could be *Introduction to offshore wind energy*. It would have the following topics:

- Offshore basics: marine environment and location types.
- Offshore wind turbines components and technologies.
- Offshore wind farms assembly management.
- Offshore wind farms operation and maintenance.
- Regulations, safety and environment.

2.2.3.2 VET curricula and qualifications proposals

The training offer of VET courses in Spain includes "training cycles", specialization courses and professional certificates. In addition, the system includes skills accreditation procedures aimed at recognizing the professional skills of those people who have acquired training through professional experience.

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Currently there is no specific offer in training cycles aimed at the development of technical profiles in offshore wind farms. There is a qualification that includes EQF level 5 training (ESP professional qualification level 3) for wind farm assembly and maintenance supervisors (operation and maintenance management technician, or wind farm assembly manager).

Related relevant qualifications (all included are EQF level 5 training - ESP professional qualification level 3): Technician level 3 in occupational risk prevention; Technician level 3 in industrial mechatronics; Technician level 3 in electrotechnical and automated systems; Technician level 3 in telecommunications and computer systems; Technician level 3 in maritime transport and deep-sea fishing.

Regarding specialization courses, there is currently neither a specific offer nor an offer directly related to the training of wind farm technicians. However, there are specialization courses that contain useful training for certain positions or profiles that can develop their activity in the offshore wind farm sector, such as:

- Specialization in Digitalization of Industrial Maintenance
- Specialization in Smart Manufacturing
- Specialization in Building Information Modelling

There is also no specific offer in mid-level cycles for the professional profiles required in the different phases of development and life cycle of offshore wind farms. As with the specialization courses, you can identify qualifications related to the sector such as:

- Technician in electromechanical maintenance
- Technician in electrical and automatic installations
- Technician in telecommunications facilities
- Technician in coastal navigation and fishing
- Security technician

As for the certificates of professionalism, they are official titles issued by the Ministry of Education, Vocational Training and Sport or by the autonomous communities, intended to train staff to acquire professional skills in a specific work activity.

Within the framework of the certificates of professionalism we find specific training that does have direct application in the performance of specific tasks to be developed in the offshore wind farm sector. Below is a non-exhaustive list of professional degrees or certificates:

- Certificate of assembly and maintenance of wind farms
- Certificate of operation and service of wind farms
- Certificate in mechanical maintenance of machines
- Certificate in commissioning, maintenance and logistics of wind projects

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- Certificate in Wind Energy Installations
- Certificate in Grid Connection and Wind Energy Integration
- Certificate in Wind Energy Installations

In addition to other titles related to the manufacture of components such as mechanical components, wind blades, etc.

Proposal 1: Develop a professional specialization course (EQF level 5)

- Introduction

Within the framework of the specialization courses, the lack of specialized training at level 3 level 5 (EQF) is identified both for the assembly and commissioning and for the management of the operation and maintenance of offshore wind farms. Therefore, it is necessary to include one or two specialization courses aimed at training supervisors for the assembly and maintenance of offshore wind farms. The aim of the degree would be to provide skills to carry out the coordination of assembly, commissioning, operation management and maintenance of marine wind farms and installations. In addition to promoting installations, develop marine wind installations projects including both the offshore electrical substation and the connection with the terrestrial substation.

- Level in the EQF

Level 5 qualification (level 3 in Spanish Vocational Training Framework)

- Topics and subjects

Offshore wind technology (fixed and floating). Feasibility studies of offshore wind farms. Assembly management in the offshore wind farms. Operation and maintenance management for offshore wind farms. Safety (including specific training for offshore work conditions).

- Delivery methods

The training could be offered both in-person mode and in distance mode. In distance mode, the workshop and practices should be compulsory in person mode.

- Target audience

This specialization course is aimed at both qualified people in renewable energies vocational training and professionals with experience in both on shore and offshore wind farms.

- Duration of training

600 hours, in one academic course.

- Learning outcomes and skills

The students will acquire specifics skills to carry out feasibility studies, design facilities and management the assembly and maintenance of offshore wind farms.

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- Evaluation and assessment methods

Students will be evaluated for teachers through exams, record tables where of training in workshops and associated skills, office works and others.

- Measures to foster inclusion

During course, every student will have a personal follow-up by the tutor, who will be the person responsible to detect and fix any problem that could be occur and give option to students who need additional support to overcome the contents, adapt the company practices or others.

Proposal 2: Develop a professional specialization course (EQF level 4)

That course could be named **"Specialisation Course in Offshore Wind Assembly and Maintenance Operations "**

- Level in the EQF:

  Level 4 qualification (level 2 in Spanish Vocational Training Frame)

- Topics and Learning outcomes:
  - Offshore wind technologies and basic regulations (floating and fixed)
  - Offshore assembly operations
  - Maintenance of offshore platforms
  - Commissioning of offshore wind farms
  - Safety in offshore operations (GWO, marine regulations, etc.)
- Main Objectives

  Installation, operation, and maintenance of offshore wind farms; marine safety; technologies of floating and fixed wind turbines; maritime logistics.

- Delivery Method

  In-person

- Duration of training

  600 hours, in one academic course.

- Target audience:

  This course could be primarily aimed at technicians who have completed Intermediate Vocational Training Programmes in the fields of Electricity or Electromechanics, workers currently employed in the onshore wind energy sector seeking to enhance their skills or specialize further, professionals from other industrial or technical sectors who are interested in transitioning into the offshore and onshore wind energy sector

Proposal 3: Develop a Level 2 (EQF 3) or Level 3 (EQF 4) professional certificate

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As mentioned above, the development of a Level 2 (EQF 3) or Level 3 (EQF 4) certificate specifically focused on Offshore Wind Energy is recommended. Such a certificate would not only enable a specialized training (as part of specialization courses), but also provide a formal recognition and accreditation pathway for current professionals already working in the sector.

2.2.3.3 National CoVE workshop

The purpose of the workshop was to present the VET Excellence Roadmap to local stakeholders and engage them in a collaborative discussion to explore potential future directions for vocational education and training, specifically in the field of ORE. This session aimed to get feedback, validate the proposed roadmap and identify opportunities for improvement and collaboration.

The event took place in the CIFP Valentín Paz Andrade (VPA) in Vigo (Galicia) and in Spanish language for the participants from all around Spain. There were 54 participants in total, 41 external participants (30 face to face, 11 online connected) and 13 internal participants, part of SHOREWINNER project. Among the attendees, there were external participants from different organizations such as companies (Altiur, Damen, Elittoral, Maisvento, Navantia and Siemens), Professional Associations (COMG), Foundations (FAEN) and educational and/or research organizations (CIFP Valentín Paz Andrade and UDC).

The event was divided into five parts, as shown below:

1. Presentation of the SHOREWINNER project and CoP as well as the Roadmap of Excellence in Vocational Training. Participatory session. By Félix Orjales (UDC).
2. Presentation of the XENIO 4.0 Applied Technology Classroom and the didactic adaptation process of the DESA A300 300 kW wind turbine By Jose Rodríguez and Denis Abreu (VPA).
3. Round table with three offshore wind workers and ex alumni of Higher VET Cycle in Renewable Energy (CS Enerxías Renovables). Moderator: Jose Rodríguez (VPA). Participants: Jose Rodríguez (Siemens) , Jorge Álvarez (Maisvento) and Xabier Marcote (Maisvento)
4. Visit to the wind energy internship ecosystem of the CIFP Valentín Paz Andrade (VPA). With teaching staff and students (VPA).
5. Evaluation session and conclusions. By Félix Orjales (UDC).

During the first part of the session, the key aspects of the SHOREWINNER Roadmap of Excellence in Vocational Training were introduced trough a participatory and structured approach. The presentation highlighted the project's objectives and the role of the Community of Practice (CoP), followed by an interactive evaluation phase. Participants, both in person and online, were part of an interactive session aimed at evaluating and validating the roadmap. The group was divided into smaller groups in order to rotate through three panels:

- **Panel 1: Identifying improvements in VET (Vocational Education and Training) in Spain**, moderated by María López Morado (UDC). It includes two sections: one for proposals to improve the effectiveness of training programmes, and another for proposals to enhance inclusion and accessibility.
- **Panel 2: Actions to deliver labour market relevant skills**, moderated by Félix Orjales Saavedra (UDC) and Amaya Soto Rey (CETMAR). It includes two sections: proposals to update training provision in the ORE (Offshore Renewable Energy) sector, and curriculum qualification proposals for VET.

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- **Panel 3: Opportunities for cross-border collaboration**, moderated by Julián Rodríguez Cortegoso (UDC). It includes two parts: the first focused on the questions "What do we need?" and "What can we offer?", and the second focused on ideas for collaboration with the five SHOREWINNER CoVEs (Centres of Vocational Excellence) from Cyprus, Greece, Spain, Italy, and Portugal.

The three groups rotated through the three panels, contributing to the proposed SHOREWINNER roadmap by using post-it notes on a board to express their opinions, suggestions, and concerns. At the same time, the participants connected online followed the same process using interactive analogue panels on the Miro online platform. Their insights, obtained through the described collaborative tools, contributed to shaping and validating the proposed roadmap.

Key findings and feedback on the roadmap and future directions were collected during the collaborative session. The insights are summarized below, organized by the thematic areas addressed in each panel and also the findings obtain from the roundtable:

Panel 1: Identifying Improvements in VET in SPAIN

In terms of improving the effectiveness of training programmemes, participants highlighted the need for more practical and hands-on learning experiences, specifically those connected to prototypes and marine energy testing zones. There were mentions of the implementation of continuous assessment systems to evaluate the real impact of training initiatives. It was also highlighted a lack of collaboration between vocational training centres and companies, with a need for more effective information exchange regarding training opportunities and labour market needs. It was also noted that training centres should be located in areas most affected by offshore wind development to help ensure positive impacts on the local population. Other proposals included enriching the training offer with topics such as hydraulics, English language skills, sustainability and risk prevention. Participants also advocated for shared infrastructure across educational institutions to enhance training capacity. The creation of advanced qualifications was proposed, such as an offshore VET master's programme, validating the proposed roadmap. Additionally, they suggest the integration of vertical training and the inclusion of GWO (Global Wind Organization) certification in the VET programmes to ensure industry-relevant skill development.

Regarding inclusion and accessibility, suggestions focused on identifying specific job roles in the offshore wind sector that could attract women, supported by targeted promotional efforts. Inclusive strategies, particularly those representing minority groups, were also encouraged. There were also concerns about limited training in health and safety, highlighting the need for improvements in this area. Standardising the quality of VET across Spain and ensuring better access to technical infrastructure were seen as priorities. Additionally, participants highlighted the need to have a wider dissemination of VET opportunities to both students and employers, as well as measures to improve accessibility, such as improving public transport options and offering transportation grants.

Panel 2: Actions to deliver labour market relevant skills

The proposals for updating the training offer in the ORE sector focused on adapting existing VET modules to include specializations in key areas such as electricity and hydraulics, as well as incorporating specific and practical offshore training. Emphasis was placed on combining classroom learning with experiences in

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companies, facilitating onshore internship and improving pedagogical approaches to better reflect real life situations. The importance of developing transversal skills such as autonomy, attitude, teamwork and communication was also highlighted. Other suggestions included encouraging teacher placement in relevant companies, compensating internship-related expenses, and strengthening safety training to reduce economic and psychological barriers (such as fear or insecurity) that could discourage individuals from choosing this type of training.

Regarding curricular and qualifications improvements, participants suggested to develop adaptation modules for individuals already trained in related sectors and promoting VET programmemes in auxiliary industries such as maritime transport, welding or subsea systems. There were also some suggestions to enhance training in the maintenance of marine electrical systems and offering microcredentials or VET master's programmes to address more specific educational needs. The inclusion of certifications like GWO, currently costly, was considered essential, along with the need for greater transparency from companies through agreements that allow sharing technical guides or manuals. Finally, they highlight the low female representation and emphasizing in addressing the need for specific awareness campaigns.

Panel 3: Opportunities for cross-border collaboration

Participants in the CoVE Spain VET Excellence Workshop have identified several needs to strengthen the Spanish roles in the offshore wind sector: improving access to information and international experiences trough talks by former students and workers, promoting the organization of webinars, seminars, forums and coworking spaces and encouraging applied research and hands-on training. It was shown interest in identifying and learning from European training centres with established offshore wind programmes, especially in Northern Europe, to adapt methodologies and teaching materials. Other needs were including standardizing trainer education, facilitating exchange opportunities, opening access to technical and training resources, and advancing towards harmonized legislation to support labour and training mobility in ORE sector.

Participants consider that Spain can offer the availability of qualified workforce and specialized research centres. They propose some collaboration among Spanish CoVE and the other four CoVEs (Cyprus, Greece, Italy and Portugal), including meetings with industry stakeholders, short term international exchanges, visits to wind farms and sharing updated documentation and soft skills training experiences. There is also an interest in aligning training programmes across countries to enhance consistency and collaboration. Furthermore, they propose to increase the coordination with other European projects such as T-shore to share best practices and lessons learned.

Extra: Roundtable discussion

During the second part of the session, there was a roundtable discussion with former students currently employed in the offshore wind sector, and various conclusions emerged regarding their real needs. It was highlighted that the most demanded roles are technicians, security personnel and medical staff, and that offshore work involves bigger logistical and safety demands compared to onshore work. The participants emphasized the importance of soft skills such effective communication and critical thinking, especially in environment where mistakes could be fatal.

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They also consider essential to increase the practical training, particularly in hydraulics and tightening tools and to develop a specialized VET master in offshore wind energy instead of a full training cycle, given the specificity of the content. Additionally, they pointed out the need to improve occupational safety and working conditions in Spain to prevent talent migration abroad, as well as to establish a specific agreement for the wind sector that guarantees workers' rights.

Key outcomes and agreed- Upon Next Steps

The VET Excellence workshop served to extract significant conclusion and check that they were aligned with the approach of SHOREWINNER Roadmap. These conclusions might guide the future development in VET in ORE sector. Based on stakeholder feedback and collaborative discussions, they have been identified the steps shown in the following table:

Key Outcomes	Next Steps
Enhancing Practical Training	- Increase hands-on learning experiences, particularly connected to prototypes and marine energy testing zones. - Strengthen partnerships with industry for real-world internships. - Adapt modules for professionals from related sectors.
Advancing Curriculum and Certification Standards	- Establish specialized training modules in hydraulics, electrical systems, and offshore safety. - Integrate GWO certification into VET programmes. - Promote microcredentials and an offshore VET master's programme
Improving Accessibility and Inclusion	-Encourage female participation - Expand efforts to raise awareness of VET opportunities. - Implement transport grants and mobility options for better access to training facilities.
Strengthening International Collaboration	- Facilitate exchanges with leading European training centres, particularly in Northern Europe. - Align training methodologies across partner CoVEs (Cyprus, Greece, Italy, Portugal, Spain). - Organize international networking events, visits to wind farms, and knowledge-sharing forums.
Ensuring Workforce Retention and Industry Growth	- Develop agreements with industry stakeholders to secure employment opportunities. - Improve occupational safety measures and working conditions to prevent talent migration. - Push for legislative frameworks that enhance labour and training mobility.
Increasing Engagement with Related Industries	- Expand VET offerings to auxiliary industries such as maritime transport, welding, and subsea systems.

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	- Encourage collaboration with other European projects, like T-shore, to exchange best practices.

2.2.4 Opportunities for cross-border collaboration

Cross-border collaboration is a powerful driver for accelerating knowledge transfer and promoting balanced growth in the offshore renewable energy (ORE) sector. By sharing knowledge, experiences, and resources, countries can strengthen their capabilities and advance together. This report highlights specific opportunities for cooperation between CoVE Spain and other participating CoVEs: Portugal, Italy, Greece, and Cyprus.

All participating countries are in the process of developing their ORE sectors, creating a shared landscape of opportunities. Portugal and Italy, already operating offshore wind farms, bring valuable insights into the operation and maintenance phases. Spain, with a fully developed value chain, offers expertise in construction and installation. Greece and Cyprus, while earlier in their development, contribute through innovation, research, and involvement in EU projects, enhancing the collaborative potential.

Spain and Portugal offer complementary strengths: Spain excels in industrial and technological development, while Portugal focuses on skills training and educational-business integration. Their geographical proximity and strategic alignment enable practical collaborations. For instance, Portuguese-led seminars could be hosted in Spanish facilities, allowing hands-on learning. Joint training programmes, summer schools, and shared modules would foster deeper knowledge exchange. Additionally, Spain's hydrodynamic testing channels in Madrid and Ferrol offer valuable infrastructure for Portuguese partners to test designs and prototypes.

Italy brings experience in information dissemination, training for both professionals and jobseekers, and student/business mobility. Its focus on flexible, responsive training programmes complements Spain’s industrial infrastructure. Spanish experts and companies could support Italian training activities, including those held at Spanish facilities. Mutual collaboration in curricular design and teacher training would enrich both countries, and in particular Spanish team could benefit from Italian’s experience in the curricular design and innovation in training programmes.

Greece contributes through its strong focus on practical training, innovation, and territorial development. Its CoVE offers summer schools, hackathons, and specialization in onshore assembly, grid integration, and environmental procedures. Internships in Spanish manufacturing and technology centres would provide Greek participants with real-world exposure, while Greek expertise in innovative training methods could enhance Spanish educational programmes. This synergy promotes both industrial knowledge and forward-thinking learning approaches.

Cyprus, though still in the early stages of ORE development, has a growing base of research centres and universities and is active in key EU projects like TETHYS and SPOWIND. Its focus includes floating wind and green hydrogen, along with maritime planning tools. Cyprus could benefit from Spanish expertise through training exchanges, internships at industrial facilities like Navantia or Haizea, and collaboration on curriculum

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design. Spain, in turn, could leverage Cypriot advancements in planning systems and green hydrogen innovation.

To foster ongoing collaboration, it is proposed to develop a directory of resources and facilities available across SHOREWINNER countries. This directory could support shared use of testing centres, virtual labs, and other resources, increasing accessibility and enabling participation by individuals and institutions that currently face barriers due to limited resources or geopolitical challenges.

2.3 Italy

2.3.1 Results and recommendation analysis of ORE sector needs and trends

The offshore renewable energy sector in Italy presents significant growth potential, driven by favourable geographical conditions, technological advancements in floating wind energy, and national and European policies supporting the ecological transition. However, several challenges persist, including high installation and maintenance costs, a lack of adequate port infrastructure, and complex authorization procedures, which may slow down sector growth. Despite these obstacles, interest from institutions, industry associations, and energy companies is increasing, particularly following the introduction of Exclusive Economic Zones (EEZs), which allow for the development of wind farms up to 200 nautical miles from the coast, reinforcing Italy's role as an energy hub in the Mediterranean.

In this context, the Italian CoVE of the SHOREWINNER project, which involves academic and training institutions such as the Polytechnic University of Marche, ForMare, I.F.O.A., and Deep Blue, has conducted a survey to analyse labour market dynamics and the skills required to meet future challenges. The analysis of responses highlights a consensus on the importance of addressing both technical and interpersonal skills in the ORE sector. The complex, multidisciplinary nature of offshore projects necessitates professionals who can integrate advanced technical knowledge with strong interpersonal abilities.

From a technical perspective, engineering skills emerged as foundational, particularly for designing and maintaining offshore systems that must withstand extreme marine conditions. Health and safety expertise remains non-negotiable due to the hazardous nature of offshore operations, including working at heights, managing underwater infrastructure, and ensuring operational reliability. Digital skills are increasingly in demand, with a particular emphasis on predictive maintenance, advanced data analytics, and digital twin modelling to optimize offshore plant performance. However, missing areas of expertise have also surfaced, such as integrating hybrid systems like floating solar, ensuring environmental regulatory compliance, and advancing manufacturing processes for turbine components. Some participants also highlighted the importance of nautical competencies for vessel operation and underwater inspections, which are currently underrepresented in training programmes.

Equally significant are soft skills, which are crucial for the success of offshore projects. Collaboration and effective communication are indispensable for managing relationships with both technical and non-technical stakeholders in a sector characterized by strong international dimensions. Critical thinking was repeatedly identified as key to addressing unforeseen complexities in offshore operations, particularly as projects grow in scale and technological sophistication. Flexibility and adaptability are similarly vital, given the sector's rapid evolution driven by technological innovation and regulatory updates. Additionally, the rise of international collaborations has underscored the need for greater cultural awareness. Leadership was also identified as a crucial skill for coordinating multidisciplinary teams in large-scale projects.

A recurring theme across responses is the need for a holistic perspective on the ORE sector. Beyond developing discrete technical or soft skills, professionals must understand the sector as a complete system, integrating engineering, environmental, and logistical considerations. This requires not only strong technical training but also the ability to balance technological advancements with broader societal, institutional, and environmental impacts.

The survey also highlighted a clear need to strengthen the connection between industry, education, and technical institutes. Many interviewees believe that aligning curricula with sectoral needs—through specialized training modules, hands-on experiences, and industry collaborations—will be key to closing the skills gap. In this context, it appears fundamental to create a network for information, consultation, and training, fostering long-term collaboration among industry players, academia, and VET providers. This initiative seeks to develop a workforce capable of driving innovation, ensuring operational reliability, and addressing the challenges of the ORE sector in Italy and beyond.

2.3.2 Identification of improvements in the VET offer

2.3.2.1 Evaluation of course content, learning outcomes, and delivery methods

The regulatory evolution, with the publication or the expected release of important decrees, as well as the progress of projects submitted for environmental impact assessment, represent significant developments that mark 2025 as a pivotal year for the growth of offshore wind energy in Italy.

Over the past year, numerous initiatives to raise awareness and promote the sector have taken place, including seminars, conferences, and fairs on sustainability and energy, which have garnered significant interest. Correspondingly, the availability of educational offerings has expanded, although these remain largely limited to university-level programmes and introductory short courses. With the acceleration of sector development, it is becoming increasingly strategic to define and plan specialized training programmes at all levels—both for new professionals and operators and for the upskilling and reskilling of individuals already working in related fields, such as maritime, logistics, and energy sectors.

As emerged from the first SHOREWINNER study “Needs and Trends in the Southern European offshore wind energy sector”, in Italy, the available VET offerings to prepare the current and projected labour force predominantly focus on high-level technical roles, such as engineers and project managers, rather than operational technicians. This situation is influenced by various structural, economic, and cultural factors:

- Culturally, there is more prestige attached to academic and highly specialized professions in Italy, which results in greater emphasis on training engineers and professionals for the design and supervision of plants.
- Historically, Italy has concentrated its strategy and efforts on developing onshore renewable technologies, such as photovoltaics and onshore wind, with targeted investments in large infrastructures and design expertise. This trend has led to a higher demand for engineers and specialists, while training for operational technicians has been more neglected.
- Economically, compared to countries like Denmark and Germany, Italy started seriously investing in offshore wind energy only later.

- Geographically, the characteristics of the Mediterranean Sea, with its deeper waters near the coast compared to the North Sea, make the installation of offshore turbines more expensive

The Trends and Needs mapped the currently available offer of VET programmemes specifically targeted to develop competences for the ORE sector. The outcomes can be summed up in Table 23, Table 24 of ANNEX II.

Several remarks stand out:

- no existing course leads to a national or regional official VET qualification; courses are delivered by private VET agencies, and are linked to sectoral or vendor-driven certifications;
- most training programmes are characterized by a limited duration and focused on introduction to the OWE;
- most courses do not address the development of soft skills, which are essential for effective communication and teamwork in professional settings;
- despite that, the cross-sector nature of the courses seems to be balanced, with programmemes offering both sector-specific knowledge and broader, transferable skills;
- many courses do not automatically provide access to internships, limiting students' opportunities to apply their theoretical knowledge in real-work situations;
- however, it is worth noting that safety is rightfully emphasized across all courses, reflecting its critical importance in this sector;
- the target groups ages show a generally inclusive approach, even if still prioritizing younger and mid-career participants.

An increasing interest and mobilization of initiatives have been observed over the past year, and the current acceleration in the offshore wind energy (OWE) sector is driving the need for a broader, more diverse, and specialized offer, both in terms of skills and content. At this stage, particular attention is required for the development of the maritime, port, and logistics sectors, as these strategic areas are essential for initiating the construction phase.

Analysing the current offer of VET programmes, several observations and areas for improvement emerge:

1. Limited Soft Skills Development: while the courses largely cover technical aspects such as wind systems, maintenance, and safety protocols, there is a notable underrepresentation of soft skills, such as leadership, adaptability, and teamwork, which are crucial for effective collaboration in operational environments. Many of the courses emphasize technical competencies but fail to integrate soft skills that can significantly enhance workplace efficiency and safety;
2. Short Duration and Lack of Real-World Application: a large portion of the courses listed in both tables are relatively short in duration, with limited access to real-world applications such as internships. Practical exposure is critical in the OWE sector, especially for operational roles that require hands-on experience with equipment, safety protocols, and logistics. The absence of internship opportunities in many courses limits the ability of participants to translate theoretical knowledge into practical skills;
3. Age Inclusivity and Target Groups: the courses show a generally inclusive approach to age, with many programmes targeting a broad range of participants, including younger individuals, mid-career

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professionals, and industry veterans. However, there is still a tendency to prioritize younger workers, which could limit opportunities for older or career-switching individuals looking to transition into the offshore wind sector;

4. Lack of Specialized Technician Training: while there is a strong focus on high-level technical roles, such as engineers and project managers, the training provision for operational technicians—especially those in port, logistics, and maintenance roles—is underdeveloped. These roles are crucial for the success of offshore wind projects, and the absence of dedicated programmes for such technicians creates a gap in the labor force;
5. Cross-Sector Integration: some courses, particularly those in the maritime, logistics, and energy sectors, show potential for cross-sector integration, offering transferable skills applicable across various domains. However, there is room for further integration, particularly for emerging roles that will require a blend of expertise from different sectors, such as Energy Managers (EGE), geologists, ICT experts, and project coordinators;
6. Absence of Vocational Higher Education Programmes: there is a noticeable absence of post-secondary technical education programmes, IFTS and ITS in the Italian VET system, specifically targeting the offshore wind energy sector. While there are some isolated pilot experiences, a more robust and structured offering of post-secondary vocational education is necessary to prepare technicians for the growing demand in the sector.

To address the identified gaps, several measures should be taken:

- Development of Modular Programmes: design flexible, modular training programmes that cover both sector-specific and transferable skills, allowing professionals to tailor their education to meet the specific needs of the OWE sector;
- Enhanced Collaboration with Industry: strengthen collaboration with industry stakeholders to ensure that training programmes are aligned with the practical demands of the sector, including the creation of internship opportunities and co-designed training curricula;
- Focus on Soft Skills: integrate soft skills development into all levels of training programmes, ensuring that professionals can work effectively in multidisciplinary teams and adapt to the challenges of offshore wind projects;
- Expansion of Higher Technical Education: invest in the development of IFTS and ITS programmes specifically tailored to offshore wind energy, ensuring that the training pipeline for operational technicians and support roles is strengthened.
- Cross-Sector Education Models: create interdisciplinary curricula that bring together expertise from maritime, logistics, ICT, energy management, and offshore wind domains, preparing professionals for the diverse and complex challenges of offshore wind energy projects. Programmes aimed at Energy Managers (EGE), specifically in the offshore wind energy sector, should be developed to help professionals manage and optimize energy systems in renewable energy and offshore wind power projects.

2.3.2.2 Assessment of training programme feedback and effectiveness

Surveys were conducted in the offshore renewable energy (ORE) sector, to have feedback and opinions, reported in Table 13, from students, HE teachers and VET trainers, and professionals.

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Table 13. ORE sector surveys (CoVE IT)

Interviewed	Characterization	Opinion
Professionals and directors	The interviewed professionals were mostly male between 26 and 55 years old, representing a vast range of companies and organizations of various sizes within the offshore renewable energy sector and related fields, covering different areas of the supply chain. Most of them works for Small and Medium Enterprises (SMEs), while some others are employed by larger companies with over 1,000 staff, operating internationally. In fact, even though most of these companies have a branch exclusively in Italy, over 40% of them provide their products globally. The respondents cover different positions within the operations department, human resources, chief officers, team leaders or supervisors. Their companies primarily operate within the upstream phases of the offshore renewable energy value chain, focusing on activities such as pre-planning and project planning.	75% of companies involved in the survey currently have job vacancies and agree that filling vacancies in the renewable energy sector can be very challenging due to a lack of adequately skilled applicants. Engineering, along with health & safety, are the domains where the highest levels of education and training are required. For most of the occupational groups considered in this survey, such as metalworkers, technicians, draughts persons, installers, and plant operators, respondents believe that an upper-secondary or vocationally oriented education is sufficient. Among the additional educational and training requirements, the respondents identified: • specialized skills in offshore renewable energy; • expertise in the port and maritime sectors; • post-degree specialization courses. They also emphasized the importance of strengthening the collaboration between companies and universities to better prepare students for the labour market, helping them understand the tasks and skills they will need to apply in their daily work. Most companies are aware that a continuous review of skills and training needs is vital for maintaining a competent and productive workforce, ensuring compliance with industry and legal standards. Nearly half of the respondents reported that their companies review skills and training needs more than once a year. A significant portion also indicated that these reviews are conducted on an annual basis.

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Interviewed	Characterization	Opinion
HE teachers and VET trainers	The interviewed sample consisted of VET trainers (EQF levels 4-6) and University teachers and professors (EQF 6-8), between 26 and 55 years old. 40% are permanent teaching staff, 32% are freelance professionals, and 24% hold temporary teaching positions. Most of them declared to be specially qualified in onshore solar energy (64%), while 24% in onshore and offshore wind energy. There is a clear majority of respondents who focus their lectures on onshore solar energy (80%), while 36% on wind onshore energy. Only 16% focus also on offshore wind energy. As evidenced, the teaching activities of the respondents primarily focus on the early stages of the ORE value chain: programmemes and activities in which the respondents are involved are mainly focused on the phase of pre-planning/research about the effectiveness of ORE technologies. The study programmemes of the respondents encompass a range of technologies related to renewable energy, e.g. energy storage (48%), energy management systems (44%). A substantial focus is also given to smart technologies, internet telecommunications, IoT, and artificial intelligence. The respondents stated that the tools that they address the most in their study programmemes are programmeming languages, simulation software and collaboration tools, followed by computer-aided (CAD) software and data visualization tools. Most of the respondents update their training course on annual base (44%) or even more than once a year (32%) to keep up with the latest advancements, highlighting the influence that the rapid	According to the teachers interviewed, the educational programmemes offered by their institutions are generally of a high standard. Nevertheless, the teachers highlighted several skill gaps among students that educational programmemes should address: • engineering skills (electrical, structural, and offshore engineering). • project design. • project planning. • digital skills. • project management skills. • health and safety skills. With reference to soft skills, the teachers highlighted mainly critical thinking and problem solving, but also flexibility and adaptability. Respondents indicated that while hard skills are regularly addressed in bachelor's and master's degree programmemes, as well as in vocational training courses, soft skills are more effectively developed through internships and on-the-job training, including mentoring and job shadowing. Additionally, they agreed that internal training offered by companies plays a crucial role in developing both hard and soft skills. Respondents also agree that the most significant challenge they face in their teaching or training activities is keeping up with the constant changes of the industry. This is linked to the need of understanding certification standards and requirements, to update their curriculum to meet those standards and to coordinate with certification bodies.

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Interviewed	Characterization	Opinion
	evolution of the industry plays on educational programmemes.	
Students	79% are pursuing a bachelor's degree, 4% are working towards a master's degree, and 17% are enrolled in vocational schools. Most respondents are engineering students at the university. A vast majority of students (84.1%) is oriented towards engineering jobs, followed by “Designers” (24.4%)[33], "Technicians" (22%), “Plant Operators” (17.1%), “Metalworkers” and “Health and Safety Officers/Managers” (both at 15.9%).	They think the best technologies that best fit into their career are onshore solar energy (40%), hydropower (28%), offshore wind energy (16%) and onshore wind energy (12%). The students declared to feel less confident in “vertical” technical-professional fields rather than in cross-functional areas. Most of them believe that their current education prepared them well (50%) or even very well (11%) for the renewable energy market's demands, with an additional 35.4% indicating to be receiving “enough” preparation. However, 86.6% of them declared to have not had any practical experience in the field. Respondents' perceptions of the obstacles to gaining practical experience in this field were uniform, indicating: • difficulty in connecting with industry professionals (42.7%). • insufficient practical training in their current curriculum (37.8%). The above could be overcome through the support from the institutions, by internship placements, career counselling, industry networking opportunities, scholarships and funding. In addition, students highlighted geographic constraints (e.g., living in an area with no nearby offshore facilities) and a lack of internship opportunities (both 32.9%).

In addition to the surveys, several face-to-face interviews were carried out with trainers, teachers and professionals. Remarkably, opinions converged on many points, as follows:

[33] Multiple answers were allowed. Thus, percentages do not simply sum up to 100%.

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- It is necessary that both students and educators remain informed about changes in legislation and industry practices. To address this challenge and keep their curricula updated, teachers can exploit various strategies, like:
  - acquiring the current sectorial standards;
  - regularly consulting field experts;
  - conducting compliance reviews;
  - participating in policy forums and collaborative workshops.
- Among the main challenges in collaborating with the industry, most respondents highlight the lack of alignment between the needs of universities/training institutions and those of businesses. Respondents point out several challenges in ensuring students are prepared for the offshore renewable energy sector, revolving around key factors:
  - the need to provide practical training opportunities and give students access to real-world projects;
  - the development of industry-specific skills;
  - searching opportunities to create effective partnerships with companies;
  - establishing advisory boards and feedback loops with industry leaders, to ensure that training programmemes keep reflecting emerging technologies like floating wind, hybrid systems, and advanced monitoring tools;
  - the availability of specialized equipment and facilities;
  - the alignment of academic curricula with current industry technologies and standards; this includes also the legal domain.
- Addressing these challenges requires joint commitment from educators, industry partners, and policymakers to create a robust framework that supports learning and skill development in the offshore renewable energy sector.
- With reference to stakeholder engagement in training, labour market respondents stated that their companies prefer overall to participate in association-led initiatives and panels and, in second order, to attend and sponsor sector-specific conferences and seminars.
- Furthermore, companies acknowledge the importance of continuous learning for their employees.
- Emphasise teamwork, problem-solving, and communication;
- Recognise the importance of organizational skills and the ability to learn quickly.
- However, teachers place greater focus on teaching-related skills such as systemic/holistic thinking, while professionals emphasize innovation, creativity, and leadership.
- Teachers highlight the need for universities to quickly adapt to changes in learning methods and the specializations required by the job market. Industry representatives are more focused on practical management and business challenges related to these needs.
- Real-world engagement is key to foster lifelong learning and skill development in the ORE industry. Strategies such as involvement in industry-sponsored projects, case studies, and competitions help students connect theoretical knowledge with practical applications.

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- Programmemes like the Talent Academies showcase the value of targeted upskilling initiatives where participants are pre-selected and directly engaged, increasing their commitment to skill development. Similarly, modular and stackable certifications in emerging technologies (e.g., floating wind, hybrid systems) allow professionals to continuously upskill without interrupting their careers.
- Highlighting career trajectories and the societal impact of ORE motivates students to adapt and innovate, while gamification of training and exposure to problem-solving in multidisciplinary teams can further enhance their learning experience. Promoting adaptability and innovation as core values prepares students for rapid industry changes.
- International collaboration is critical for enhancing training quality in the sector. Key benefits include sharing best practices, exposing students and professionals to diverse technologies and environments, and creating standardized certifications for global employability. Programmemes like Erasmus+ and international research collaborations are highlighted as effective platforms for fostering exchange and ensuring global relevance in training. These initiatives offer exposure to varied offshore conditions, regulatory frameworks, and advanced technologies, enriching the learning experience. Collaborations with leading institutions, particularly from Northern Europe, can introduce cutting-edge knowledge and innovative practices to Italy.

In summary, effective strategies include integrating real-world projects, industry collaborations, international mobility, modular certifications, and showcasing the sector's dynamic nature and societal benefits. These approaches can encourage a mindset of continuous learning and adaptability, ensuring students and professionals stay ahead in the evolving ORE industry.

2.3.2.3 Identification of barriers and enhancements for inclusion and accessibility

The increase in the participation of underrepresented groups in the labour market, such as women and young people, is one of the priority areas for action, involving Member States and social partners identified by the European Commission to address the skills gap in green sectors. The other four priority areas identified are:

- Support for education, vocational training, and skills development;
- Improvement of working conditions in specific sectors;
- Enhancement of internal mobility within the EU, both for training and employment;
- Attraction of talent from outside the EU.

The feedback received from industry representatives and trainees does not highlight challenges related to inclusion and accessibility in VET programmes. This is partly because the industry in Italy and the Mediterranean region is still in its early stages. For this reason, a wide range of data related to inclusion and accessibility is not currently available. Expanding the scope to other related and more developed sectors in Italy, the following observations can be made:

- In sectors such as maritime, port, and logistics, male workers are overrepresented at all levels, although there has been a growing interest among women in these fields in recent years.
- Operational roles in construction and maintenance are largely occupied by male workforce.

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- On the other hand, fields such as engineering, geology, biology, and economics are some of the specialization areas where there is more equal participation of women, both as technicians and in managerial positions.

2.3.3 Development of actions to deliver labour-market relevant skills

2.3.3.1 Updating training offerings for ORE sector

As part of the effort to modernize vocational and higher education for the offshore renewable energy (ORE) sector, existing academic programmes have been reviewed to identify opportunities for curriculum enhancement. This process led to the selection of relevant master's level courses in energy and infrastructure engineering as suitable platforms for integration of updated content aligned with evolving industry needs.

In one of the selected courses, new modules will introduce offshore wind energy technologies, focusing on platform typologies based on seabed depth. The curriculum will cover fixed-bottom structures such as monopiles for shallow waters, semi-submersible and floating platforms for deep-sea environments, and intermediate solutions including concrete gravity bases and tripod foundations. In addition, logistical aspects related to the transport of turbines and components to offshore sites will be discussed, including the organization and management of offshore construction yards.

Another course will incorporate content focused on wind resource assessment through the use of reanalysis data and mesoscale atmospheric models. This includes the explanation of meteorological scales (macro to micro), the use of historical databases such as ERA5 (ECMWF Reanalysis 5th Generation), and the application of numerical models to reconstruct historical and forecast future wind availability. These techniques are particularly relevant given the variability and non-dispatchable nature of renewable energy sources such as wind power.

To reply to the demand of technicians, a revision of existing post-secondary curricula will be developed. In Italy, graduates of 5-year upper secondary programmemes or 4-year IeFP programmemes who passed entrance exams may enrol in:

- Higher technical education and training courses (Istruzione e formazione tecnica superiore, IFTS): 1-year post-secondary non-academic programmemes leading to a high technical specialisation certificate (certificato di specializzazione tecnica superiore, EQF level 4).
- Higher technological institute programmemes (Istituti tecnologici superiori; ITS academy): 2-year tertiary non-academic programmemes which lead to a high-level technical diploma (diploma di specializzazione per le tecnologie applicate - EQF level 5. The implementation of the recently reformed system (2022) of Higher Technological Institutes is ongoing in 2023. It foresees the introduction of three-year programmemes leading to an Applied Technologies qualification (EQF level 6).

The Italian CoVE intends to initially focus on higher technical education and training courses (IFTS). These programmes are based on national standard specializations and competences which are declined, in the course proposals, according to more specific industry and territorial needs. According to the needs analysis conducted in the past year, the more relevant specializations - listed by economic-professional area - are the following ones:

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- Economic-professional area: Mechanics, Systems and Construction
    - Techniques in Industrial Design and Drafting
    - Techniques for Product and Process Industrialization
    - Techniques for Production Planning and Logistics
    - Techniques for Installation and Maintenance of Civil and Industrial Systems
    - Techniques for Environmental Safety Systems and Industrial Process Quality
    - Techniques for Environmental and Land Monitoring and Management
- Economic-professional area: Culture, Information and Information Technology
    - Techniques for Network and System Security
    - Techniques for the Design and Development of Software Applications
    - Techniques for the Integration of Systems and Telecommunication Devices
    - Techniques for Database Design and Management
- Economic-professional area: Business Services
    - Techniques for Economic and Financial Management and Administration

Specific programmemes are being developed by VET providers for some of these specialisations, while for others, the revision of existing curricula is being proposed. This includes updating certain units and introducing new ones, with the aim of equipping students with the competences required by companies operating in the ORE industry.

Furthermore, introduction of training modules covering general aspects of offshore wind energy is considered strategic, as it enables more cross-functional professional profiles to operate across the value chain, equipped with specific knowledge and skills related to offshore wind energy.

These units will cover topics such as the current regulatory frameworks, the state of the art in Europe and nationally, key stages of the offshore wind value chain, and an overview of notable projects at national and regional level.

All content updates are being implemented in the national language to ensure inclusivity and effectiveness at the local level. The revised curricula will support learners in acquiring competencies aligned with European labour market expectations and the EQF framework, thus reinforcing the link between education and the strategic goals of the offshore renewable sector.

2.3.3.2 VET curricula and qualifications proposals

Proposals of VET curricula and qualifications to be developed at the consortium and CoVE level:

- Topics and objectives

  EQF 4 – IFTS programmes:

  In consideration of the status and needs in the ORE industry in Italy, the most required IFTS specializations are:

    - Techniques in Industrial Design and Drafting

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- Techniques for Production Planning and Logistics
- Techniques for Environmental Safety Systems and Industrial Process Quality
- Techniques for Environmental and Land Monitoring and Management
- Techniques for Database Design and Management

Another important opportunity, currently being explored with stakeholders to meet both current and future demands for professionals—including technicians and operators—in the relevant job market, is the IFTS Academy (EQF 4): Higher Technical Education and Training delivered through apprenticeship.

- Delivery methods (e.g. in-person, online, blended) – Blended, with an envisaged a predominant focus on in-person sessions. More specifically, IFTS programmes are structured into a theoretical classroom-based component and a practical in-company component (at least 40% of the total duration). Additionally, project work activities and laboratory sessions may also be included
- Target audience (e.g., students, professionals, unemployed, etc.): IFTS programmes are targeted at individuals seeking to acquire a specialization and access employment opportunities in the ORE industry, operating as technicians within companies across the related supply chain. The main target group includes recent graduates and unemployed individuals. No age limits are established.
- The IFTS Academy is addressed to young people up to 25 years of age who, following a selection process, are enrolled in a 6- to 12-month Higher Technical Education and Training programme (IFTS) and, at the same time, are employed by a company under a first-level apprenticeship contract.
- Duration of training: it will maunly depend from the envisaged EQF. Usually, IFTS programmes have a duration of 800-1000 hours.
- Learning outcomes and skills - Higher Technical Education and Training programmes are regulated by law at national level, general and technical competences are described within the relevant regulations. Additional competences to fulfil specific needs of a specific industry, sector and territory can be introduced in the programme.
- Evaluation and assessment methods – Mid-course assessments, internship evaluation, and final exam
- Measures to foster inclusion – The main measures envisaged in these offered programmes includes:
  - Orientation meetings: aimed at supporting candidates in choosing the training pathway most suited to their previous skills/experience and professional aspirations, and to prevent the dispersion of potential participants
  - Organization of free hands-on Summer Camps aimed at promoting inclusion and gender equality, particularly in STEM disciplines and technical professions
  - Feedback analysis, tutoring and coaching activities throughout the realization of the programme

- Additional and personalized training sessions, materials and remedial sessions for those students who fail assessments tests or with special needs.

2.3.3.3 National CoVE workshop

As part of the SHOREWINNER project activities, a national workshop was organized to present the VET Excellence Roadmap to local stakeholders operating in the field of offshore renewable energy (ORE) and related sectors, held on 17/04/2025. The event served as a strategic moment to introduce the long-term vision of the national CoVE, share preliminary findings from the sectoral needs analysis, and explore opportunities for alignment between education, industry, and policy.

The workshop brought together over 30 external participants, including representatives from academic institutions, vocational training centres, energy-related companies, public authorities, and civil society organizations. The meeting format included presentations, open discussions, and the collection of feedback through structured dialogue sessions. Particular attention was given to the role of VET in supporting the development of competencies required for the emerging offshore energy value chain, with specific reference to skills in offshore wind planning, marine engineering, sustainability, logistics, and safety.

A particularly valuable contribution was provided by a stakeholder from a leading technical university, who noted that certain advanced topics in offshore wind and ocean energy are already part of a master's level course in energy engineering. Furthermore, they shared that their institution is actively considering the launch of a dedicated degree programmeme in Ocean Engineering. In this context, they expressed strong interest in aligning such ambitions with European initiatives like SHOREWINNER, which could act as a catalyst and offer institutional leverage to support innovation in academic governance.

The stakeholder expressed willingness to continue the dialogue and explore possible collaboration with the national CoVE and the broader SHOREWINNER network. This input illustrates the potential of the project to stimulate national-level developments in educational policy and programmeme design, beyond the immediate scope of its activities. It also highlights how CoVE workshops can function not only as dissemination moments but as living labs for co-creation, institutional exchange, and political engagement.

All materials from the event were collected and shared through a digital platform, and follow-up actions were planned to maintain the engagement of participants. The feedback gathered will inform the next phases of the roadmap development and help identify strategic priorities for capacity building and curriculum innovation in the offshore renewable energy sector.

2.3.4 Opportunities for cross-border collaboration

The SHOREWINNER project foresees multiple opportunities for cross-border collaboration and exchange aimed at fostering transnational cooperation and mutual learning among VET providers across five countries. This is achieved through a combination of strategic initiatives outlined in the project's implementation plan:

- **International Mobilities and Study Visits:** At least three study visits and 24 international mobilities targeting students are planned. These initiatives are designed to foster transnational learning experiences, encourage knowledge transfer, and enhance mutual understanding among VET institutions operating in the ORE sector.

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- **Co-creation of Continuous Training Modules:** Partners will co-develop and test 2–3 innovative continuous training courses focused on reskilling and upskilling workers within the sector. This approach encourages cooperation in curriculum design, implementation, and the exchange of pedagogical practices between VET providers in different countries.
- **Development of Career Kits and Participation in Skills Competitions:** The project includes the organization of at least two international Skills Competitions and the creation of at least four "career kits". These activities promote cross-border dialogue on the evolving skill needs of the industry and support the alignment of training offers with labour market demands.
- **Shared Mapping of Professional Profiles:** The Italian CoVE will work with other project partners to define **at least 15 professional profiles** in the ORE sector. This collaborative effort promotes a common understanding of emerging job roles and supports the comparability of qualifications and competences at the European level.
- **Organisation of Knowledge-Sharing Workshops**: The national CoVE will organise knowledge-sharing workshops aimed at bringing together sector stakeholders, policymakers, and training providers to present best practices, showcase success stories, and promote dialogue on emerging trends and innovations in the offshore renewable energy (ORE) and blue economy sectors. These workshops offer a valuable opportunity for cross-border collaboration, as they can be designed and implemented in cooperation with CoVEs from other countries. Joint participation will foster the exchange of experiences across different national contexts, support mutual learning, and strengthen the visibility and impact of the SHOREWINNER project at the European level. By aligning workshop themes and involving international speakers or participants, CoVEs can collectively address common challenges and contribute to building a shared knowledge base across borders.

These initiatives are grounded in the Italian CoVE's mission to address current skill gaps, both technical and transversal. By integrating transnational collaboration into its activities, the CoVE contributes to building a connected and responsive European vocational education ecosystem capable of supporting the sustainable growth of the offshore renewable energy sector.

2.4 Greece

2.4.1 Results and recommendation analysis of ORE sector needs and trends

The following analysis of findings and recommendations relates to the surveys conducted in Greece during the first year of the SHOREWINNER project. These surveys concerned industry professionals (22 responses), VET and HEI instructors (36 responses) and VET and HEI students (86 responses).

2.4.1.1 Industry professionals

Survey identity

Survey participants were Greek professionals working in the wind energy sector, most of them were in the age group of "Between 36 and 45", 60% of respondents were men and most of them were highly educated holding important roles in their companies. Most of them, based on the most frequent answers, work in companies operating in the "Pre-planning/ Research" phase of the offshore renewable energy value chain. Actually, since the offshore wind industry in Greece is at its very early stages, most of the respondents work in companies active in the Pre-planning/Development phase of onshore projects, but these are the same

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companies which are expected to be a part of the offshore supply chain offering the same services which they offer today, and which they know best, i.e. Pre-planning/Development services. These companies mostly employ engineers and secondly technicians, as it becomes evident from the survey.

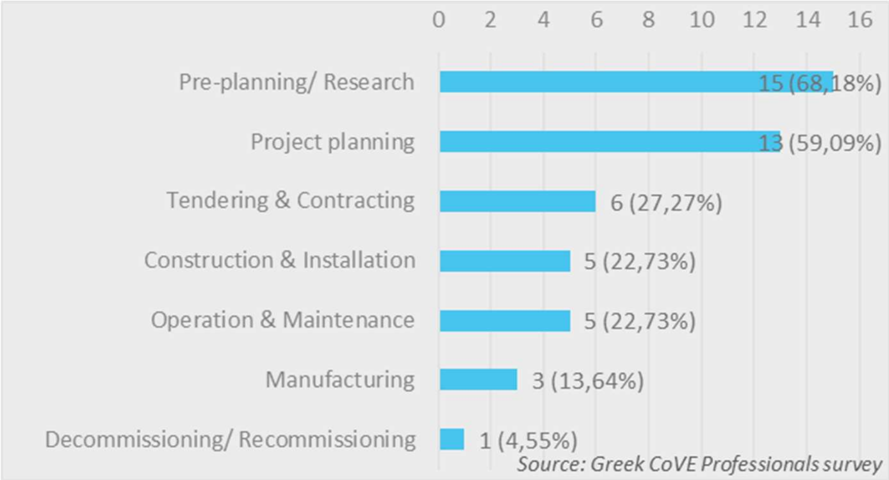

Figure 3. Phases of the offshore renewable energy value chain, where the companies of the respondents mainly operate (Question asked: Which phases of the offshore renewable energy value chain do the activities of your company typically cover?) (CoVE GR)

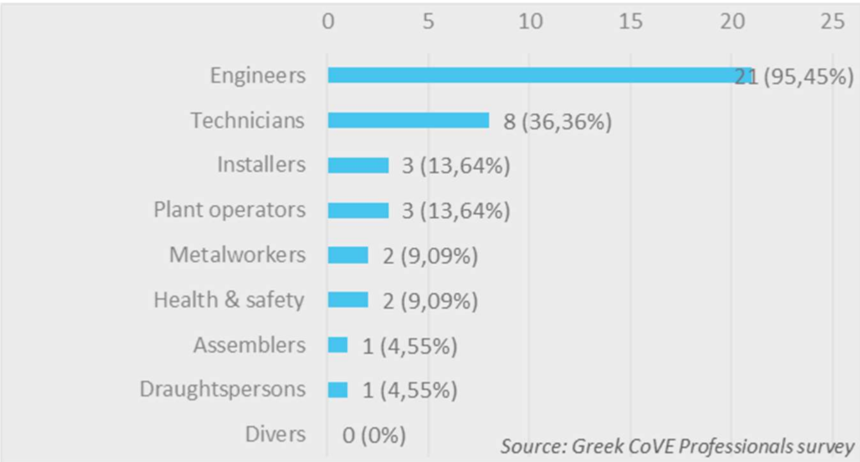

Figure 4. Employment profile of the companies where respondents work (Question asked: Which of the following occupational groups are the most representative among your company's employees?) (CoVE GR)

The survey is divided into two parts, at the first one the industry skill priorities, its current situation, observed gaps/ skill shortages and ways to address these issues are presented, while at the second part collaboration between companies and associations, continuous learning and development for employees, smart specialisation, compliance with regulations and standards, and other relevant issues are presented.

Skills supply / Skills review

In our effort to identify the industry skills priorities and the skill supply, we asked survey participants about the minimum requirements in terms of education and training for specific occupational groups, which are expected to play a significant role in the deployment of the offshore wind industry in Greece. As it was

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expected, as we move from technical job roles which require mainly practical skills and technical expertise to engineering roles the minimum requirements are increasing to the level of Tertiary/MSc.

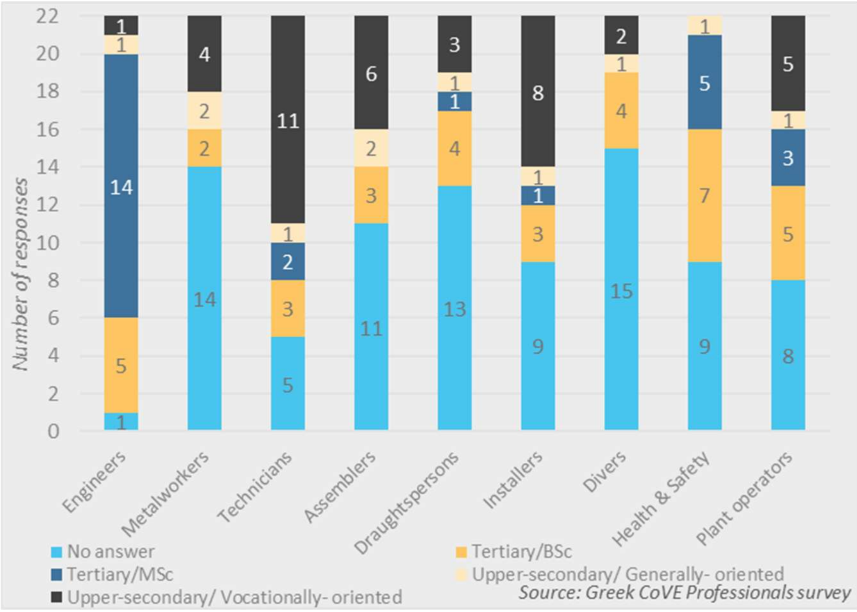

Figure 5. Minimum requirements in terms of education and training for each occupational group (Question asked: What are your minimum requirements in terms of education and training for each occupational group?) (CoVE GR)

As to where organizations offer training, the vast majority is provided in-house or online with distance training. General knowledge training is likely to be provided in-house or online, while when it comes to greater specialization this is more likely to be undertaken not in-house but with external training for staff development, supporting the attendance of workshops and post graduate studies (see next figure).

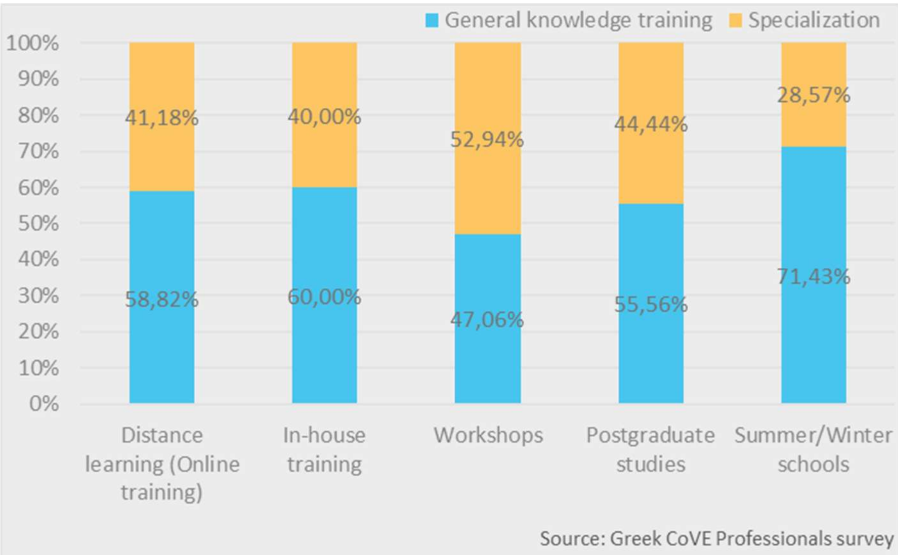

Figure 6. Types of training measures which companies use to upskill their employees (Question asked: Does your company support training measures? If yes, which is/are the type(s) of training preferred in your company? If no, skip the question.) (CoVE GR)

However, the first step that companies need to make, before offering training to their employees (either online, or in-house, or via workshops, etc.), is a training needs analysis determining which type of training an employee needs to thrive in his role, fill a knowledge/skill gap, or develop his learning in order to improve his job performance. Based on the outcomes of our survey, companies tend to review the skills and training needs of their employees on an annual basis. While it seems that companies tend to review the skills and training needs of their engineers and less of their technical staff. This last question and the provided answers reveal the early stage of the offshore wind industry in Greece, as no respondent referred for example to divers indicating that we have not yet absorbed the idea that this new industry will require personnel with different characteristics compared to the one currently employed in the onshore wind energy sector.

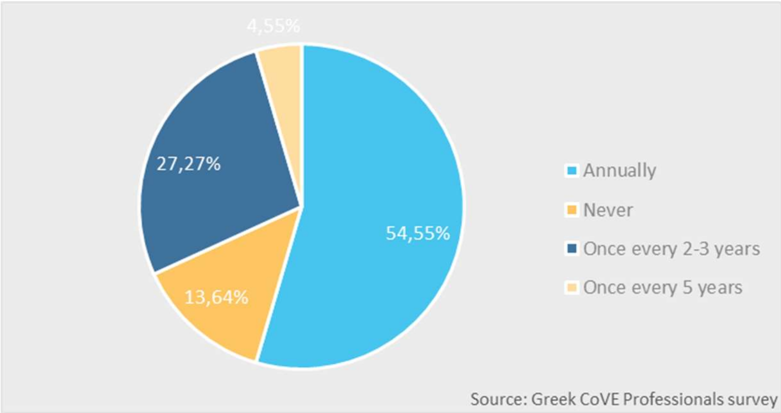

Figure 7. Frequency at which companies review the skills and training needs of their employees (Question asked: How regularly does your company review the skills and training needs of your employees?) (CoVE GR)

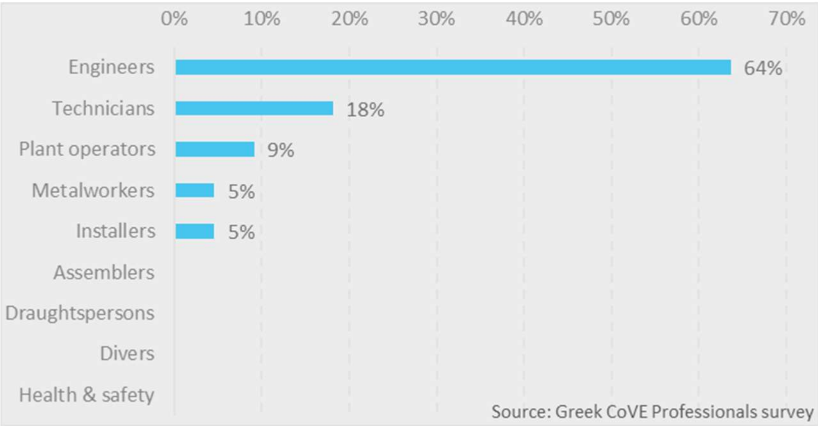

Figure 8. Employee groups which are evaluated as for their skills and training needs (Question asked: Which employee groups are mainly addressed?) (CoVE GR)

Respondents were also asked to rate the importance of specific technologies in their companies. As next figure shows, the most important technology is Energy Management Systems (EMS) (e.g., SCADA, BEMS) as this was the most frequent answer. An energy management system is a system of computer-aided tools used by operators of electric utility grids to monitor, control, and optimize the performance of the generation or transmission system. Also, it can be used in small scale systems like microgrids. Other popular answers were cloud services (e.g., AWS, Google Cloud Platform) and energy storage (e.g., lithium-ion batteries, supercapacitors).

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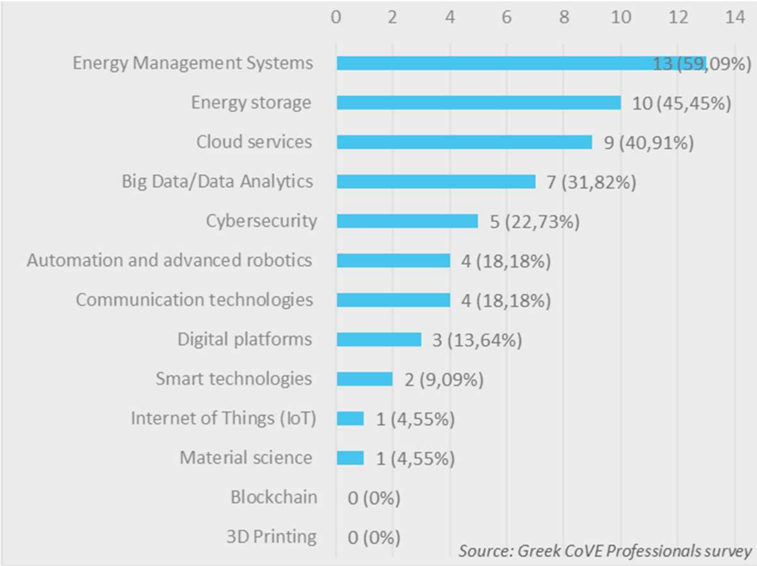

Figure 9. Technologies which are considered more important in one company (Question asked: Which of the following technologies do you consider most important for your company?) (CoVE GR)

A critical outcome of the survey conducted was the identification of possible skill gaps in the current workforce and in what ways these gaps could be addressed.

With regard to hard skills, based on the respondents' most frequent answers, the most important gaps that should be addressed by educational/training programmes are engineering skills (e.g., electrical, structural, offshore engineering) and offshore specific skills (e.g., working at heights, underwater welding) (this was a multiple-response question, so the total percentage exceeds 100%.).

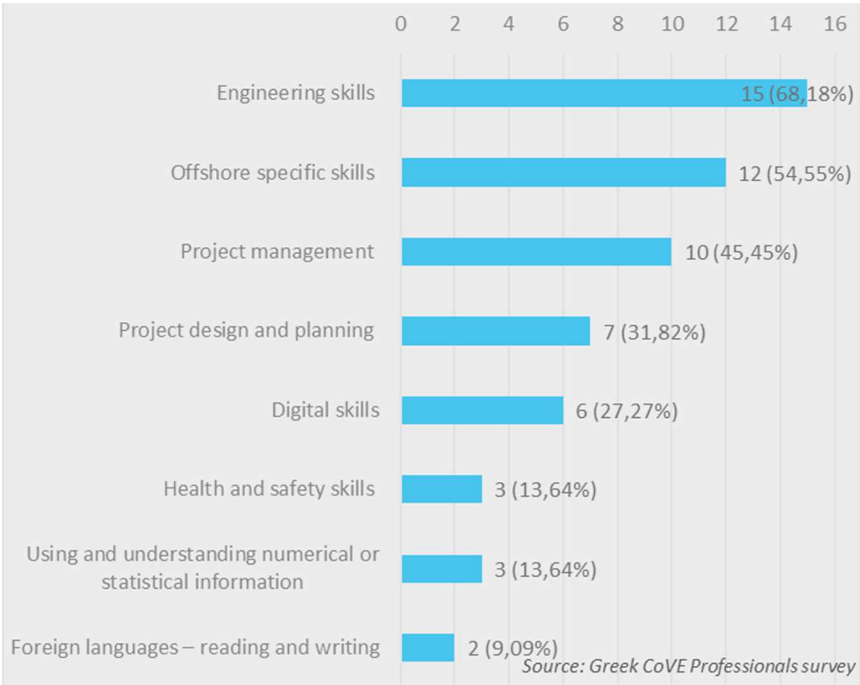

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Figure 10. Skill gaps in terms of hard skills which should be addressed by educational/training programmes (Question asked: With regard to hard skills of your employees, what in your opinion are currently the most important gaps that should be addressed by educational/training programmes?) (CoVE GR)

While when the same question was addressed in relation to soft skills, respondents replied more frequently and identified that the most important gaps had to do with skills such as critical thinking and problem solving (analyzing issues and finding effective solutions) and communication and collaboration (exchanging information clearly and working well in teams) (this was a multiple-response question, so the total percentage exceeds 100%.).

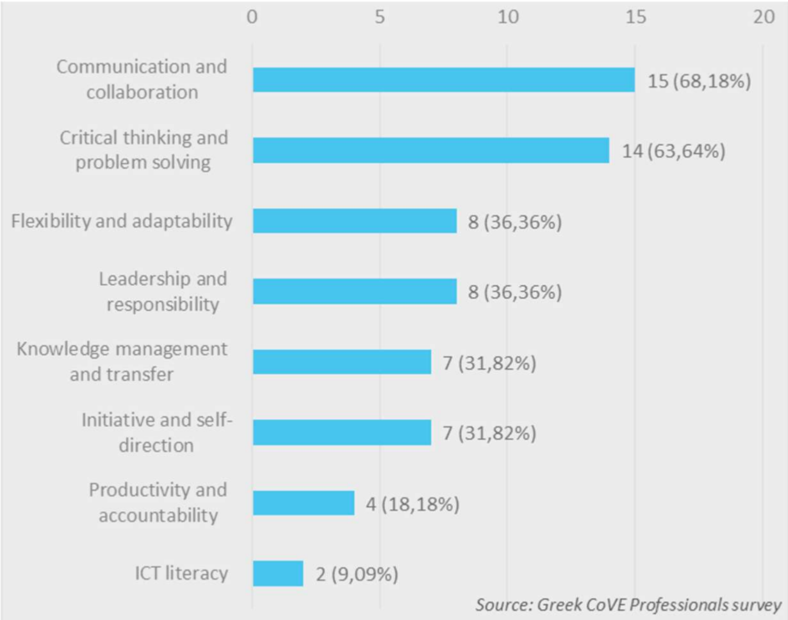

Figure 11. Skill gaps in terms of soft skills which should be addressed by educational/training programmes (Question asked: With regard to soft skills of your employees, what in your opinion are currently the most important gaps that should be addressed by educational/training programmes?) (CoVE GR)

A correlation analysis was conducted in order to investigate if there is correlation between the identified skill gaps in terms of soft skills and hard skills. It seems that there is high correlation between "Digital skills" and "Using and understanding numerical or statistical information", "Engineering skills" and "Leadership and responsibility", while there is important negative correlation between "Critical thinking and problem solving" and "Communication and collaboration".

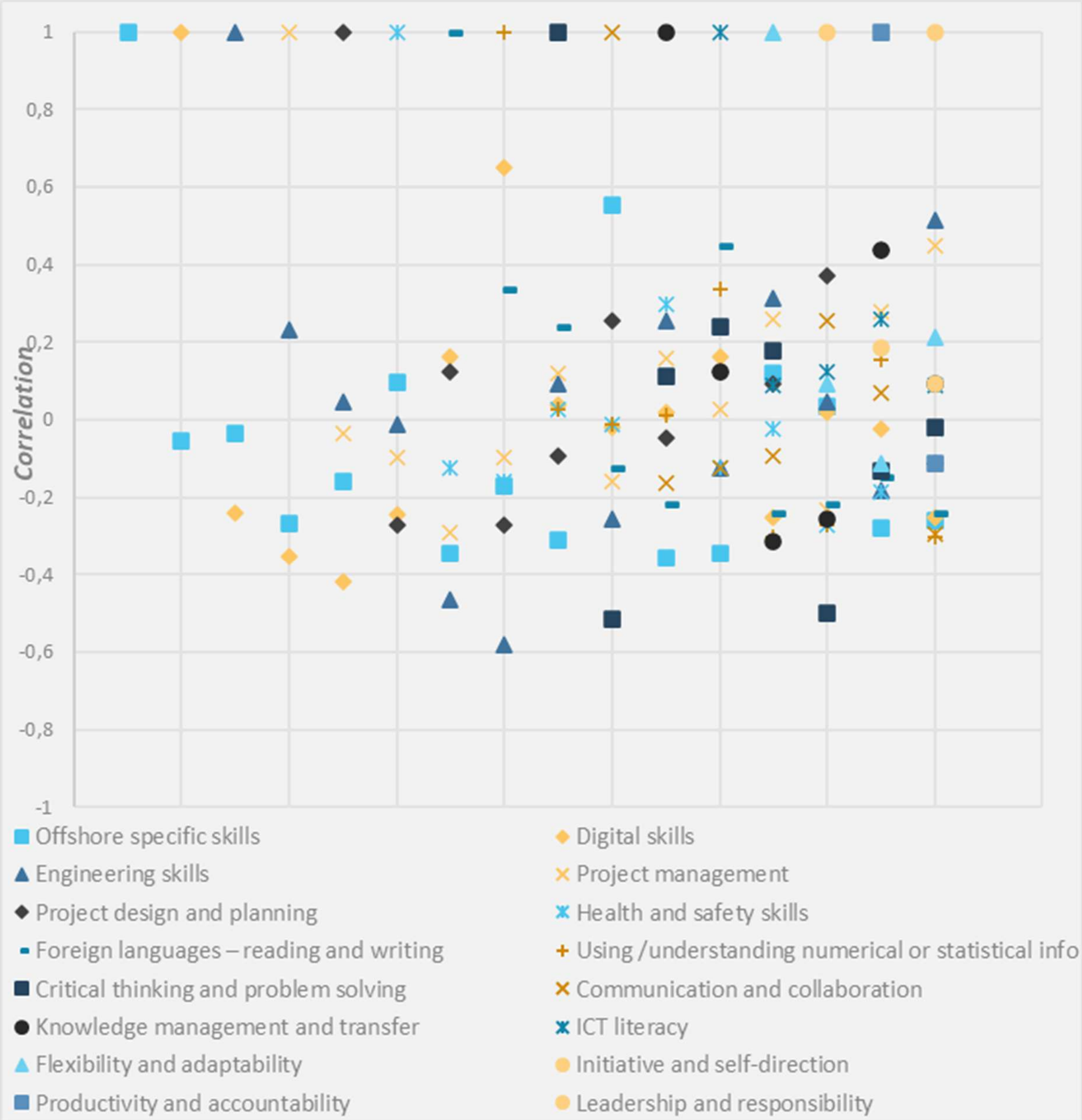

Figure 12. Correlation between identified skill gaps in terms of soft skills and hard skills (CoVE GR)

Once the above-mentioned gaps in relation to hard skills and soft skills had been identified, respondents were asked to evaluate the most appropriate method which should be used in order employees to acquire these "missing" skills. In-house training, on-the-job training and VET programmes seem more effective for employees to acquire or develop the necessary soft skills, while educational programmes at the level of Master seem ideal to tackle the gaps identified in relation to hard skills.

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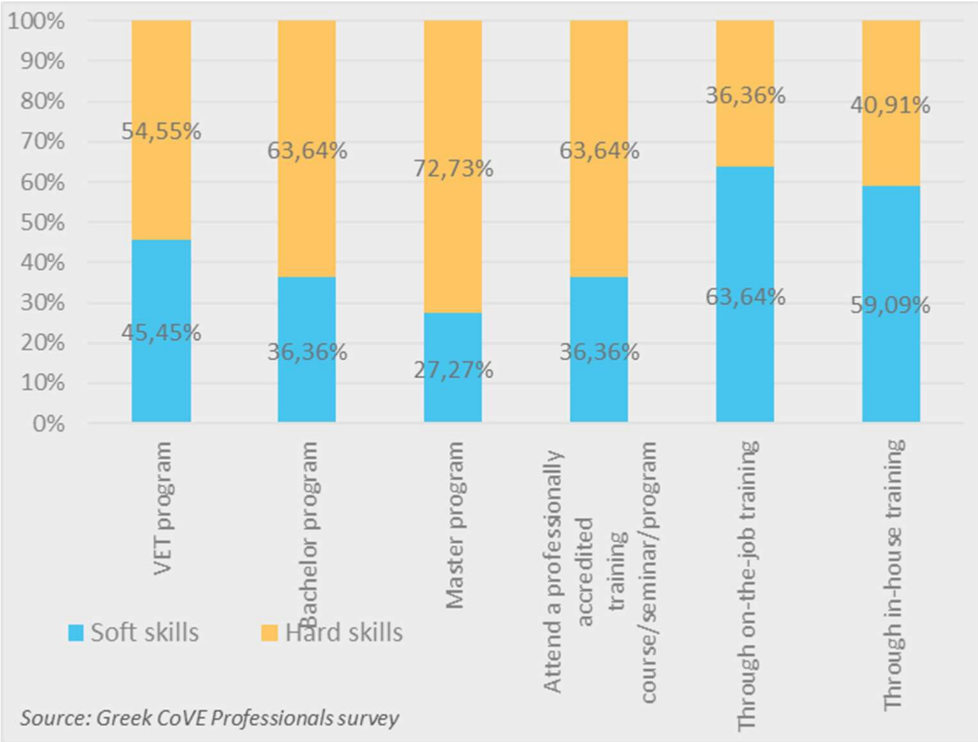

Figure 13. Most effective methods for employees to acquire / develop soft& hard skills (Question asked: Which methods do you believe are most effective for employees to acquire or develop the following skills?) (CoVE GR)

Collaboration and challenges

To ensure regulatory compliance, businesses must stay updated with relevant regulations and implement effective policies and procedures. Staying informed about the ever-changing regulatory landscape is key. Businesses should closely monitor and understand the laws and regulations that govern their industry. Taking into account the importance of this business practice, respondents were asked how their companies ensure their compliance with current regulations and standards. It seems, based on the most frequent answers, that most of the companies have established a dedicated compliance team responsible for monitoring and identifying new regulations that apply to the organization and/or engage external consultants and experts to audit compliance practices. Such teams continuously monitor industry news, regulatory agency websites, and relevant publications to identify any regulatory changes (this was a multiple-response question, so the total percentage exceeds 100%.).

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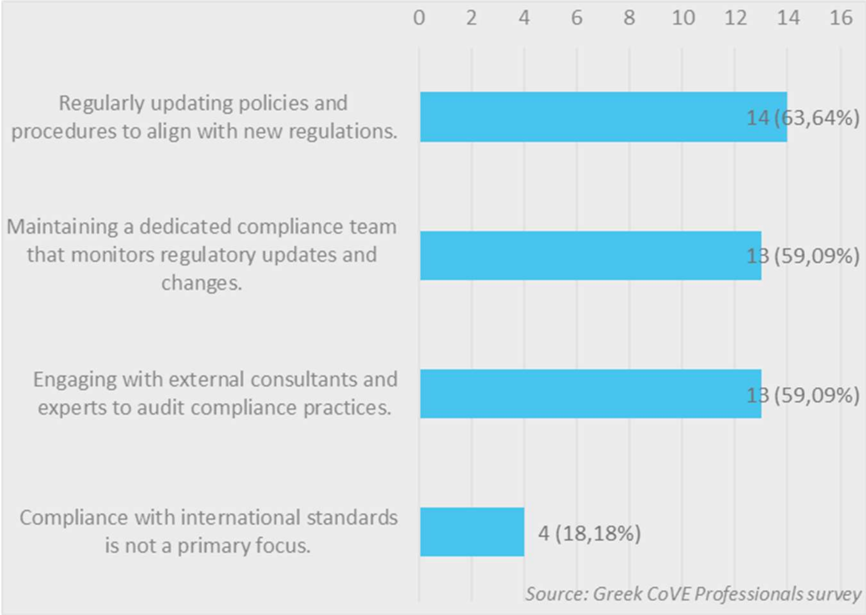

Figure 14. Ways which companies use to ensure their compliance with current regulations and standards (Question asked: How does your company ensure its compliance with current regulations and standards?) (CoVE GR)

By pooling resources, knowledge, and expertise, collaborative networks enable companies to drive innovation, bolster growth, and elevate their competitive edge in the market. The importance of engaging with other companies and associations of the sector in which one company operates was outlined in this research as well. More specifically, respondents were asked about the strategies that they use to engage with professional associations in their sector. Most of them seem to participate in associations and attend conferences or seminars in order to build collaborative networks and enhance the exchange of knowledge and information.

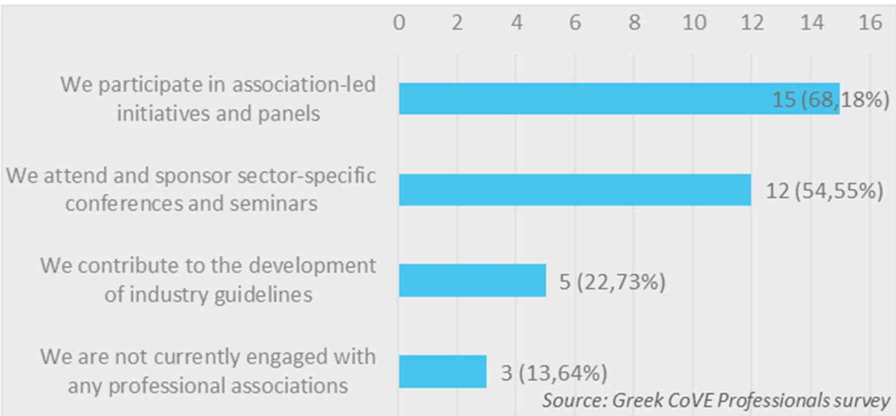

Figure 15. Strategies which companies use to engage with professional associations in their sector (Question asked: What strategies do you use to engage with professional associations in your sector?) (CoVE GR)

In this context of examining collaborations strategies which could enhance the performance of the companies, respondents were asked if and in what way they collaborate with technology providers. As next figure shows, the most frequent answer was that companies tend to engage in pilot projects for new technology applications.

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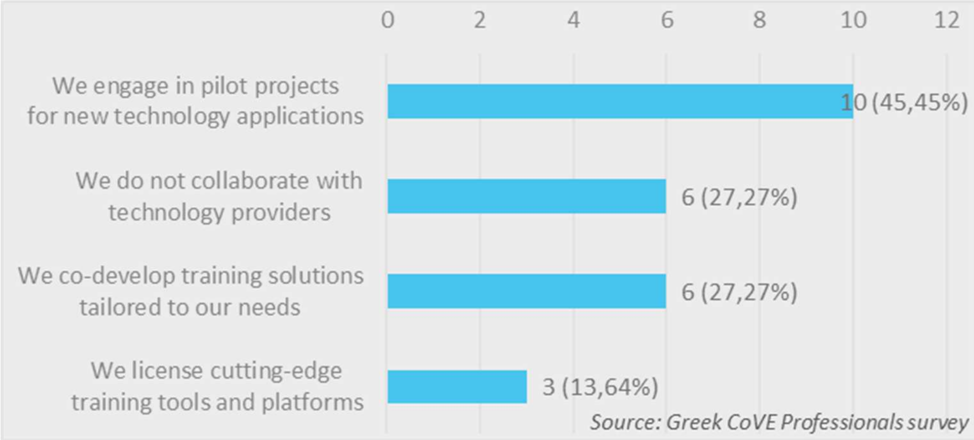

Figure 16. Ways which companies use to collaborate with technology providers in order to enhance their performance (Question asked: In what ways do you collaborate with technology providers to enhance company performance?) (CoVE GR)

Effective employee and team training is a staple of any successful organization. The concept of continuous learning in the workplace transforms the way teams approach professional employee development altogether. Rather than seeing learning and growth as something that happens in isolation or at certain moments in time, the goal is for all team members to constantly be growing more knowledgeable and competent at all times. Learning and professional development can occur in a number of different ways within an organization. In this context, we asked respondents about the support structures which are in place in their companies to facilitate continuous learning and development for employees. Most of the companies seem to offer to their employee's subscriptions to online learning platforms, while there is a significant percentage of companies which unfortunately do not promote the concept of continuous learning at all or at a very limited level.

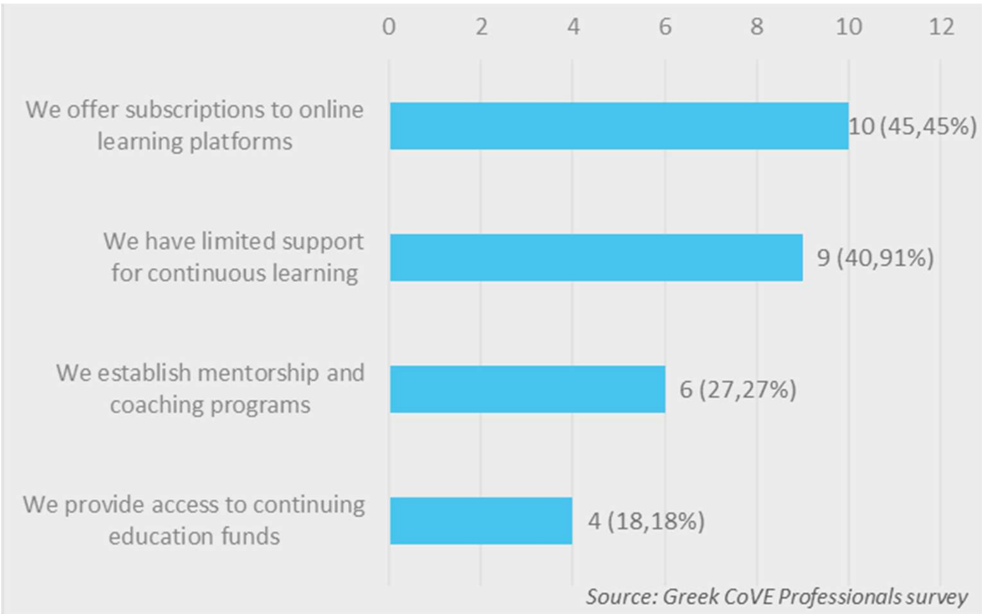

Figure 17. Company structures in place to facilitate continuous learning and development for employees (Question asked: What support structures are in place to facilitate continuous learning and development for employees?) (CoVE GR)

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Transversal skills

ESCO (European Skills, Competences and Occupations) identifies six main categories of transversal skills and competences: core skills and competences, thinking skills and competences, self-management skills and competences, social and communication skills and competences, physical and manual skills and competences and life skills and competences. In this survey, recognizing the importance of transversal skills, respondents were asked to identify the transversal skills which are cultivated at their companies. Teamwork, problem solving and planning and organization have been identified as the ones promoted and cultivated the most, as these were the most frequently provided answers.

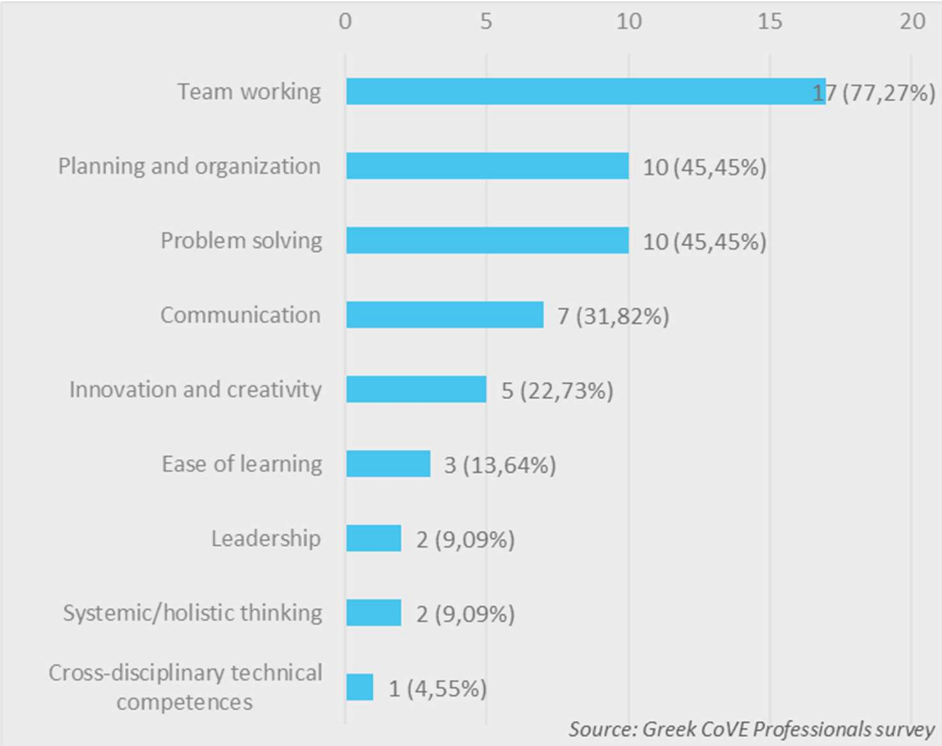

Figure 18. Most frequent transversal skills which are cultivated in companies (Question asked: Please specify which of the following transversal skills are cultivated at your company.) (CoVE GR)

Smart specialisation

Smart specialisation is an example of fruitful interaction between science and policy. Smart specialisation is an innovative approach that aims to boost growth and jobs in Europe, by enabling each region to identify and develop its own competitive advantages. Through its partnership and bottom-up approach, smart specialisation brings together local authorities, academia, business spheres and civil society, working for the implementation of long-term growth strategies supported by EU funds.

The concept was first developed in the context of the high-level expert group on 'Knowledge for Growth' created by the European Commission. It was recast through work by researchers both within and outside the Commission to foster regional economic transformation and incorporated as a key principle of investment in research and innovation in the framework of the EU regional policy. Through its adoption and adaptation towards regional development, the smart specialisation concept has become a powerful instrument for place-based innovation-driven growth. Furthermore, evidence arising from regions and ongoing informal policy discussions signals that the smart specialisation approach may be evolving towards a methodology that goes beyond its application to the EU regional policy. In fact, smart specialisation is gaining interest in both scientific and policy-making communities linked for instance to urban and local development and is also bridging the gap towards more thematic policy approaches such as industrial and energy policies.

Understanding the importance of the smart specialisation concept, we addressed on this issue two questions to the survey respondents in an effort to understand the challenges which their companies might face in adapting their study programmes to smart specialization goals and policies and the necessity or not of adapting new skills for smart specialization that were not needed in the past. Based on the provided answers, it cannot be excluded the possibility that respondents and their companies are not yet very familiar with this concept.

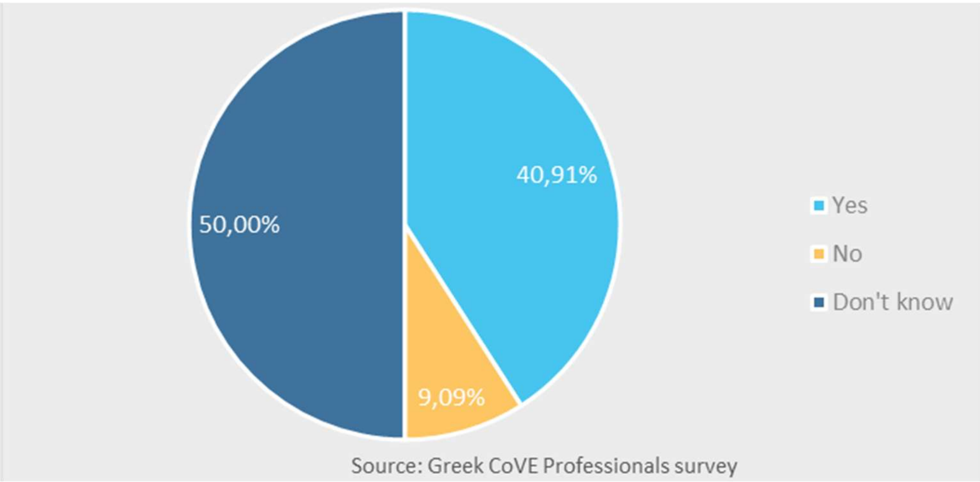

Figure 19. Challenge of adapting study programmes to smart specialization (Question asked: Does your company face the challenge of adapting its study programme to smart specialization goals and policies?) (CoVE GR)

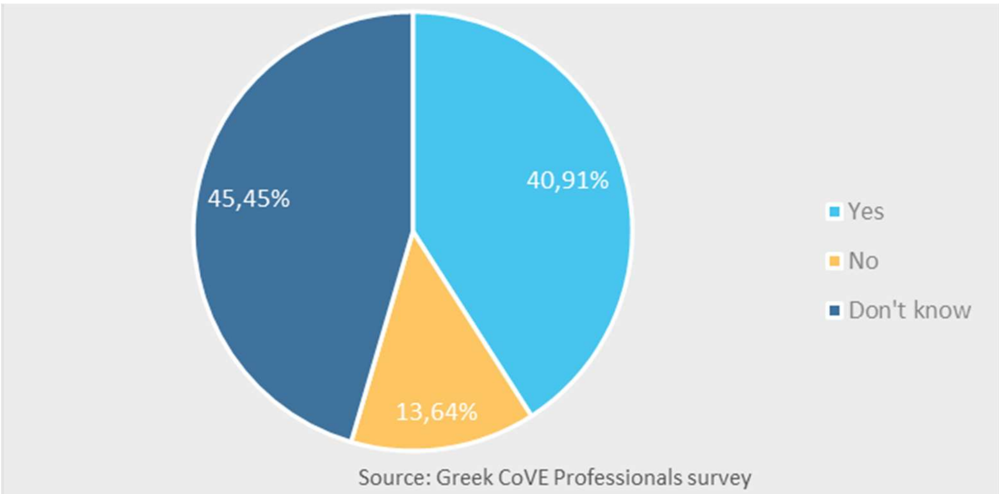

Figure 20. Need for adaptation of new skills for smart specialization (Question asked: Does your company need the adaptation of new skills for smart specialization that were not needed before?) (CoVE GR)

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2.4.1.2 VET and HEI instructors

Thirty six (36) VET and HEI instructors participated in the survey, with most of them (47.2%) belonging to the age group between 46 and 55 years. These findings reveal the need for sensitization of the younger groups as well.

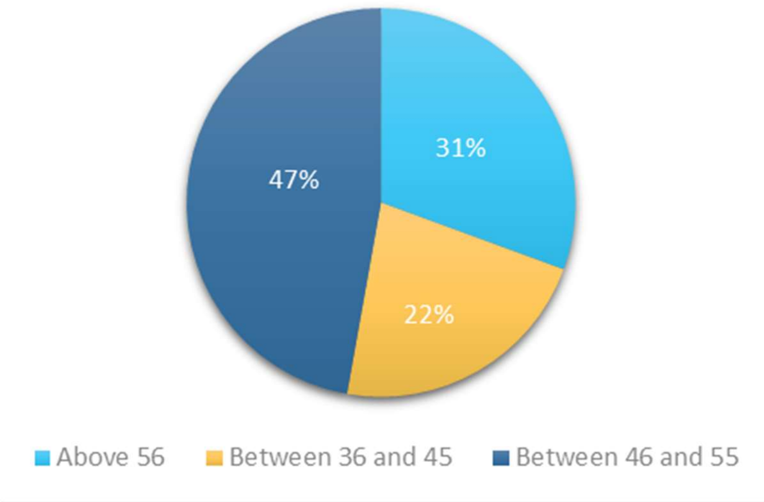

Figure 21. Total results for Question ''Please, specify your age below'' (CoVE GR)

The vast majority of participants in the survey were men (75%) with only a small percentage of women (25%). With these findings, it appears that there is still a need to address the gender gap within the renewable energy sector, with particular attention to offshore wind energy.

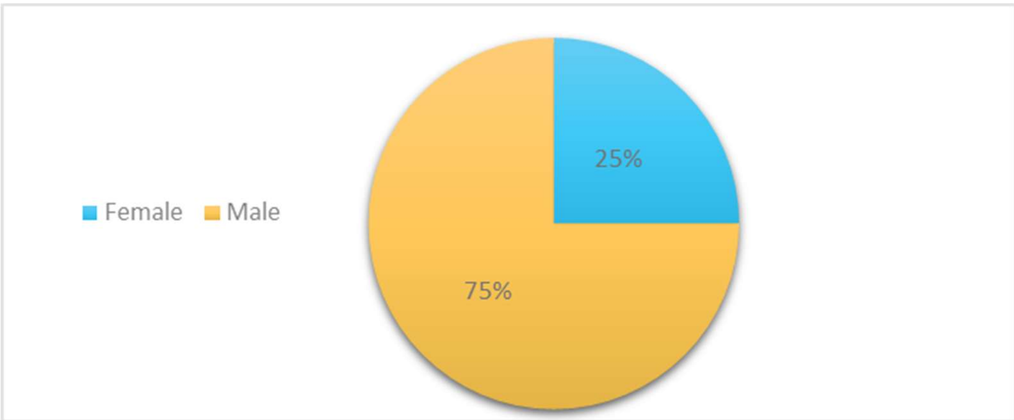

Figure 22. Total results for Question ''Please, specify your gender'' (CoVE GR)

In addition, there was greater participation of instructors in VET, vocational high school education compared to academics and other teaching staff, with percentages ranging from 47.2% of teachers from SAEK Egaleo, 25% of teachers from Vocational high schools of Mytilene and 11% and below Professors from Universities and laboratory centres. Strengthening the sector in academic education is considered necessary based on these results.

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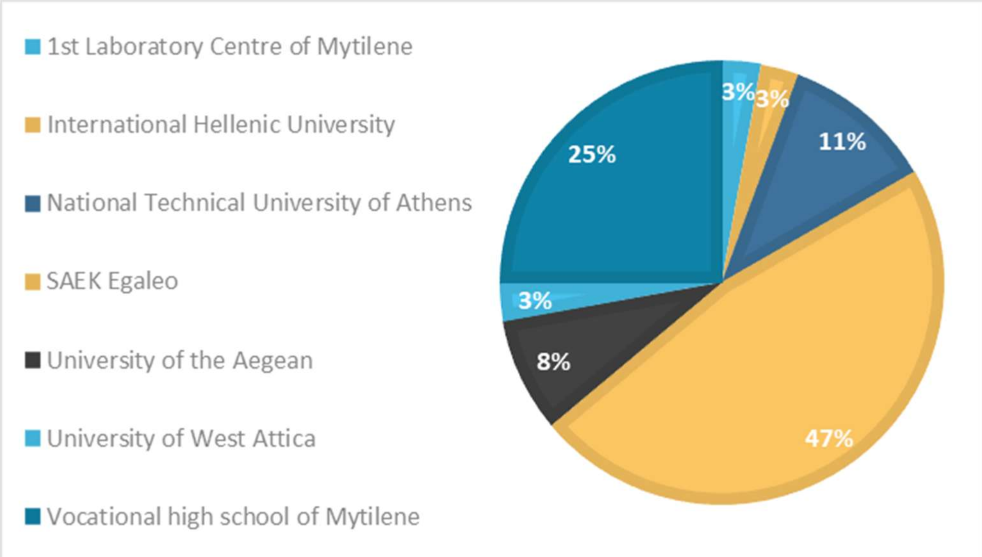

Figure 23. Total results for Question '' Institution/affiliation'' (CoVE GR)

In the next figure, the answers to the question "What is your current position in your institution?", show that most of the teachers were Permanent teaching staff (41.7%) or Temporary teaching staff (41.7%) while below 8.3% were the Administrative staff, Permanent teaching - Research staff and Professor Emeritus (2.8%). As mentioned above, strengthening the offshore wind energy sector in the academic community and research has critical importance for its development and evolution in the country.

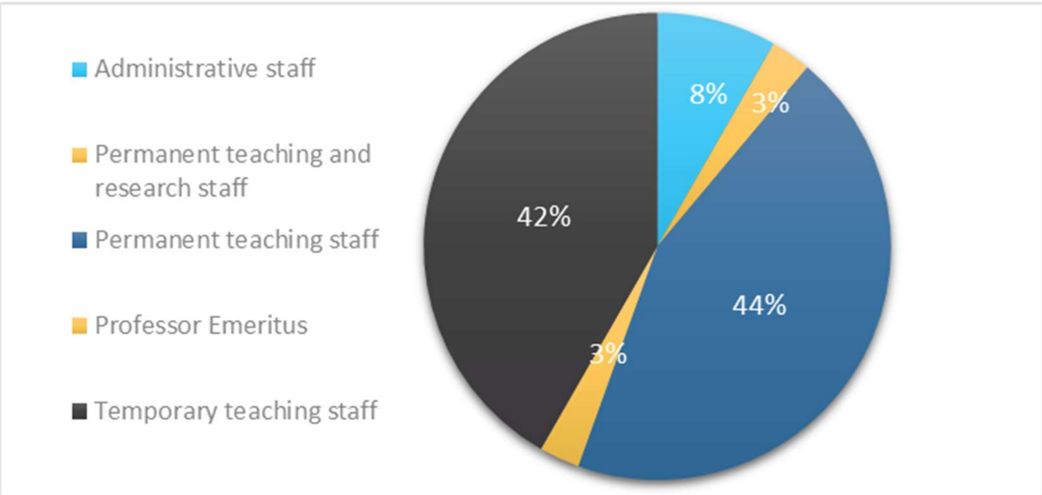

Figure 24. Total results for Question '' What is your current position in your institution?'' (CoVE GR)

In the next figure, the responses to the question "How can your organization be best described?", present that the majority participation was noticed in Vocational Education and Training (VET) while 25% were from universities and another 25% from Secondary Education, which need to be enhanced.

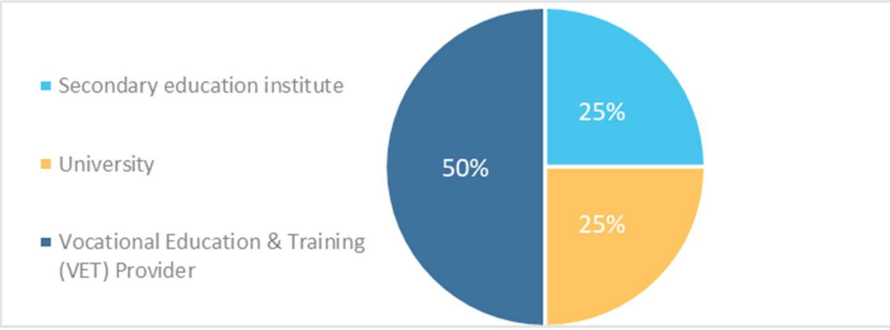

Figure 25 Total results for Question '' How can your organization be best described?'' (CoVE GR)

In the next figure, the replies to the question “How many students does your institution have in total?”, reveal that most institutions (66.7%), have in total 101 to 1000 students while the 11.1% mentioned, reported over 10.000 students.

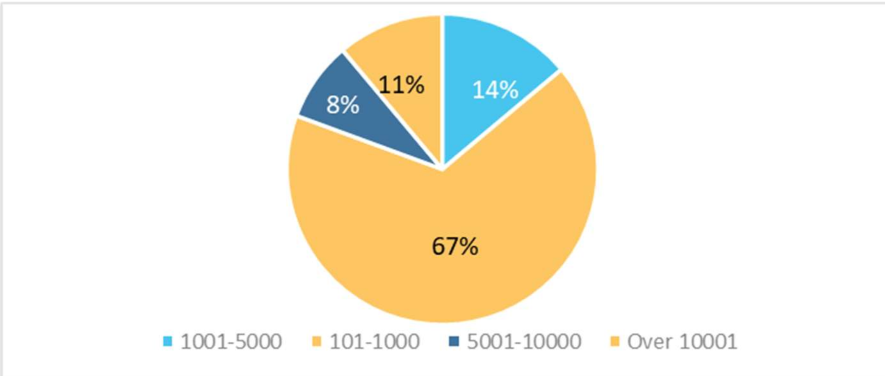

Figure 26. Total results for Question '' How many students does your institution have in total?'' (CoVE GR)

In the next figure, the answers to the question “What are the European Qualifications Framework (EQF) level(s) of the educational programmes at your institution?”, the EQF levels of most educational programmes of the institutions were level 5, while no Answer at all was given for level 2. Education around renewable energy sectors underscores at lower levels of education and needs further exploration.

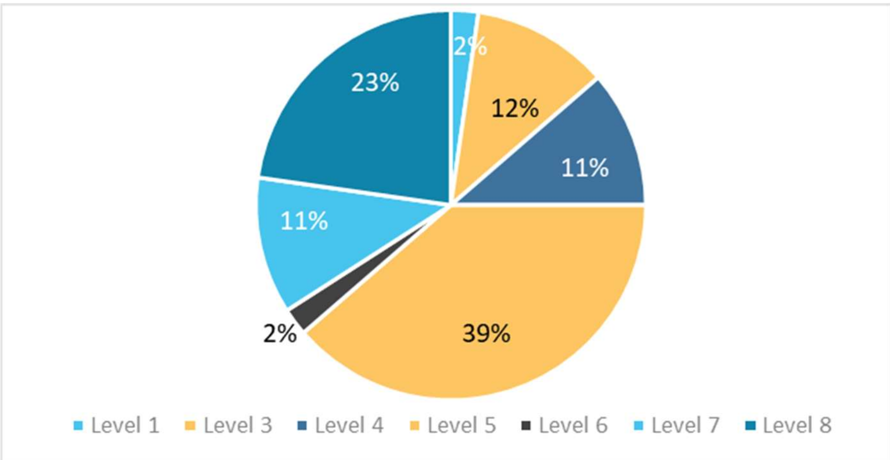

Figure 27. Total results for Question ''What are the European Qualifications Framework (EQF) level(s) of the educational programmes at your institution?'' (CoVE GR)

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In the next figure, the answers to the question "What type of degrees are attributed by your institution?", show that from the types of degrees attributed by the institutions, associate degree (44.4%) pioneered from technological education followed by Doctorate Degree (20%), Master's Degree (17.78%) and Bachelor's Degree (15.56%). Only 2.22% of the participants mentioned Other Degrees.

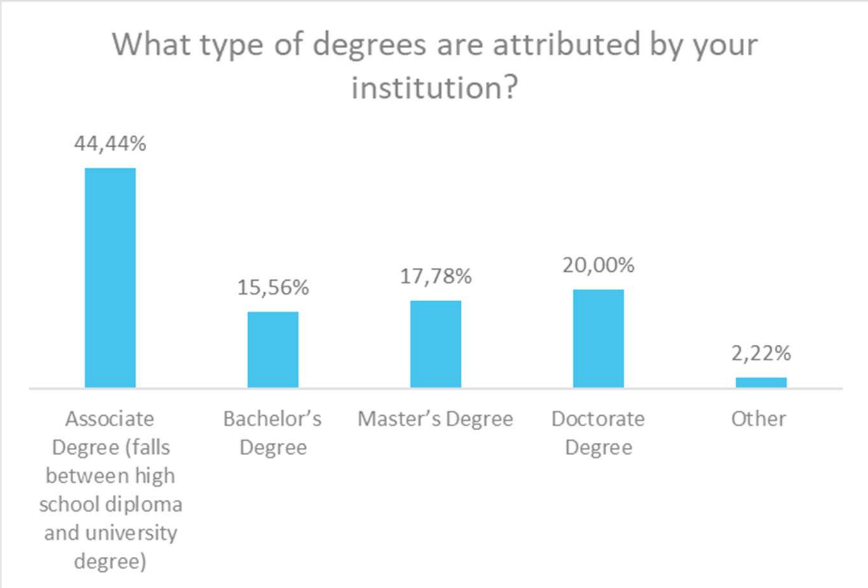

Figure 28. Total results for Question ''What type of degrees are attributed by your institution?" (CoVE GR)

In the next figure, the answers to the question "What are the most encouraged career paths for students at your institution?" show that the most encouraged careers that dominate at the professional level include Engineers (22.89%), Technicians (22.89%), Installers (15.66), Assemblers (10.84), and Health – Safety staff (10.84%). Professions like Metalworkers (1.20%), Draughtspersons (3.61%), Divers (3.61%), Plant Operators (2.41%), and Others (6.02%) are not encouraged as much by institutions, but it is important to take actions based on these findings to support these careers and highlight their additional value for the development of the offshore wind energy sector.

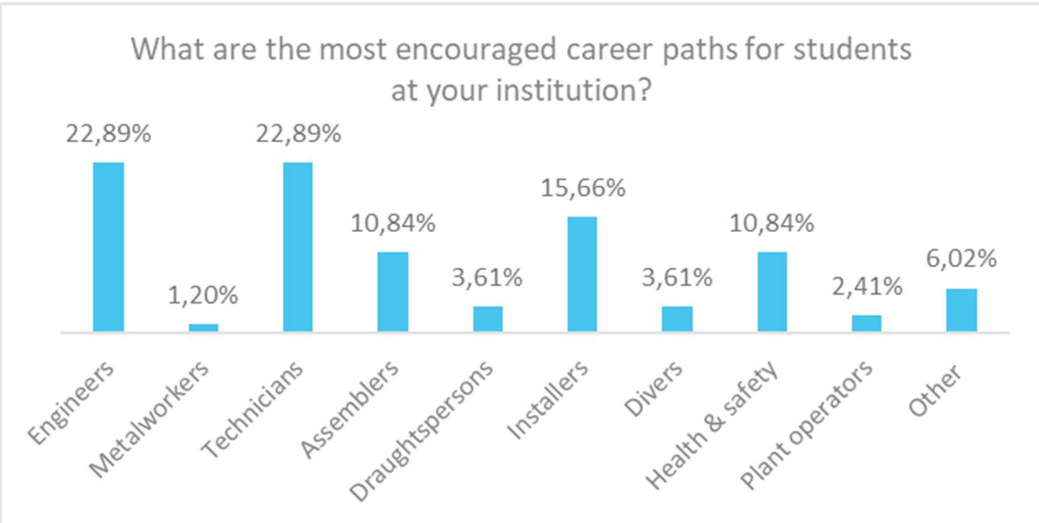

Figure 29. Total results for Question ''What are the most encouraged career paths for students at your institution?'' (CoVE GR)

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In the next figure, the answers to the question "What Percentage of your students are younger than 30 years old? Personal estimation" present that most instructors stated that the majority of students at their educational institutions are under 30 years old (77.8%) and 14% mentioned that all of the students are under 30 years old, which is expected, since most students study at a young age. According to these findings, raising awareness among young students about offshore wind energy issues is key to the development of the sector.

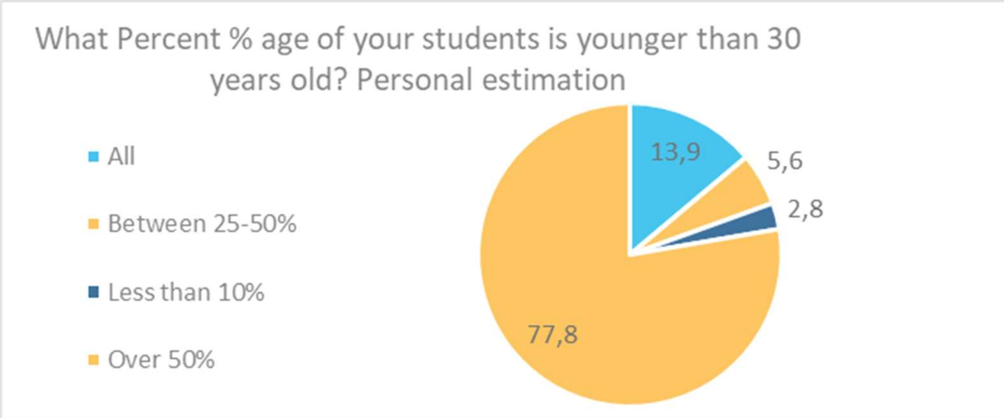

Figure 30. Total results for Question ''What Percentage of your students is younger than 30 years old? Personal estimation'' (CoVE GR)

In contrast with the previous results, the next figure presents the answers to the question "What Percentage of your students are older than 50 years old? Personal estimation". Students over 50 years old occupy a percentage of less than 10% in most institutions (91,7%) while only one instructor noted that the students of their institution are older than 50 years old in a percentage of 50% and above. These findings reveal that the education of older adults is currently less targeted than the education of younger people.

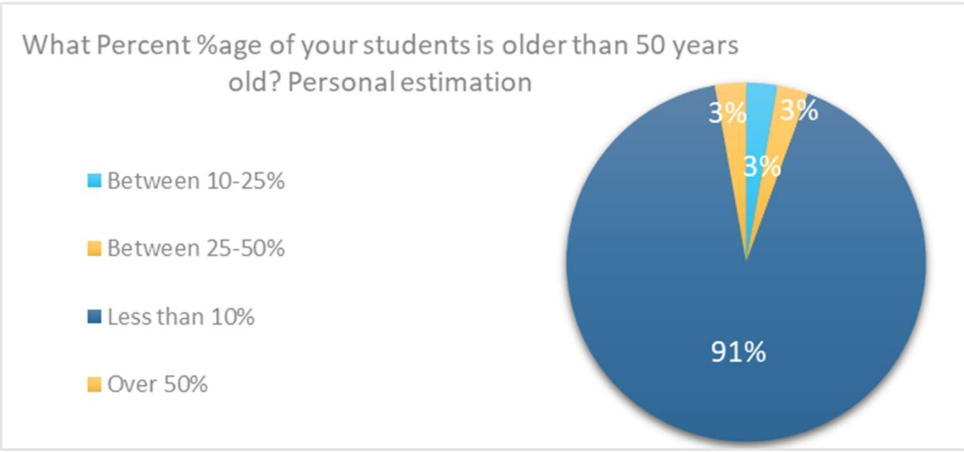

Figure 31. Total results for Question ' What Percent %age of your students is older than 50 years old? Personal estimation'' (CoVE GR)

In the next figure, the answers to the question "Which of the renewable energy groups best fits into the overall value chain of your specialty?" show that the majority of the instructors are specialized in Onshore Solar Energy (33.3%), Offshore Wind Energy (27.8%) and Onshore Wind Energy (11.1%). Only a few noted other renewable energy groups such as Wave Energy (5.6%), Offshore Solar Energy (5.6%), Tidal Energy

(2.8%), etc.. These findings present a clear focus on wind and solar energy sectors, which are considered to be developing and sustainable.

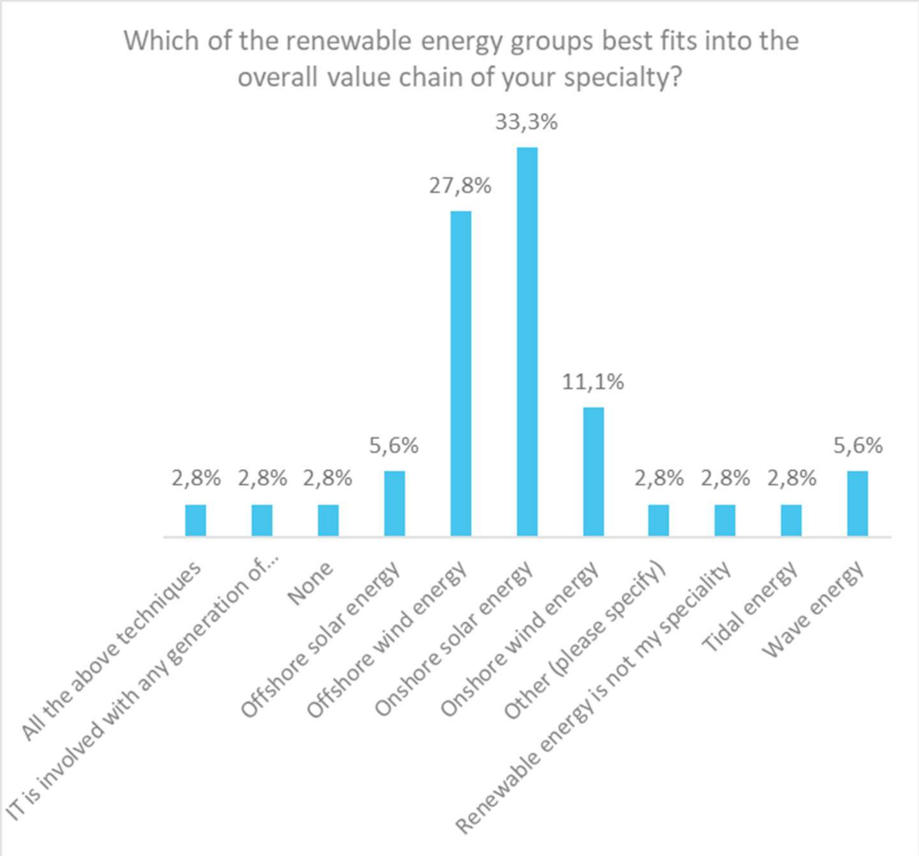

Figure 32. Total results for Question ''Which of the renewable energy groups best fits into the overall value chain of your specialty?'' (CoVE GR)

In the next figure, the answers to the question "Which phases of the offshore renewable energy value chain do your teaching activities cover?" show that the teaching activities most instructors cover are Pre-planning/ Research (21.92%), Operation & Maintenance (21.92%), followed by Project Planning (16.44%) and Construction & Installation (16.44%). Teaching activities like Tendering & Contracting (1.37%), Manufacturing (9.59%), and Decommissioning/Recommissioning (5.48%) had a low coverage rate. It was also important that 4 out of 36 responders, stated that they did not cover any of activities in the sector. These results show that there is a gap in education in the field of offshore renewable energy and it needs to be filled.

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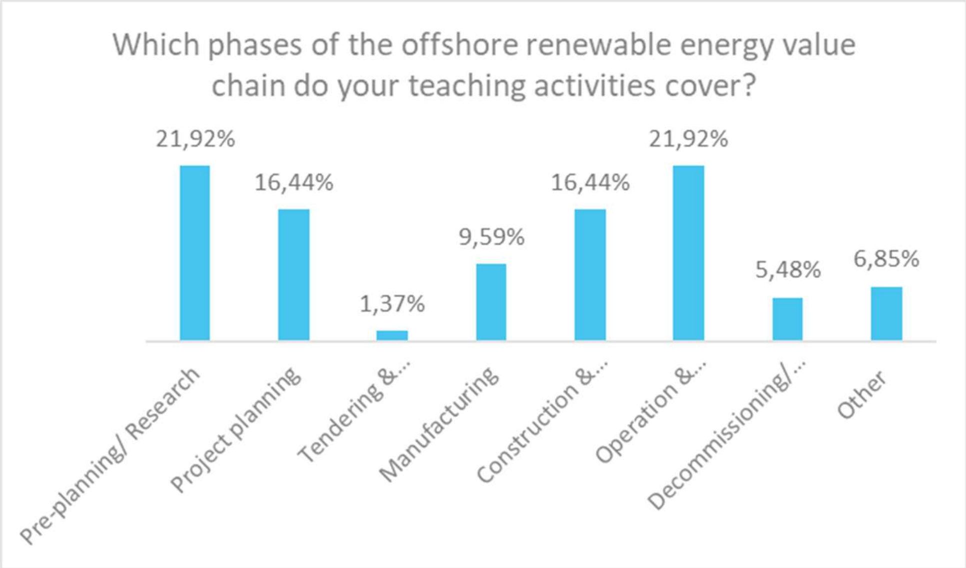

Figure 33. Total results for Question ''Which phases of the offshore renewable energy value chain do your teaching activities cover?'' (CoVE GR)

In the next figure, the answers to the question “Which subjects related to renewable energy technologies have you taught?” showed that the majority of the instructors have taught mostly Onshore solar energy (23.94%), Offshore wind energy (18.31%) and Onshore wind energy (16.90%), while Wave energy (14.08%), Offshore solar energy (12.68%), Tidal energy (7.04%), Ocean thermal energy (1.41%), and other subjects had less taughtened. This indicates that teaching is mainly based on technologies that are already developed and commercially viable.

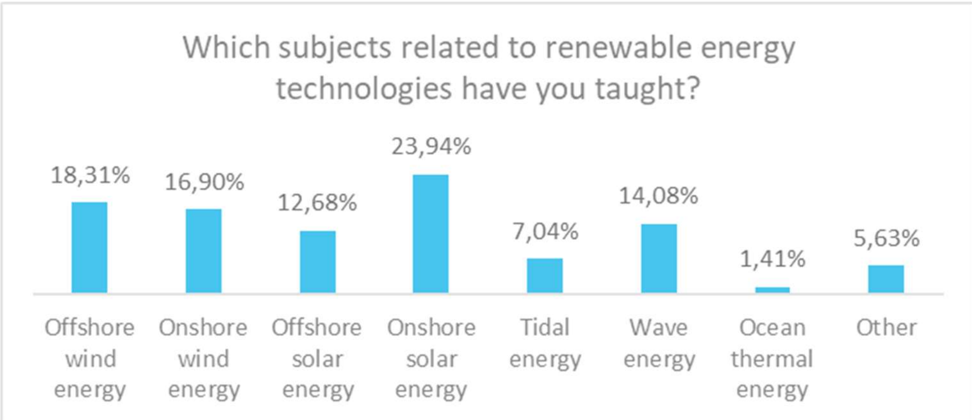

Figure 34. Total results for Question ''Which subjects related to renewable energy technologies have you taught?'' (CoVE GR)

As presented in the next figure, which shows the answers to the question “How many years of teaching experience do you have in the sector of renewable energy technologies?”, 52.8% of the instructors have less than 3 years of teaching experience combined in renewable energy technologies, while 27.8% have more than 10 years of experience respectively. This distribution indicates that most instructors in the field do not have extensive experience, which is an important factor not only in the quality of teaching but also in effective student guidance. Therefore, the continuous training of teachers to develop skills in the sector of renewable energy technologies is necessary.

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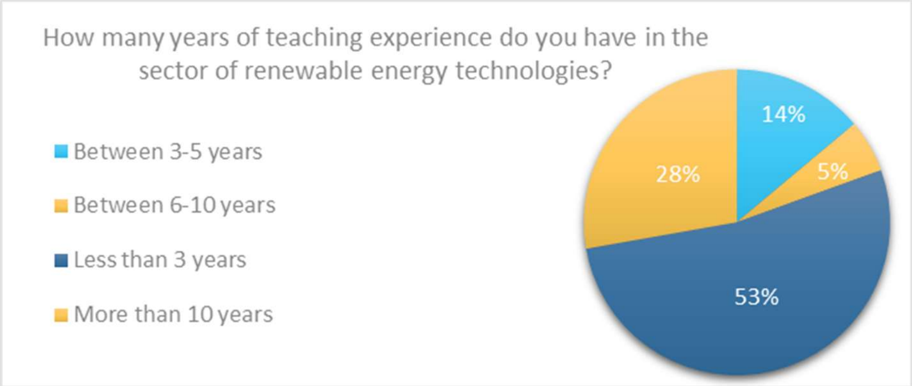

Figure 35. Total results for Question '' How many years of teaching experience do you have in the sector of renewable energy technologies? '' (CoVE GR)

Accordingly, in the next figure, the answers to the question "How many years of teaching experience do you have in the sector of offshore renewable energy technologies?", 22.2% of the instructors have less than 3 years of teaching experience, specifically in offshore renewable energy technologies, while 16.7% stated they have more than 10 years respectively. These findings reveal that offshore renewable energy remains a relatively new sector yet, with space for development in both education and research.

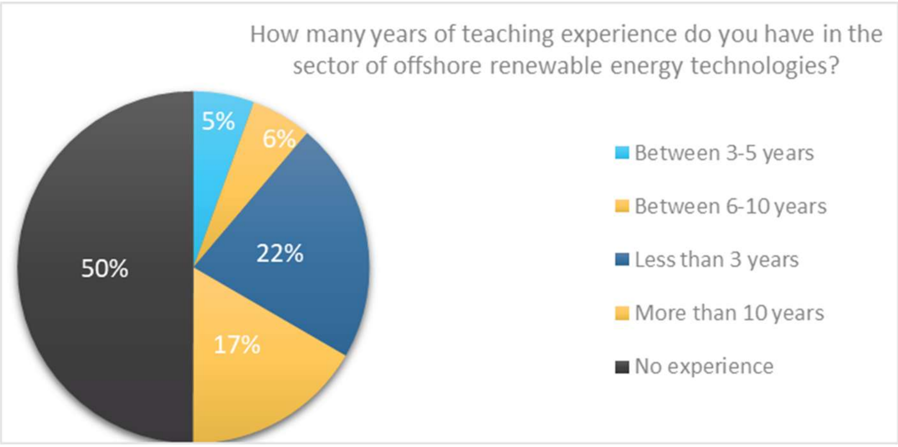

Figure 36. Total results for Question '' How many years of teaching experience do you have in the sector of offshore renewable energy technologies? '' (CoVE GR)

The next figure, displays the responses to the question "With regard to hard skills of your students, what in your opinion are currently the most important gaps that should be addressed by educational/training programmes?". The majority of the instructors reported that the most important gaps that should be addressed by educational or training programmes include Engineering skills (21.18%), Digital skills (16.47%), and Offshore specific skills (15.29%). The adaptation of educational programmes for the strengthening of specialized knowledge plays a vital role in the future of the industry.

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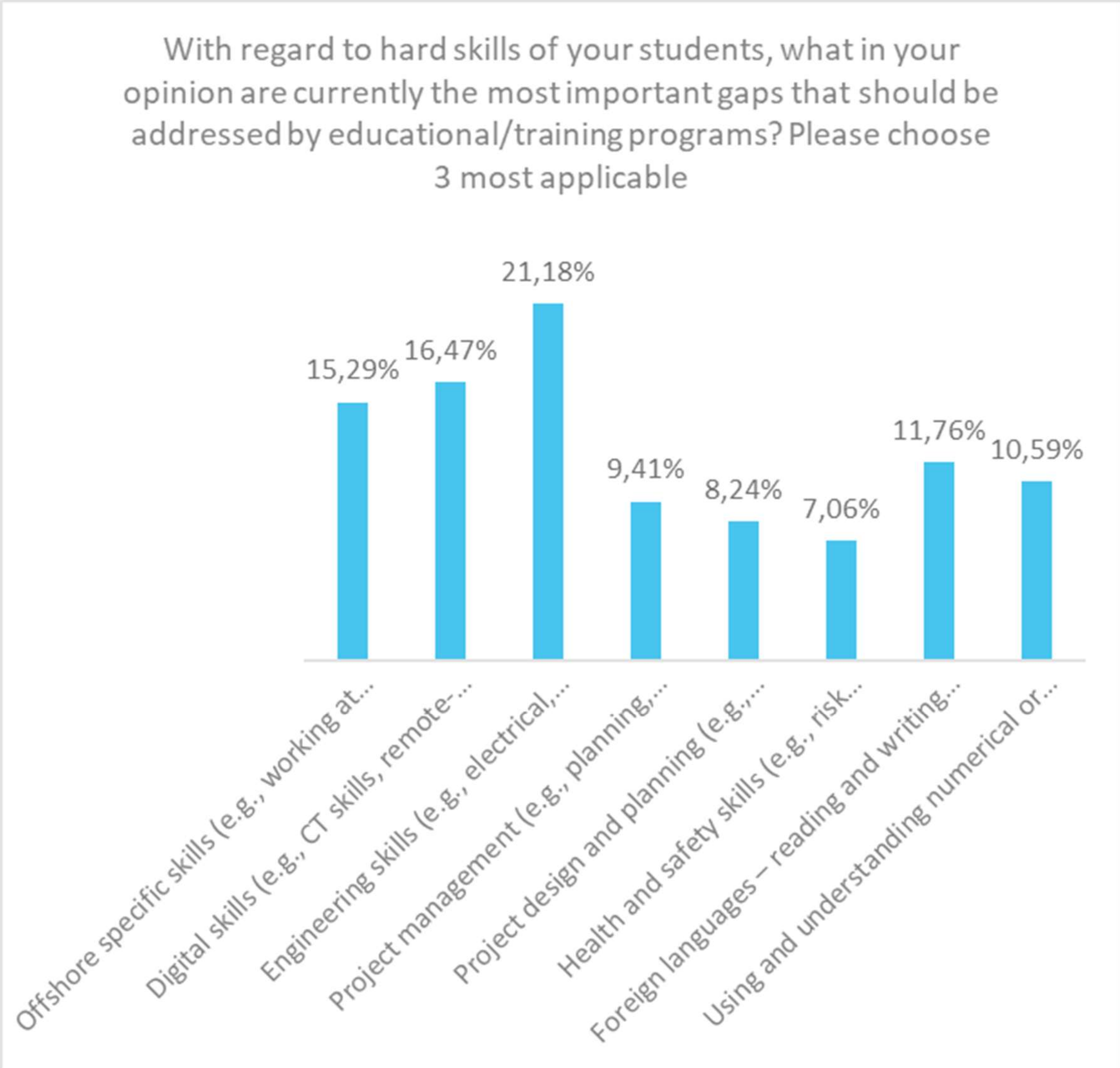

Figure 37. Total results for Question ''With regard to hard skills of your students, what in your opinion are currently the most important gaps that should be addressed by educational/training programmes? Please choose 3 most applicable'' (CoVE GR)

In the next figure, the answers to the question "With regard to soft skills of your students, what in your opinion are currently the most important gaps that should be addressed by educational/training programmes?" highlighted Critical thinking and problem-solving skills as the most crucial gaps by 33.33%. Moreover, other significant gaps include Communication and collaboration (13.58%) and Productivity and accountability skills (12.35%). Knowledge Management and Transfer Skills (11.11%) and Flexibility and Adaptability (11.11%) had less frequency, together with Leadership and Responsibility skills (9.88%), Initiative and Self-direction (7.41%), and ICT literacy (1.23%), suggesting that these areas are not so critical, but still worthy of attention. These findings show the importance of addressing Critical thinking and problem-solving skills, Communication – collaboration, and Productivity skills through targeted educational or training programmes, while also supporting the evolution of other significant abilities like Knowledge management, Leadership, Flexibility/Adaptability, Initiative and self-direction, and ICT literacy.

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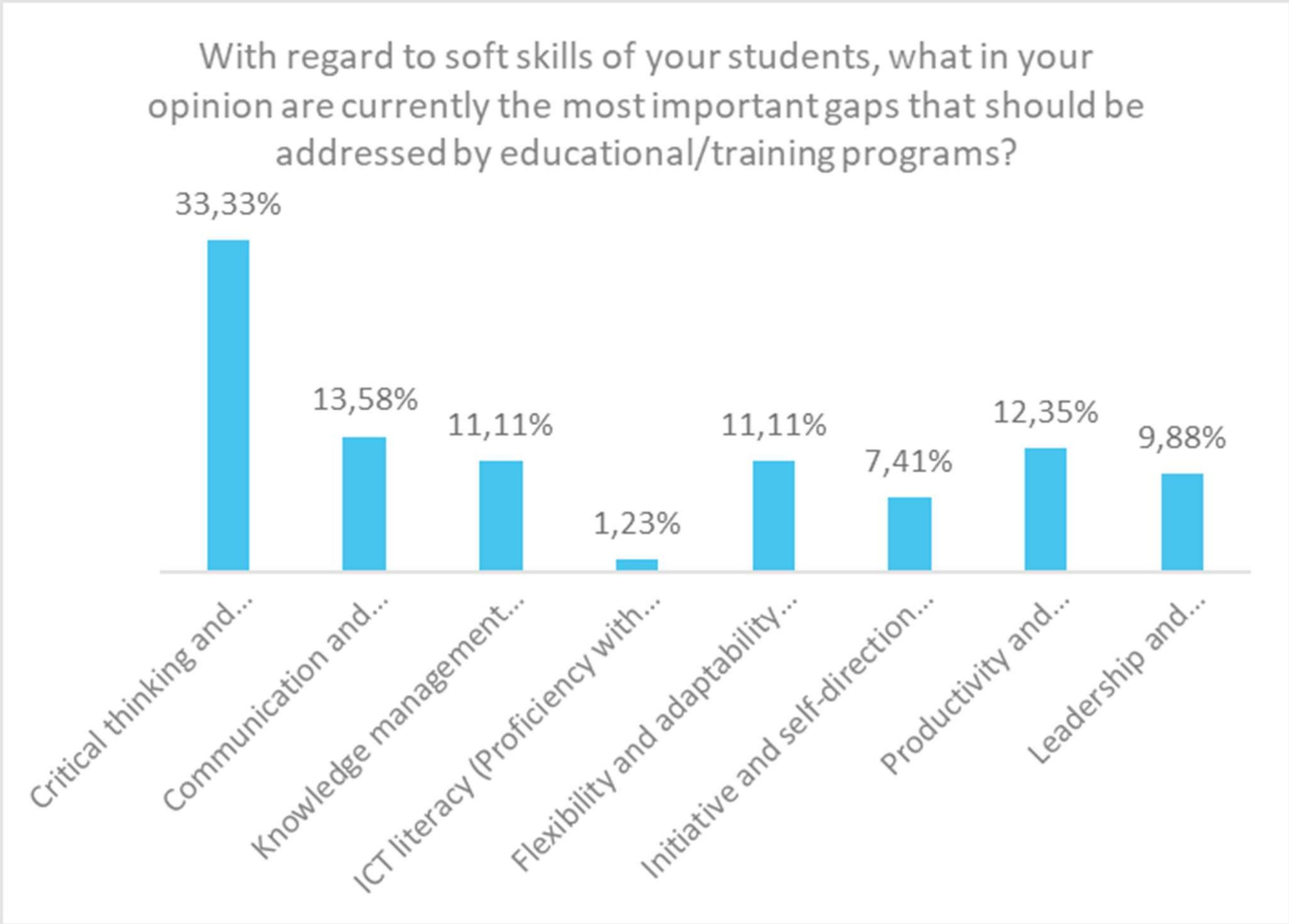

Figure 38. Total results for Question ''With regard to soft skills of your students, what in your opinion are currently the most important gaps that should be addressed by educational/training programmes?'' (CoVE GR)

In the next figure, the answers to the question "Which methods do you believe are most effective for employees to acquire or develop the following skills?" show that most instructors believe that VET programmes (20.17%) and on-the-job training (19.33%) are more effective for employees to acquire or develop Hard skills, followed by Bachelors (17.65%), Masters (15.13%), Professionally accredited training course/seminar/programmes (14.29%) and in-house training (13.45%). Respectively for soft skills, the respondents mostly noticed in-house training (20.62%), Professionally accredited training course/seminar/programmes (19.59%), followed by Masters (18.56%), Bachelors (15.46%), on-the-job training (13.40%) and VET programmes (12.37%). According to these findings, it is important to strengthen higher education so that provides the students with the necessary resources to develop Hard skills.

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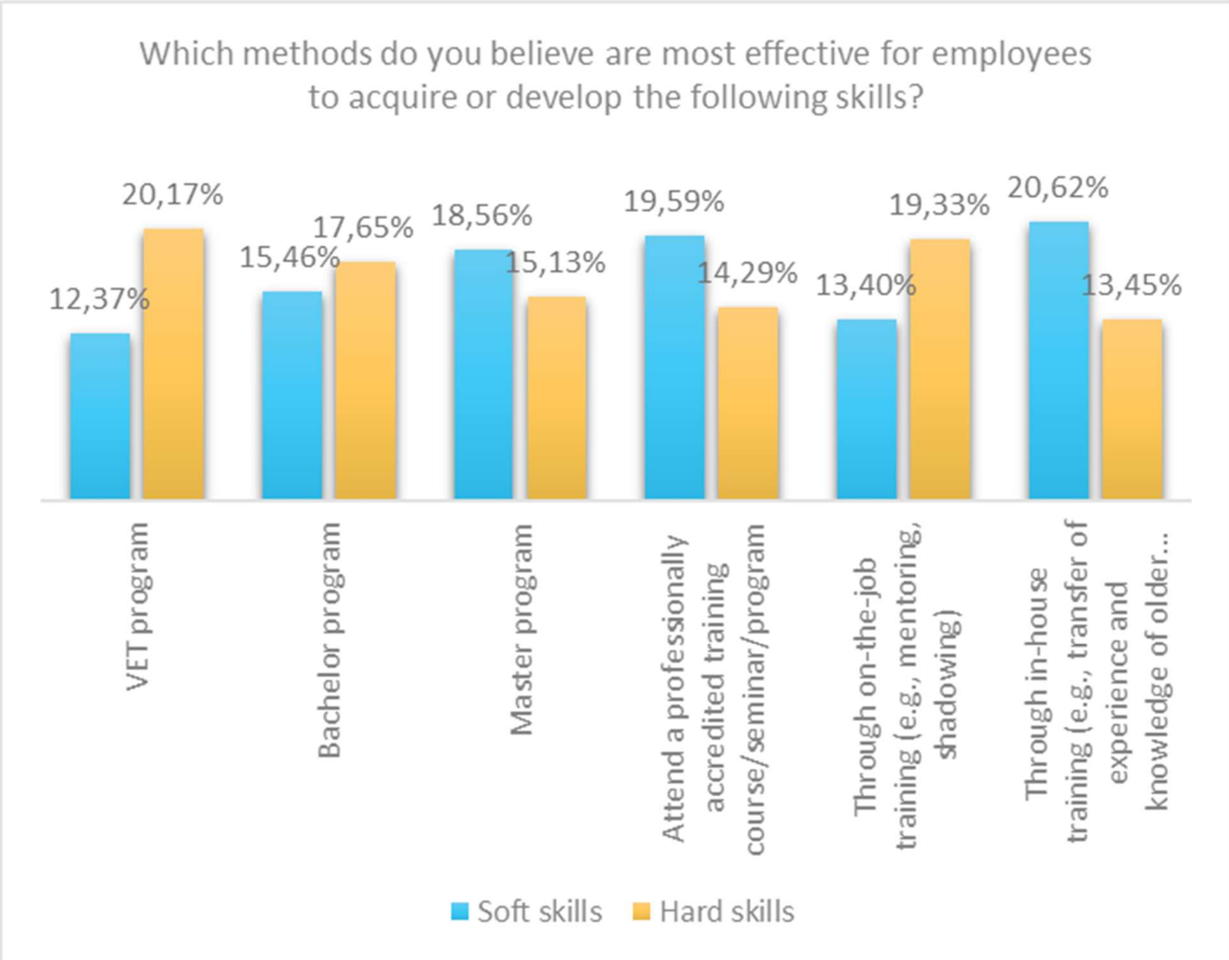

Figure 39. Total results for Question '' Which methods do you believe are most effective for employees to acquire or develop the following skills?'' (CoVE GR)

In the next figure, the answers to the question "Which of the following technologies are covered by your curriculum?" show that most instructors mentioned technologies such as Automation and advanced robotics, Internet of Things, and Energy storage at 12.50%, which are covered by their curricula followed by Energy Management Systems (11.36%), 3D Printing (9.09%), Material Science (9.09%), Smart Technologies (7.95%). To a lower extent, respondents stated Artificial Intelligence (6.82%), Digital Platforms (6.82%), Big Data/Data Analytics (3.41%), Communication Technologies (3.41%), Cloud Services (2.27%), Cybersecurity (1.14%) and Blockchain (1.14%). Strengthening education with new technologies is an important pillar for enhancing its effectiveness and efficiency.

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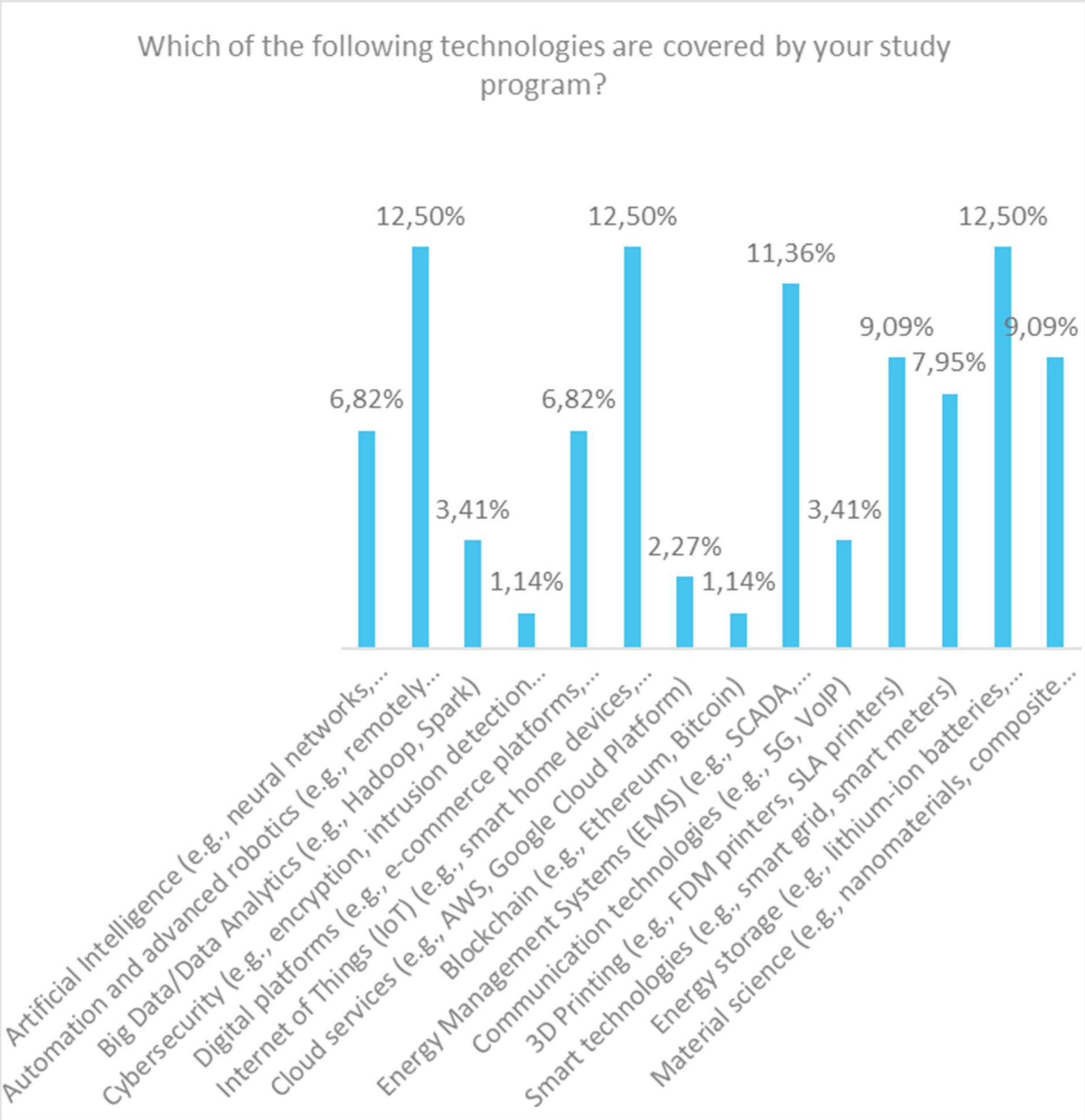

Figure 40. Total results for Question '' Which of the following technologies are covered by your study programme? '' (CoVE GR)

In the next figure, the answers to the question “Which of the following tools are addressed (provide training or use) at your study programmes?” highlight the emphasis on education tools that are used for renewable energy education. Programmeming languages and Simulation software were the most frequently addressed by 14.56% of the instructors. Other tools, such as Internet of Things (11.65%) Geographic Information Systems (9.71%), Collaboration tools (9.71%), CAD software (9.71%) were also commonly integrated. However, specialized tools like Database management systems, Cybersecurity tools, Data visualization tools, Cloud computing platforms, Virtual and augmented reality tools, Blockchain platforms, Project management tools and Database management systems, were less frequently mentioned, revealing potential gaps in education coverage. These findings present the crucial role of computational tools in renewable energy education while they emphasize the need for greater integration of specialized technologies.

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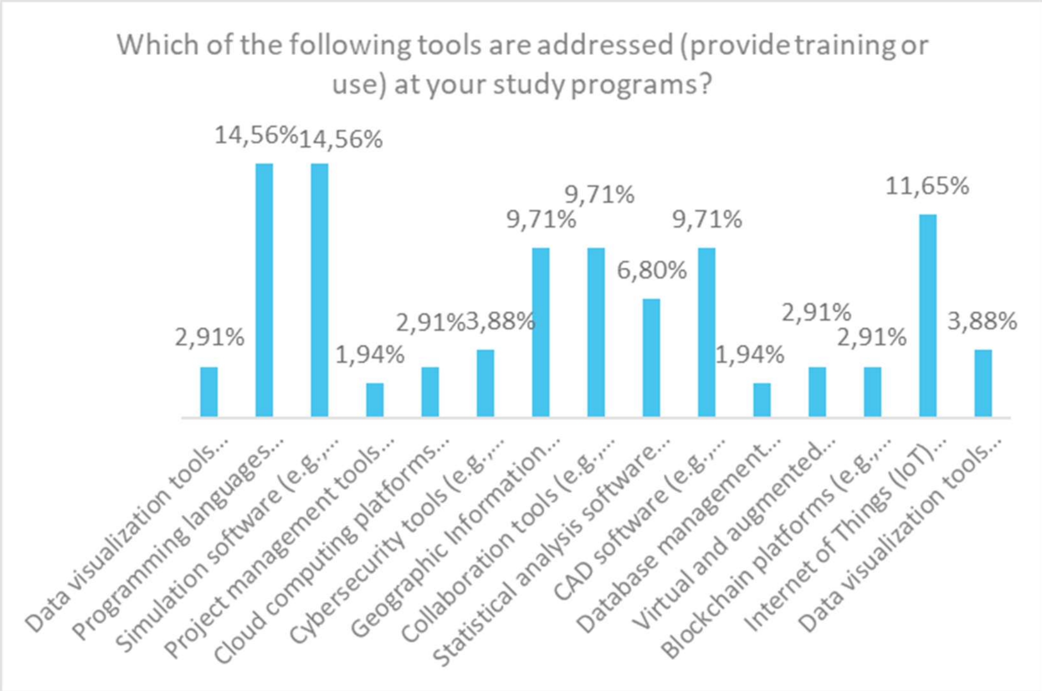

Figure 41. Total results for Question '' Which of the following tools are addressed (provide training or use) at your study programmes? '' (CoVE GR)

The answers to the question "How often do you update your course content to reflect industry changes?" as presented in the next figure, show different practices. 44% of the instructors reported that they update their course content Annually, while 31% declared content updating every 2-3 years. A smaller group which represents 8% of the participants, updates their content more than once a year, while 11% are undergoing updates every 5 years. Finally, 6% of the instructors do not update their course content, which shows a disconnection with evolving industry needs. With these findings, it seems that despite the efforts of most instructors to align their curricula with the evolving needs of the industry, there is still room for greater consistency in curriculum updates.

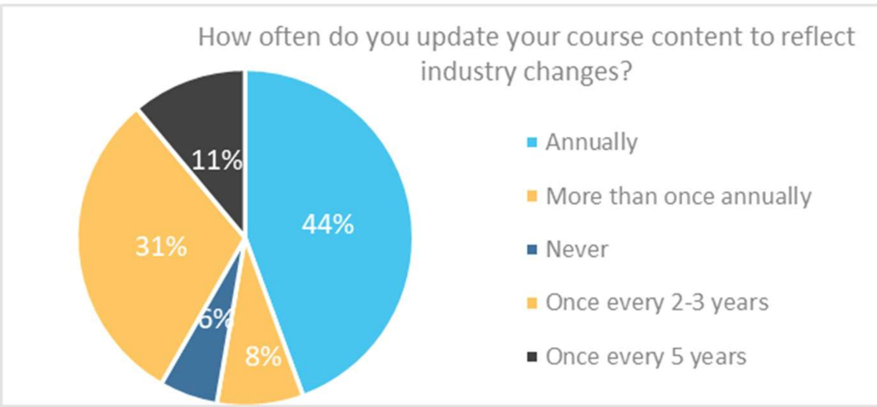

Figure 42. Total results for Question '' How often do you update your course content to reflect industry changes?'' (CoVE GR)

In the next figure, the answers to the question “What additional training or resources do you need to improve your teaching effectiveness?”, present important fields for improvement. In more detail, the results

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are categorized as follows: Updated course materials (27.4%), Access to industry experts (26.03%), Industry workshops (23.29), and Practical training facilities (21.92). According to these findings, instructors recognize the importance of collaboration with industry for the provision of new educational resources, leading to the improvement of their teaching methods.

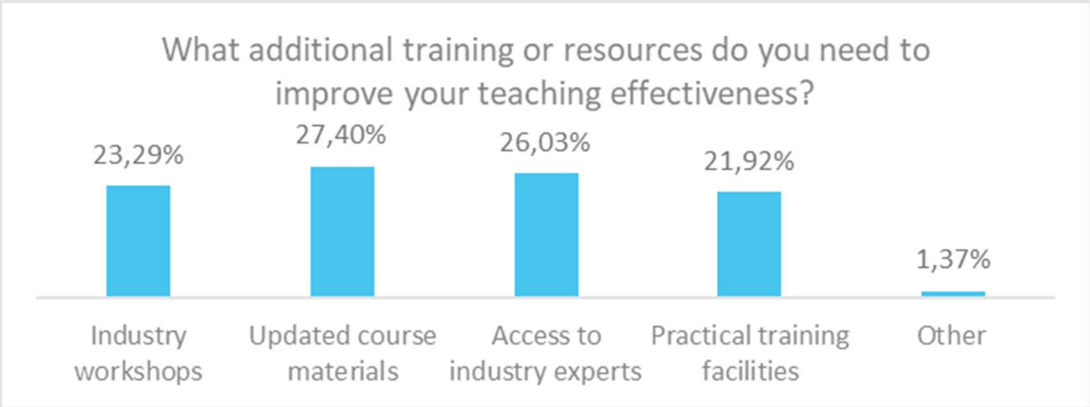

Figure 43. Total results for Question ''What additional training or resources do you need to improve your teaching effectiveness?'' (CoVE GR)

In the next figure, the answers to the question "How do you incorporate practical experience into your teaching?'' indicate the instructors' high perception of the importance of connecting their courses with practice experience and the efforts they make to achieve it. The most frequent answers were organizing Field trips (22.62%) and Guest lectures from industry experts (21.43%) followed by organizing Hands-on labs (20.24%) and Internships (19.05%). Last, in their preferences was the use of Virtual labs (16.67%). These findings show that the connection of lessons with practical experience is at a satisfactory level but needs more improvement and encouragement from the instructors to move more in this direction.

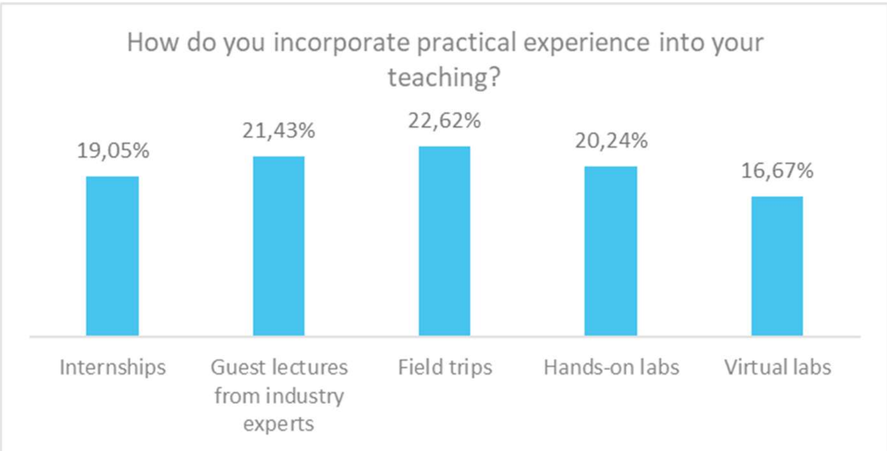

Figure 44. Total results for Question ''How do you incorporate practical experience into your teaching?'' (CoVE GR)

In the next figure, the answers to the question "What are the main challenges you face in delivering effective education and training?" highlighted as the major challenges Student engagement (32.31%) and the Lack of resources (29.23%). Other crucial challenges constitute Limited practical training opportunities (21.54%) and

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Keeping up with industry changes (16.92%). These challenges reflect the need for resource provision, the upgrade of infrastructure, innovative strategies, and greater student involvement in education.

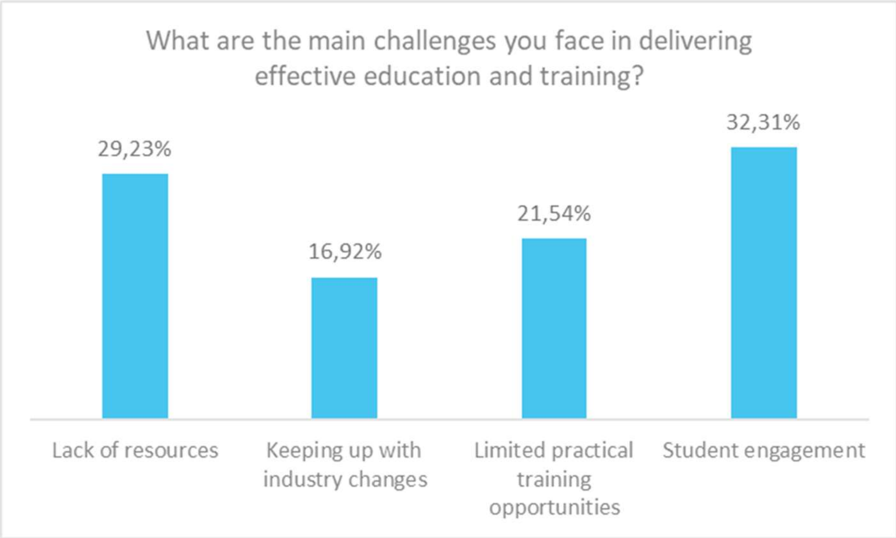

Figure 45. Total results for Question '' What are the main challenges you face in delivering effective education and training? '' (CoVE GR)

In the next figure, the answers to the question ''How do you ensure your curriculum aligns with current regulation and standards?'', indicate that there is no preference (or the ability) of instructors to cooperate with policy makers, as most of them address that they don't engage with policy makers (25.49%) and they prefer the use of collaborative workshops (23.53%) and adopting industry standards (19.61%). Last in their choices were following compliance reviews (13.73%), participation in policy forums (9.8%) and participation at regular consultations with policy makers (5.88%). These findings show that there is a collaboration between the educational system and the industry, but not with the policy makers. There is room for action to close this gap so industry, policy makers, and the educational system work together for the improvement of the field.

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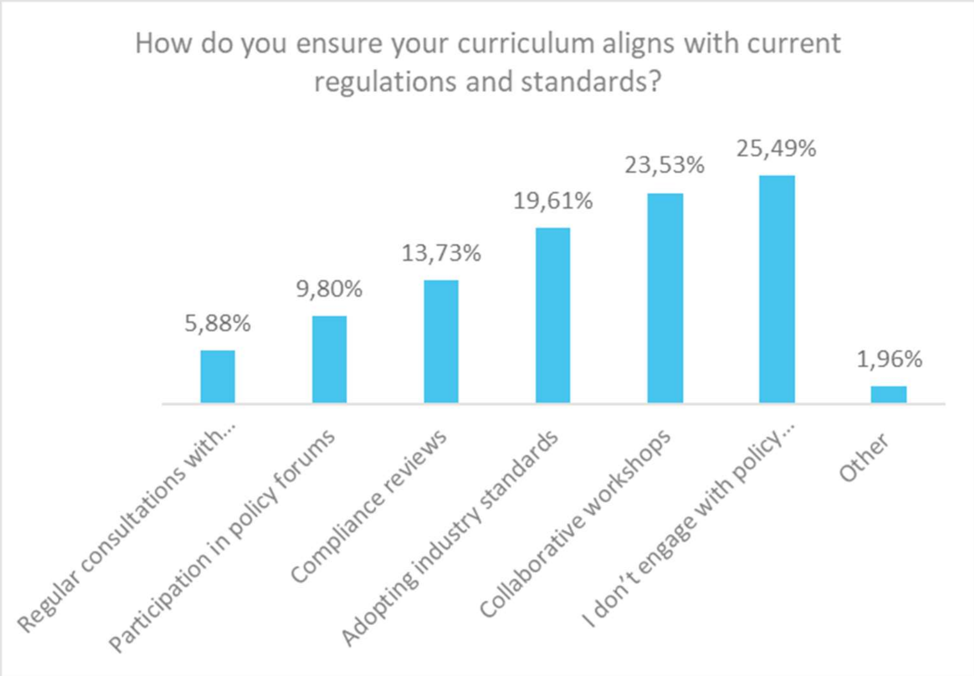

Figure 46. Total results for Question '' How do you ensure your curriculum aligns with current regulations and standards? '' (CoVE GR)

In the next figure, the answers to the question "How do you collaborate with education and training providers to enhance the quality of teaching and learning?" shows that most educators choose Shared training facilities (27.50%) and Teacher exchange programmes (27.50%) while in a less percent Joint curriculum development (20%). It is worth mentioning that 25% noticed that they do not collaborate with other education and training providers. Collaborations with other providers play a significant role in education quality and with these findings, it seems that there's still a gap that needs to be filled.

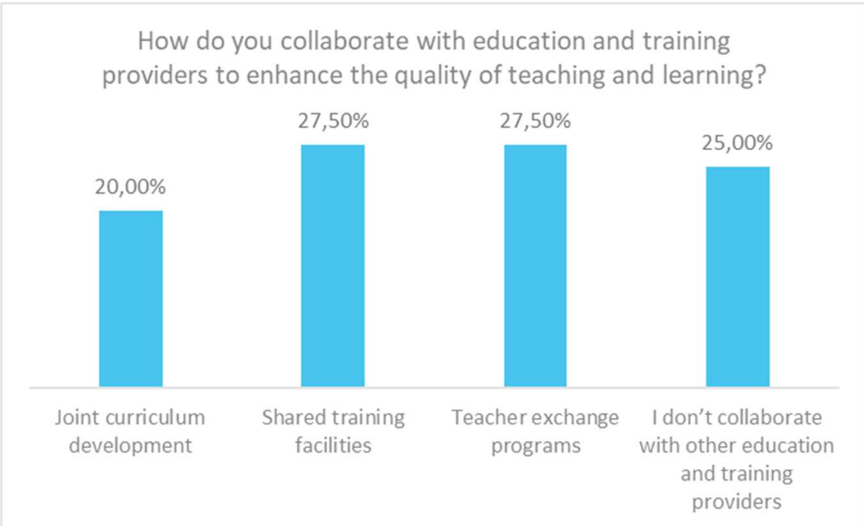

Figure 47. Total results for Question '' How do you collaborate with education and training providers to enhance the quality of teaching and learning? '' (CoVE GR)

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According to the next figure, the answers to the question "What challenges do you face in collaborating with employers to ensure the relevance of your programmes?" reveal that 30.95% of the respondents reported that they faced no challenges while 28.57% reported obstacles like Limited engagement from employers and Logistical issues in organizing internships or placements (23.81%). Misalignment of academic and industry needs was also noticed at a percentage of 14.29%, while 2.38% noticed Other. These findings show that generally, most instructors have effective collaborations with their employers, but in some cases, the partnership, engagement, and alignment remain fields for improvement.

Figure 48. Total results for Question '' What challenges do you face in collaborating with employers to ensure the relevance of your programmes? '' (CoVE GR)

In the next figure, the answers to the question "What support do you need from social partners to better prepare students for the workforce?" highlighted the Mentorship programmes (32.81%) followed by Networking opportunities (31.25%) and Career counselling services (31.25%). The 4.69% noticed that No support is required. These findings focus on the need for the involvement of social partners in bridging the gap between education and employment.

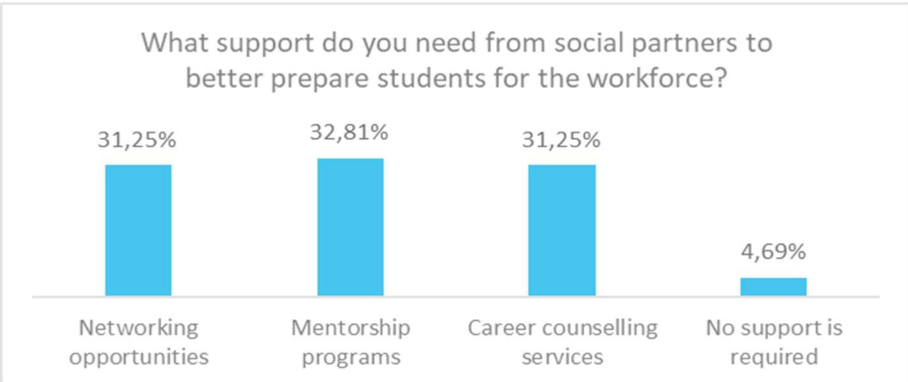

Figure 49. Total results for Question ''What support do you need from social partners to better prepare students for the workforce?'' (CoVE GR)

In the next figure, the answers to the question "How do you address the challenge of keeping up with rapid technological changes in your teaching?" show that the majority of the instructors mentioned that Continuous professional development (46.27%) is the main strategy that they follow for keeping up with

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rapid technological changes, followed by Access to the latest tools and software (32.84%) and Partnerships with technology companies (19.40%). Only 1.49% of the responders noticed that they did not face any challenges. These findings show that Continuous learning and Partnerships with the industry are essential to align education with rapid technological changes.

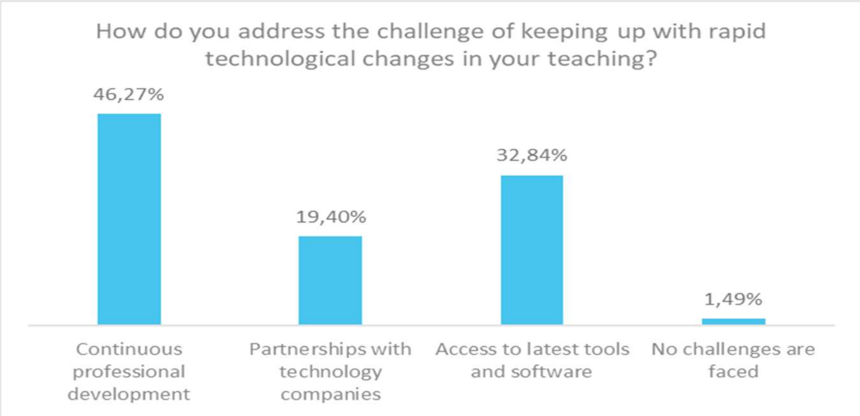

Figure 50. Total results for Question '' How do you address the challenge of keeping up with rapid technological changes in your teaching? '' (CoVE GR)

In the next figure, the answers to the question "What are the main challenges in ensuring student readiness for the offshore renewable energy sector?" show that most of the instructors noticed that Practical training opportunities (20.26%), Access to real-world projects (16.34%) and Effective partnerships between educational institutions and industry leaders (12.42%) are the primary challenges in ensuring student readiness. Other challenges that influence less but not least ensuring student readiness, are Industry-specific skill development (9.80%), Availability of specialized equipment and facilities for training (9.15%), Geographic limitations affecting on-site learning experiences (9.15%), Alignment of academic curricula with current industry technologies (7.84%), Safety training for working in offshore environments (6.54%), Financial barriers to accessing advanced training programmes (5.23%) and Legal and regulatory compliance training (3.27%). According to these findings, facing these challenges will lead to targeted investments in professional development and effective collaboration with industry to straighten the effective preparation of students in integration of the offshore renewable energy sector.

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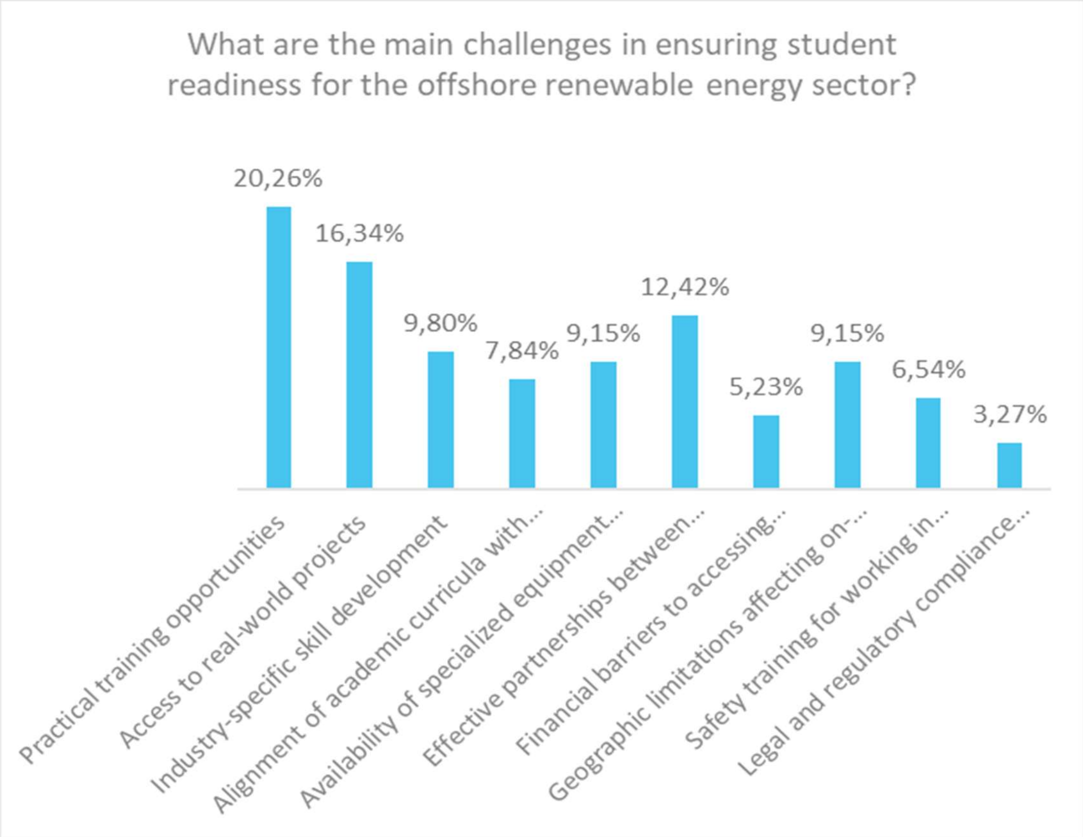

Figure 51. Total results for Question '' What are the main challenges in ensuring student readiness for the offshore renewable energy sector? '' (CoVE GR)

In the next figure, the answers to the question "What are the key challenges in aligning your educational programmes with industry standards?" highlighted most the Updating curriculum to meet standards (40.43%) followed by Understanding certification requirements (31.91%) and finally, the Coordination with certification bodies (27.66%) as key challenges in aligning educational programmes with the industry standards. Summarizing the results, aligning educational programmes with industry standards needs better communication with certification bodies and improved practices for updating curricula.

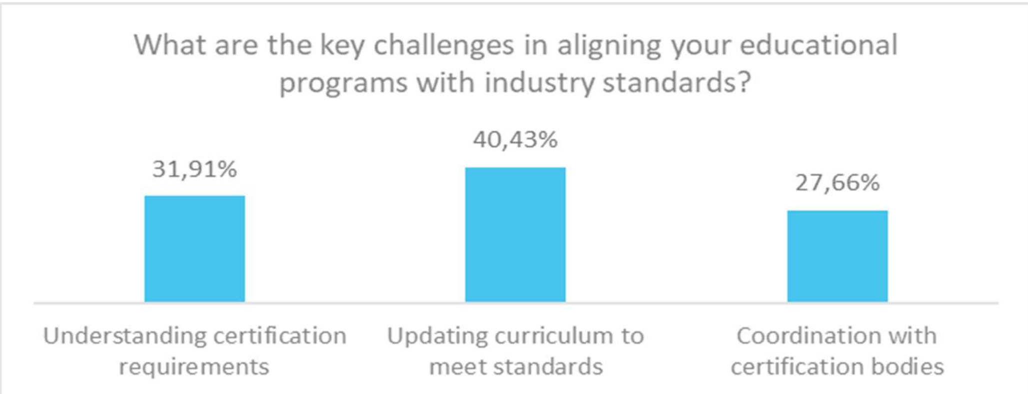

Figure 52. Total results for Question '' What are the key challenges in aligning your educational programmes with industry standards? '' (CoVE GR)

In the next figure, the answers to the question “Please specify which of the following transversal skills are cultivated at your organization.?" show that most of the instructors specified Team working (25.81%), Problem solving (20.43%), and Communication (19.35%) as transversal skills in their organizations. Less were noted for Ease of learning (10.75%), Innovation and creativity (6.45%), Planning and organization (5.38%), Systemic/holistic thinking (4.30%), Cross-disciplinary technical competencies (4.30%) while the smallest percentage was observed in Leadership (3.23%). With these findings, it is crucial to further strengthen skills such as creative thinking and innovation, while equally important is the cultivation of organizational skills and leadership to ensure a comprehensive education.

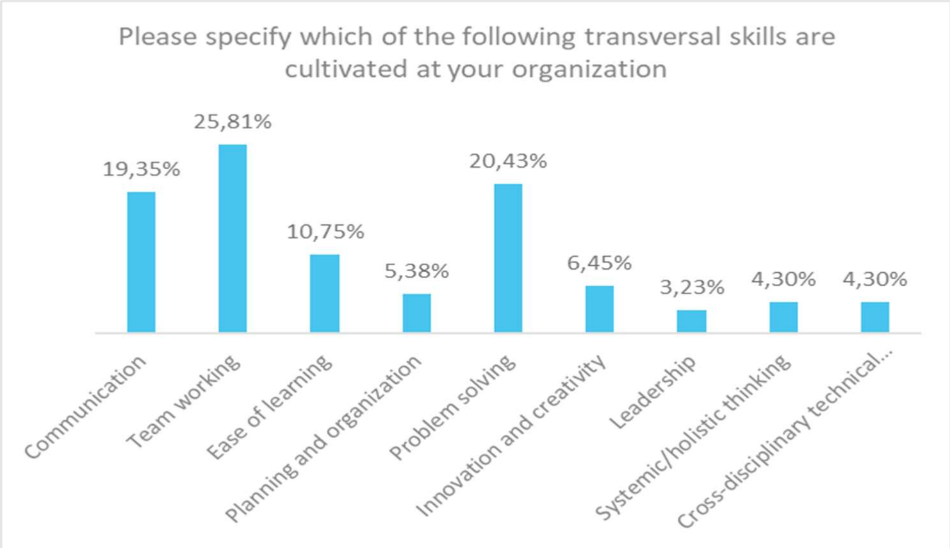

Figure 53. Total results for Question ''Please specify which of the following transversal skills are cultivated at your organization.” (CoVE GR)

The next figure shows the answers to the question “Does your institution face the challenge of adapting its study programme to smart specialization goals and policies?”. The majority of the respondents (55%) replied yes, 31% didn't know, and 14% reported that they didn't face the challenge of adapting their study programme to smart specialization goals and policies.

Figure 54. Total results for Question '' Does your institution face the challenge of adapting its study programme to smart specialization goals and policies? '' (CoVE GR)

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In the next figure, the answers to the question “Does your institution need the adaptation of new skills for smart specialization that were not needed before?” most instructors (64%) replied yes while 28% didn't know and only 8% reported that their institutions don't need the adaptation of new skills for smart specialization.

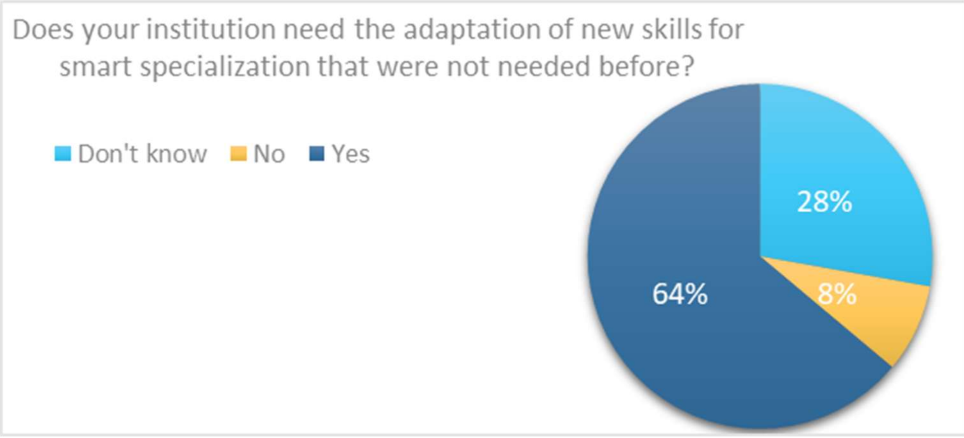

Figure 55. Total results for Question ''Does your institution need the adaptation of new skills for smart specialization that were not needed before?'' (CoVE GR)

The analysis of the questionnaire data presents the current situation in the Offshore Wind Energy sector in both education and training in Greece. Based on the results, key features of the current situation, challenges, and needs are highlighted. Most respondents to the questionnaires consist mainly of men between the ages of 46-55, while there is significantly lower participation of women and younger age groups.

Most participants come from vocational rather than university education, while the specialties that dominate professionally at the local level include engineers, technicians and other technologically or technically oriented professionals. Teachers active in the field of renewable energy sources have limited experience, with more than 50% having less than 3 years of experience in renewable energy technologies. The lack of educational experience is even more evident in the field of Offshore Wind Energy in particular, with 50% reporting a complete lack of experience, while only 17% have more than 10 years of experience. So far, solar energy and onshore wind energy are the sectors with the greatest specialization of teachers, leaving room for improvement in education, specialization and training in the field of Offshore Wind Energy.

In addition, the analysis identifies significant skills gaps, both in transversal and specialized skills. Engineering skills (e.g. electrical, offshore engineering), digital skills, as well as skills for working offshore are needed. At the same time, students' skills such as critical thinking, adaptability, and problem-solving are essential to prepare students to enter the labour market.

In terms of educational tools, teachers mainly choose to work with programmeming languages (e.g. Python), IoT platforms, and various simulation software, however, most of them present the need to transition to education with access to renewed and sophisticated educational tools and to create partnerships with industry. It is also noteworthy that based on the data, 44% of teachers proceed to renew their educational materials annually, but there remains a need for more systematic reform with new educational material. In addition, key challenges faced by teachers include the absence of traineeships, access to or lack of limited

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resources, and the difficulty of aligning their curricula with market needs. To improve the quality and effectiveness of education, the integration of laboratory practice, field visits - facilities, as well as internships are considered key.

In conclusion, there is a strong need to strengthen and develop education and training in the field of Offshore Wind Energy and it is crucial to focus on broadening teachers' skills, simultaneously developing their curricula with developments in technology and creating and supporting partnerships with industry. All these practices will enhance the effectiveness of the training process by better preparing trainees to stand and cope with the demands of the labour market in the sector as well as strengthening and disseminating the Offshore Wind Energy sector in Greece.

2.4.1.3 VET and HEI students

A total of 86 VET and HEI students participated in the survey, of whom 80.2% were men and 19.8% were women. The core target group consisted of individuals up to 35 years of age, with a distribution of 60% VET learners and 40% HEI students. The largest proportion of women was observed in the age group up to 35 years (18.6%), while the majority of men fell into the age category up to 25 years (51.16%).

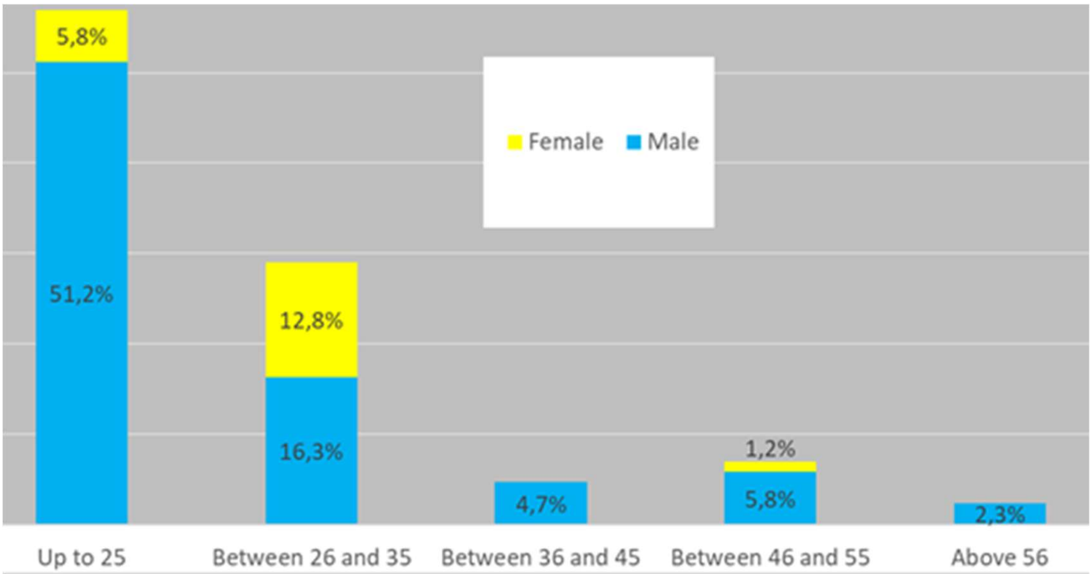

Figure 56. Gender and age distribution of VET learners/ HEI students (CoVE GR)

At the same time, we noticed that in the age group up to 25 years, most survey participants were VET learners (48.84%), while the majority of HEI students were found between 26 and 35 age category (25.58%).

Figure 57. Age distribution of VET learners/ HEI students (CoVE GR)

The majority of participants were young, with 57% aged up to 25 years and an additional 29% between 26 and 35 years old. This means that over 85% of the respondents were under 35, leaving little variation across age groups. As a result, further breakdown by age would not provide significant additional insights for the research findings. Similarly, while gender is an important demographic, less than 20% of the respondents were women. This limited representation makes it less practical to conduct detailed gender-based analysis, as the smaller sample size for female respondents could lead to less reliable or representative conclusions. In contrast, the institutional distribution, with approximately 60% of the respondents coming from VET providers and 40% from universities (HEI), offers a much more balanced and meaningful basis for comparison. Exploring differences between these two groups is critical for understanding how educational backgrounds influence perceptions, interests, and course relevance to the offshore renewable energy sector.

Main survey findings

For the question "*In your opinion, which career paths does your institution most actively encourage* students *to pursue?*", it was deemed appropriate to conduct a crosstab analysis with age and the type of organization the student is enrolled in. This approach allows for a deeper understanding of how different institutions (e.g., universities versus vocational training providers) tailor their career guidance based on the demographic characteristics of their students. By incorporating age as a variable, the analysis could reveal whether career encouragement strategies vary between younger and older students, potentially shedding light on how institutions adapt their focus to meet the specific needs and aspirations of diverse student populations.

The bar chart reveals distinct trends in career paths encouraged by institutions across different age groups. In the Above 56 age group, there was an exclusive focus on Engineers (100%), suggesting that older professionals predominantly hold specialized roles. On the other hand, the age groups Between 46 and 55 and Between 36 and 45 demonstrated greater diversity in their career paths. In these groups, Engineers, Technicians, and Health and Safety were the most prominent fields, reflecting the engagement of experienced professionals in a variety of roles.

In the Up to 25 age group, Engineers (54.2%) and Technicians (77.1%) clearly dominated, while participation in other sectors remained relatively low. This pattern indicated that institutions actively encourage these career directions for younger individuals, likely due to the demand for such roles in the labor market.

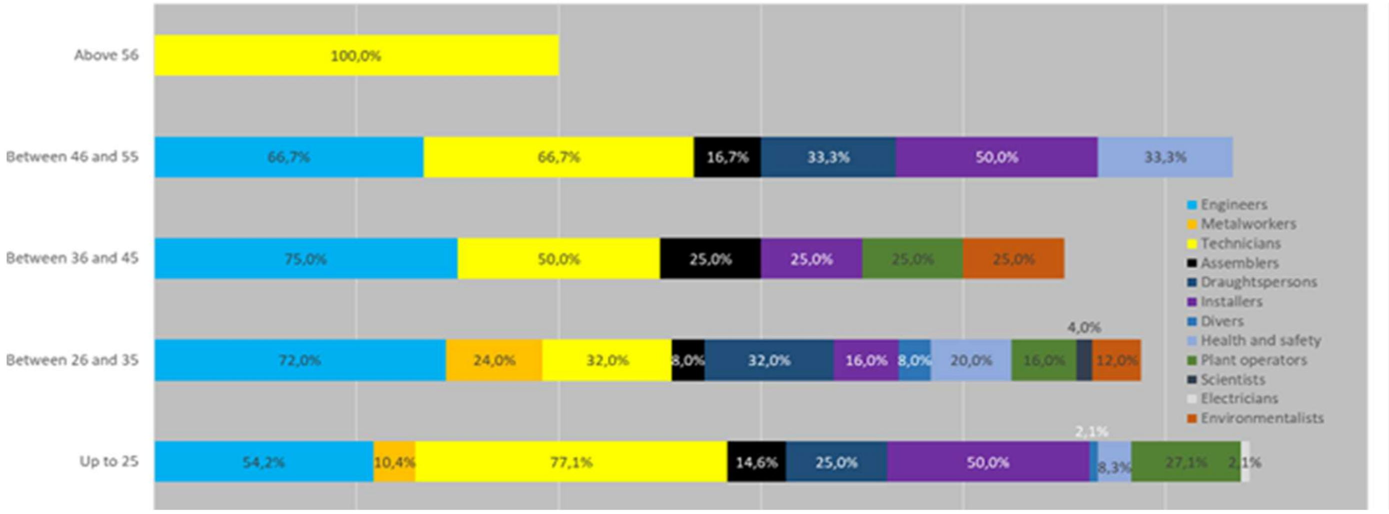

Figure 58. Distribution of career paths encouraged by age categories (CoVE GR)

Meanwhile, participation in fields such as Plant Operations and Environmentalists was minimal across all age groups, potentially pointing to limited interest or representation of these careers within institutions. Additionally, careers like Divers and Assemblers were more frequently observed in the middle age groups, likely correlating with practical experience accumulated over time.

Overall, the chart suggests that institutions prioritize technical and engineering career paths for younger students, while older age groups display broader professional diversification. The dominance of Engineers in the Above 56 age group reflects the tendency for professionals in stable and highly specialized roles to continue working into later years.

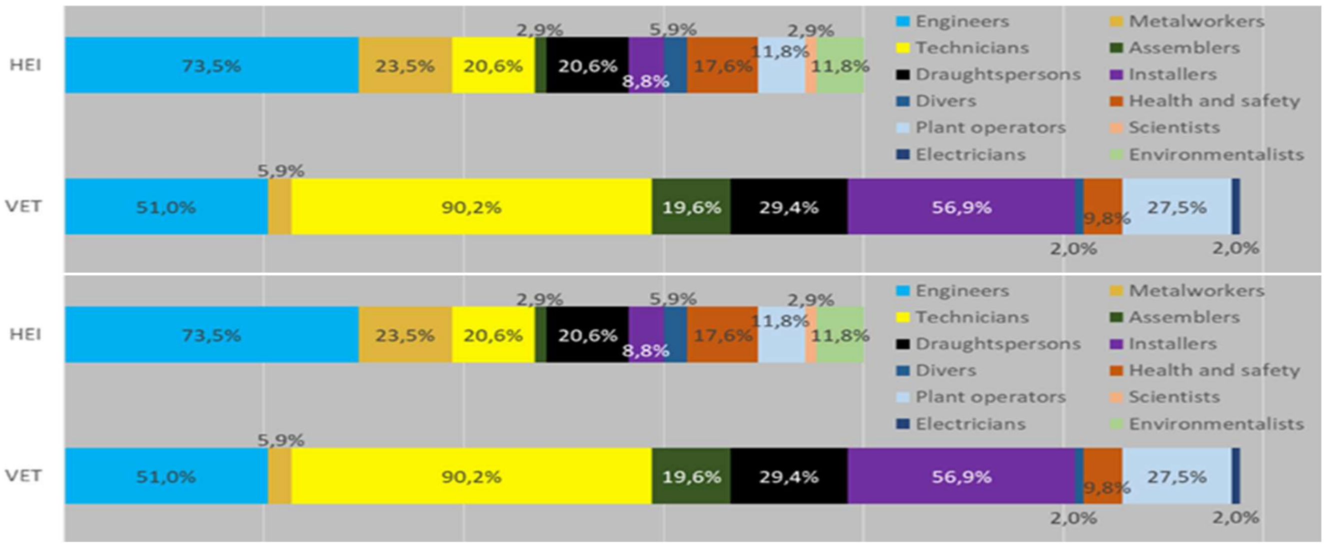

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Figure 59. Distribution of career paths encouraged by HEI and VET (CoVE GR)

The above chart illustrates the career paths most actively encouraged between HEI students and VET learners. It highlights the proportions of students directed towards specific professions by each institution. Universities predominantly encourage careers in engineering. On the other hand, VET providers prioritize technical and practical careers, with an overwhelming 90.2% of students encouraged to pursue technical roles, while other significant areas include metallurgy (51%) and assemblers (19.5%). Engineering is notably less emphasized by VET providers, with only 2.6% of students directed toward this field.

For the question "*What is your level of interest in pursuing a career in the offshore renewable energy sector?",* the following chart compares the levels of interest among HEI and VET students in pursuing a career in the offshore renewable energy sector. Overall, the results indicate a strong interest in this field among both groups, with VET learners showing slightly higher enthusiasm. Specifically, 46.2% of VET learners reported being "very interested", compared to 44.1% of HEI students, while 30.8% of VET learners and 29.4% of university students were "interested". A small proportion of students were "somewhat interested", with university students at 23.5% and VET learners at 19.2%. Only 3.0% of HEI students and 3.8% of VET learners indicated that they were "not interested", demonstrating minimal disinterest overall. These results highlight a promising level of engagement in the offshore renewable energy sector across both educational pathways, which can be utilized to design targeted recruitment and training initiatives.

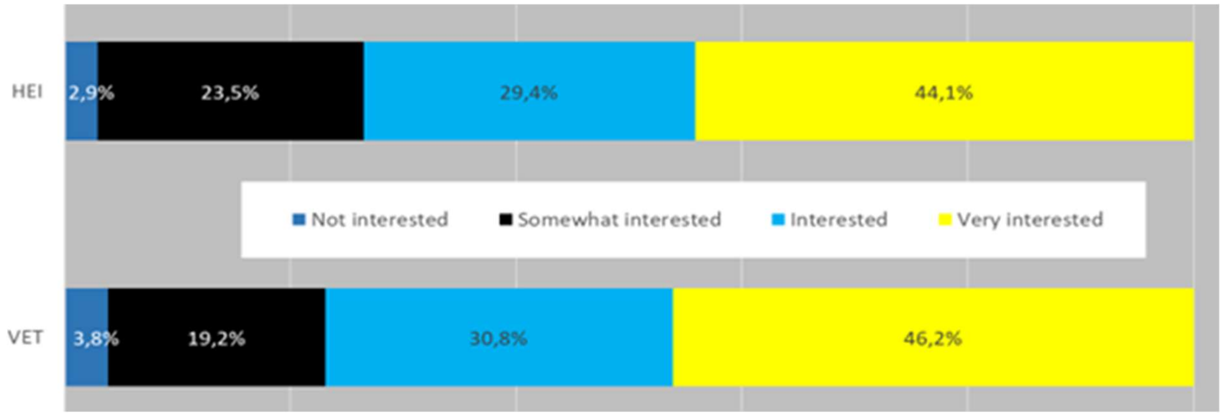

Figure 60. Levels of interest in pursuing a career in the offshore renewable energy sector among VET learners and HEI students (CoVE GR)

The responses at the question "*In which phases of the offshore renewable energy value chain are you more interested?*" reveal notable differences between HEI and VET students in their interests across the offshore renewable energy value chain. University students predominantly showed interest in Pre-Planning Research (67.6%) and Project Planning (64.7%), reflecting their inclination toward the earlier, analytical phases of project development. Conversely, VET learners displayed the highest interest in Construction & Installation (69.2%), aligning with their practical and hands-on training background. Operation & Maintenance was also a significant area of interest for both groups, with 46.2% of VET learners and 38.2% of HEI students selecting this phase. Other areas like Manufacturing and Tendering & Contracting had moderate interest levels, with VET learners generally showing slightly higher engagement. Interestingly, under "Others", where students could write their own responses, options like "Environmental Impact" and "In all phases related to ensuring water quality" were mentioned but received very low response rates. This suggests that only a small minority of students were interested in these more specialized or broader aspects of the offshore renewable energy value chain. Overall, the data highlights a clear distinction in preferences, with HEI students favouring research-oriented roles and VET learners leaning towards implementation and maintenance tasks, reflecting the differing focuses of their educational pathways.

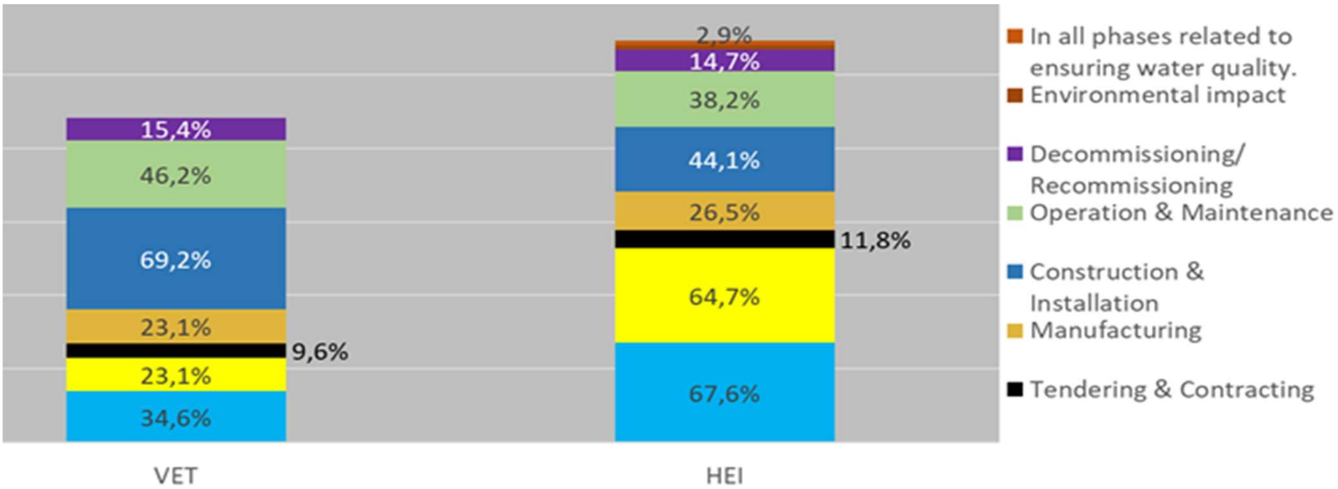

Figure 61. Distribution of student interest across phases of the offshore renewable energy value chain among VET learners and HEI students (CoVE GR)

The responses to the question "*How relevant do you find your current courses to the offshore renewable energy sector?*" revealed notable differences between HEI and VET students. A higher proportion of VET learners (36.5%) considered their courses to be "very relevant" compared to 23.5% of HEI students, highlighting that VET programmes may have a stronger practical alignment with the offshore renewable energy sector. Similarly, the majority of both groups rated their courses as "moderately relevant", with 51.9% of VET learners and 52.9% of HEI students selecting this option, suggesting that while their programmes provide some relevant knowledge, there may be gaps in directly addressing sector-specific skills. Interestingly, a greater percentage of HEI students (14.7%) viewed their courses as only "slightly relevant" compared to 7.7% of VET learners, indicating that some university curricula might lack direct applicability to this industry. Additionally, the proportion of respondents who found their courses "not relevant" was minimal for both groups, with 8.8% of HEI students and 3.8% of VET learners, reflecting an overall recognition of some relevance to the sector. These findings suggest that VET programmes could be perceived as more tailored to the practical demands of the offshore renewable energy sector, while university courses might benefit from further integration of industry-specific content to enhance their relevance.

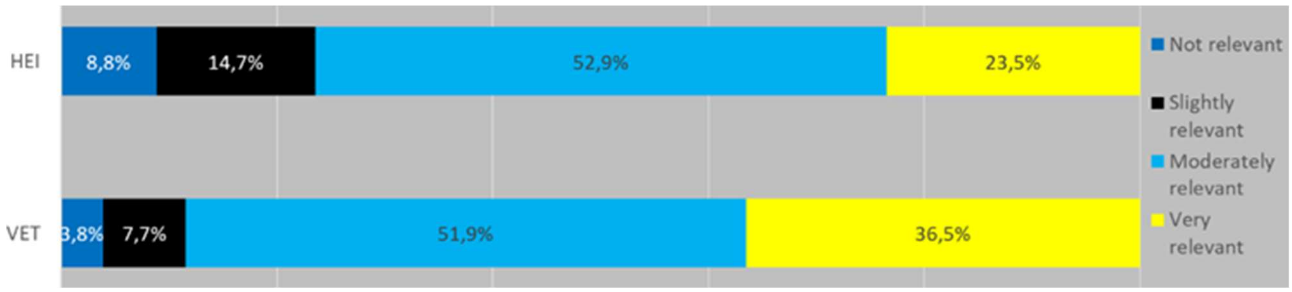

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Figure 62. Distribution of perceived course relevance to the offshore renewable energy sector among VET learners and HEI students (CoVE GR)

Following, students were asked to assess their confidence levels across a range of skills on a scale from 1 (very low confidence) to 5 (very high confidence). The correlation analysis revealed interesting patterns in the relationships between confidence levels across various skills, with distinctions observed between VET learners and HEI students.

Among VET learners, strong positive correlations were observed between skills related to critical thinking, collaboration, and project design. For instance, those who reported high confidence in "Critical Thinking", also demonstrated high confidence in "Communication and Collaboration". In contrast, foreign language skills were negatively correlated with more technical skills, such as engineering, suggesting potentially distinct learning priorities among this group.

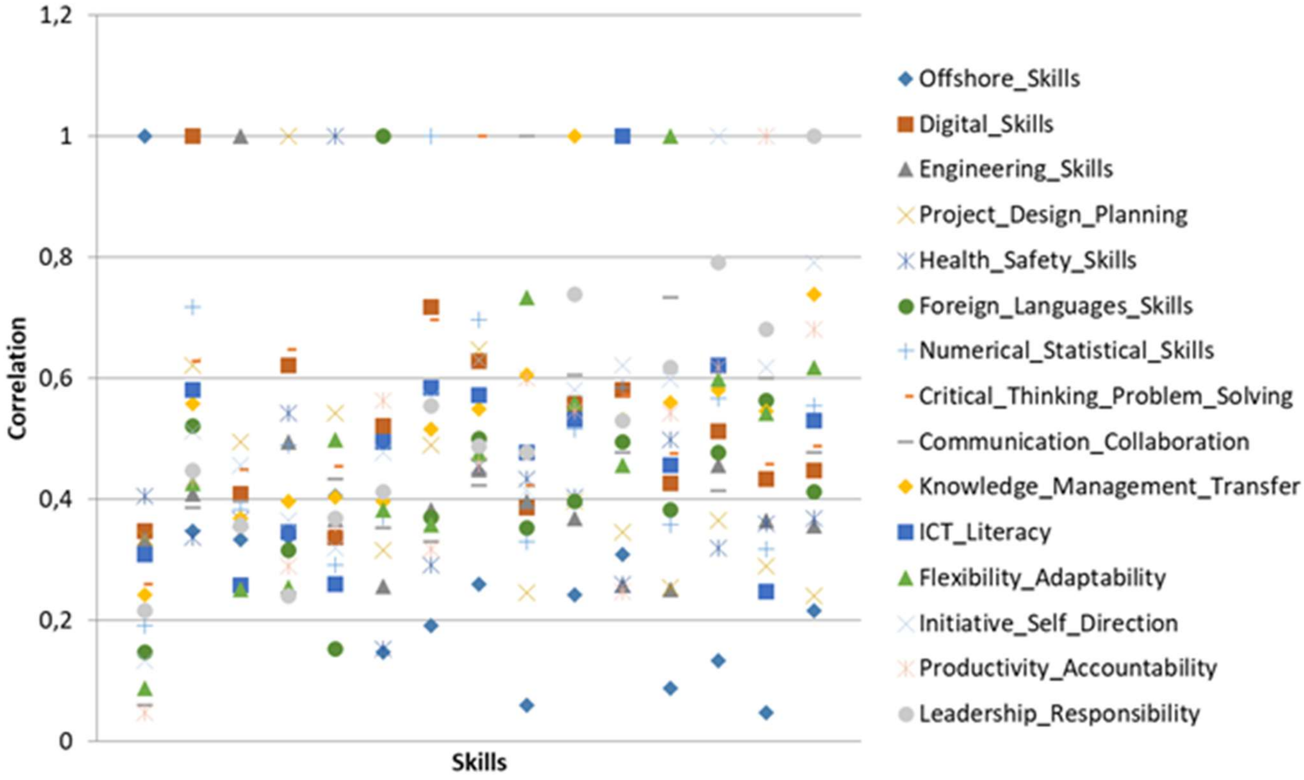

Figure 63. Correlation matrix of skills confidence for VET learners (CoVE GR)

For HEI students, skills such as "Project Design and Planning" were strongly correlated with "Problem Solving" and "Knowledge Management". This may reflect the emphasis on holistic approaches to addressing complex challenges in higher education. Notably, skills like "Flexibility" and "Leadership" showed stronger correlations in the HEI context compared to the VET setting, potentially indicating a greater focus on strategic and adaptive competencies.

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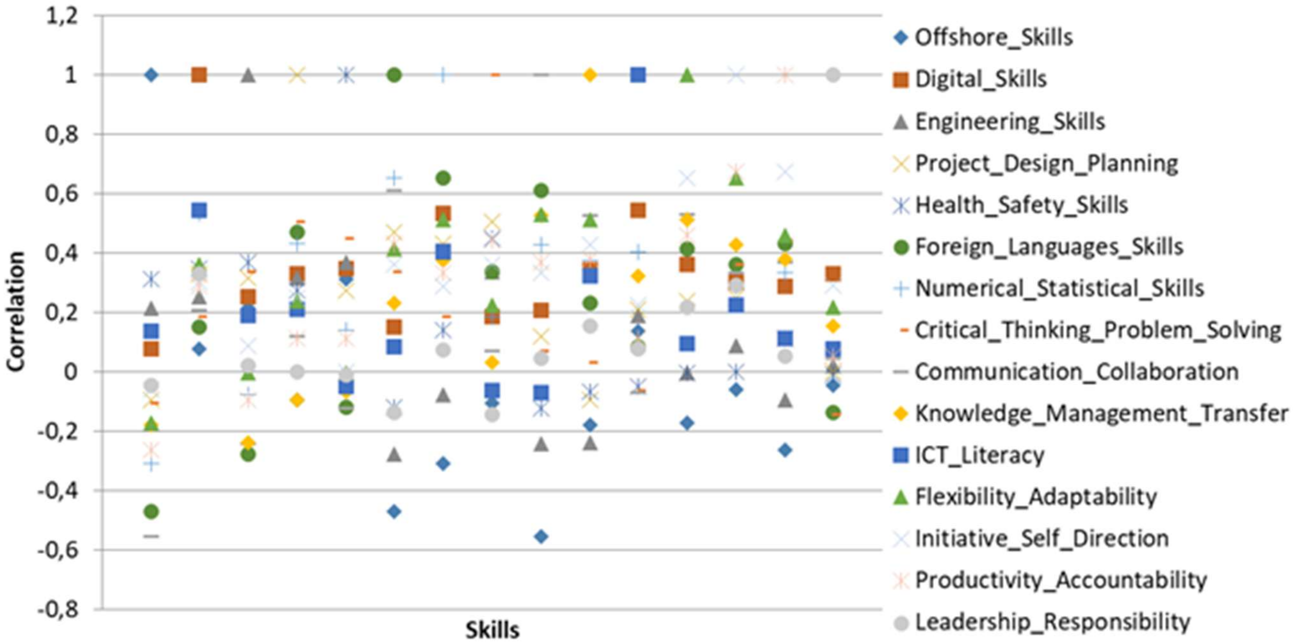

Figure 64. Correlation matrix of skills confidence for HEI students (CoVE GR)

Overall, the results highlight differences in skill development priorities between VET learners and HEI students. VET learners appear to focus more on practical and applied skills, while HEI students emphasize competencies related to information management and strategic thinking.

The responses to the question "*How do you stay informed about the latest developments in offshore renewable energy?*" reveal notable differences between HEI and VET students. Social media is the most common source of information for both groups, with 63.8% of HEI students and 66.5% of VET learners relying on it, highlighting its dominant role in modern communication. Academic journals and industry newsletters are more frequently used by HEI students (64.7% and 48.2%, respectively) compared to VET learners (11.5% and 36.5%), reflecting the academic orientation of HEI curricula. In contrast, VET learners appear to rely more on hands-on and direct sources like trainers at VET institutes (17.3%) and professional networks (26.9%), aligning with their practical learning environment. Other sources like TV and LinkedIn show minimal relevance, with low percentages for both groups, while online courses hold moderate interest across both (26.9%). The data emphasizes the different information-seeking behaviours of these two groups, with HEI students leaning toward scholarly and formal channels, while VET learners prefer practical and immediate sources of information. This divergence underscores the importance of tailoring communication strategies to their distinct preferences.

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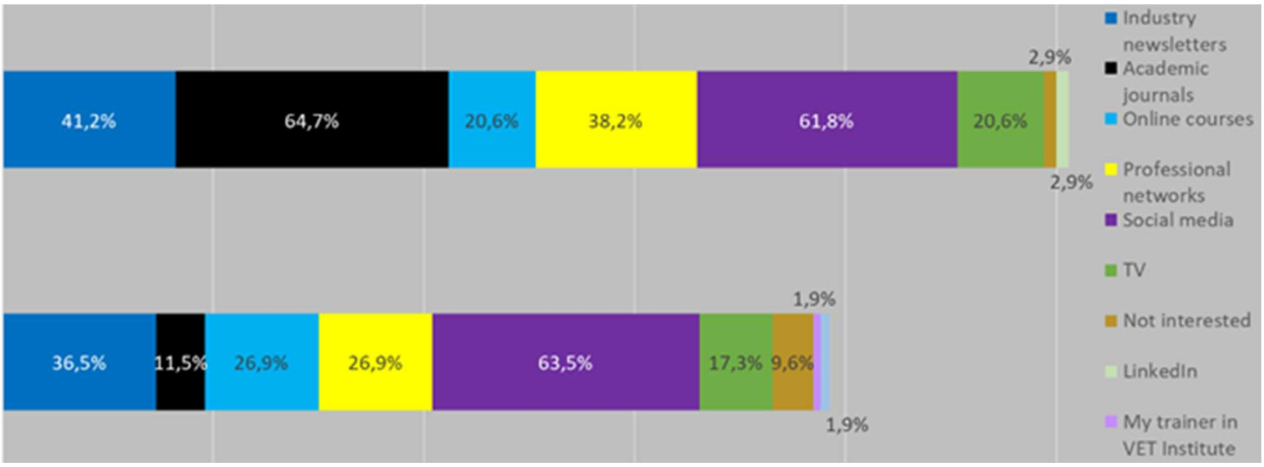

Figure 65. Distribution of information sources for staying informed about offshore renewable energy among VET learners and HEI students (CoVE GR)

The responses to the question "*How well do you think your current education is preparing you for the offshore* renewable *energy market needs?*" reveal significant differences between VET learners and HEI students. Among HEI students, 44.1% feel their education prepares them "well", but only 8.8% rate it as "very well", suggesting moderate confidence in their programme's alignment with industry needs. In contrast, VET learners display a stronger positive perception, with 48.1% stating their education prepares them "well" and a notable 23.1% rating it as "very well". Additionally, 38.2% of HEI students view their preparation as "adequate", compared to 21.2% of VET learners. The percentage of those who feel "poorly" prepared is minimal but slightly higher among VET learners (7.7%) than HEI students (8.8%). Overall, the results highlight the practical focus of VET programmes, which appear to better equip students for the offshore renewable energy sector, while university programmes may need to strengthen their connection to industry-specific skills and practices to boost students' confidence.

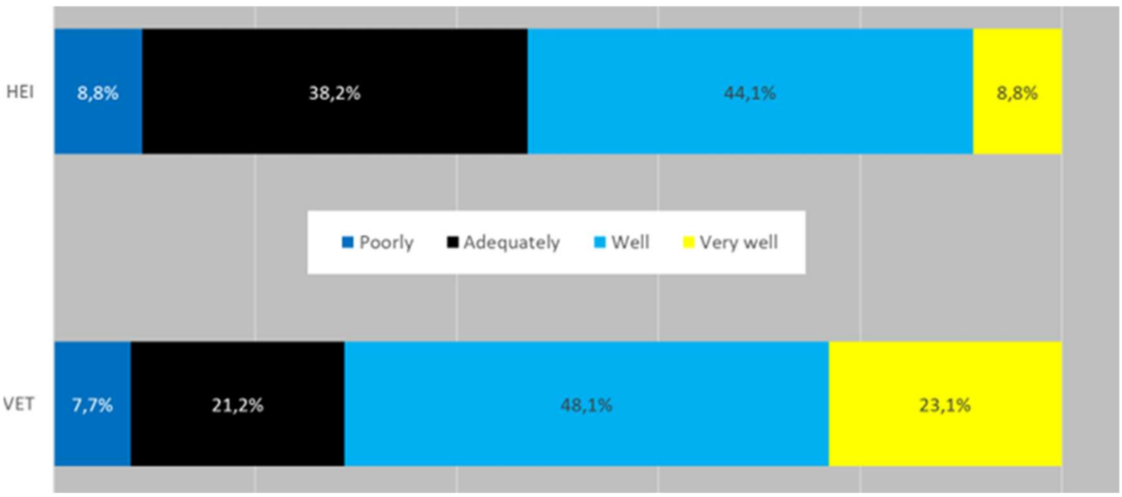

Figure 66. Distribution of perceived adequacy of education in preparing for offshore renewable energy market needs among VET learners and HEI students (CoVE GR)

The responses to the question "Have you participated in any industry-related projects or research?" indicate that the majority of both HEI and VET students did not have such experiences, but there are slight differences

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in participation levels between the two groups. Only 34.6% of HEI students reported participating in industry-related projects or research, compared to 32.7% of VET learners. This shows a marginally higher engagement among HEI students, which may reflect their potential involvement in academic research or internships tied to their studies. However, the majority of students from both groups—65.4% of HEI students and 67.3% of VET learners—indicated no participation, highlighting a significant gap in industry exposure across both educational pathways. These findings suggest a need for greater emphasis on integrating industry-relevant projects and research opportunities into both HEI and VET curricula to enhance students' practical experience and readiness for the offshore renewable energy sector.

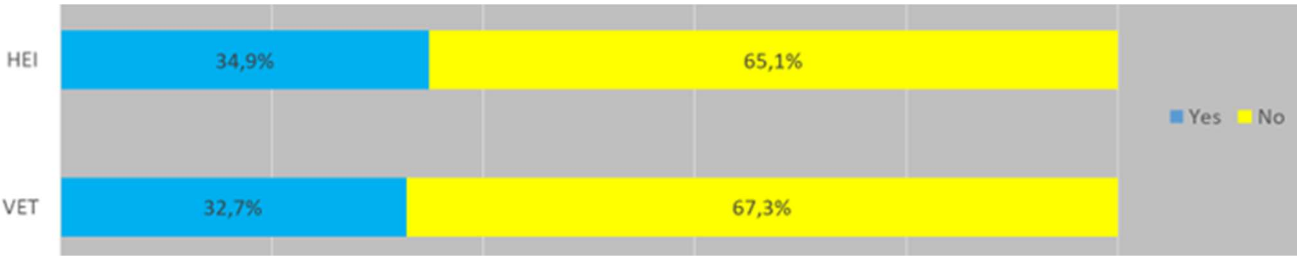

Figure 67. Distribution of participation in industry-related projects or research among VET learners and HEI students (CoVE GR)

The responses to the question "*What practical experiences have you had in the sector of offshore renewable energy?*" show notable differences between HEI and VET students. A significant proportion of VET learners (55.8%) reported having no practical experience, slightly lower than HEI students, where 64.7% indicated the same. Internships are the second most reported experience among VET learners (25%), highlighting a relatively stronger focus on hands-on training compared to HEI students, where only 8.8% have participated in internships. Workshops are also more common among VET learners (26.9%) than HEI students (17.6%), reflecting the emphasis of VET programmes on practical learning. Research projects were reported at similar levels by both groups (17.3% for VET and 17.6% for HEI students), indicating that academic-oriented experiences are equally prioritized. Lastly, the category "related to causing changes in water quality" appeared in the "Other" field, representing a very small fraction of responses (2.9%) exclusively among university students. Overall, the data indicates that VET programmes are more effective at offering practical and applied learning experiences, while university students tend to have limited engagements with industry-related practices. This highlights an opportunity for universities to strengthen experiential learning opportunities like internships and workshops.

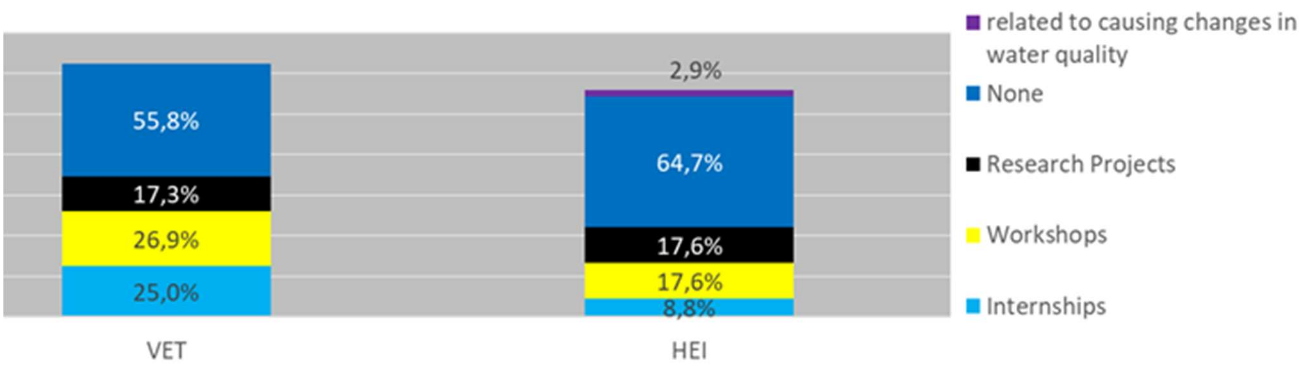

Figure 68. Distribution of practical experiences in the offshore renewable energy sector among VET learners and HEI students (CoVE GR)

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The responses to the question "*What challenges do you face in gaining practical experience in this field?*" highlight several obstacles that students encounter, with notable differences between HEI and VET students. For HEI students, the most significant challenge is geographic limitations (38.2%), indicating that access to industry facilities is often restricted by location. This is followed by limited access to industry professionals (35.3%) and insufficient practical training in the curriculum (29.4%), reflecting the theoretical nature of university programmes. In contrast, VET learners identified limited access to industry professionals (32.7%) as their main barrier, followed closely by insufficient practical training (26.9%) and geographic limitations (26.9%).

Additionally, lack of internship opportunities is a far greater issue for VET learners (25%) compared to HEI students (8.8%), suggesting a stronger need for internship programmes in VET pathways. A small percentage of responses fall under the "Other" category, with HEI students mentioning challenges such as current job position (2.9%) and not facing any difficulty (2.9%). Similarly, a small number of VET learners reported being freshmen and unable to answer (1.9%) or noted that they face no difficulties (1.9%).

Overall, these findings highlight that while both groups face overlapping challenges, HEI students struggle more with geographic access and theoretical curricula, whereas VET leaners emphasize the need for industry connections and internships. Addressing these issues through targeted programme improvements could support students in gaining practical experience (this was a multiple-response question, so the total percentage exceeds 100%.).

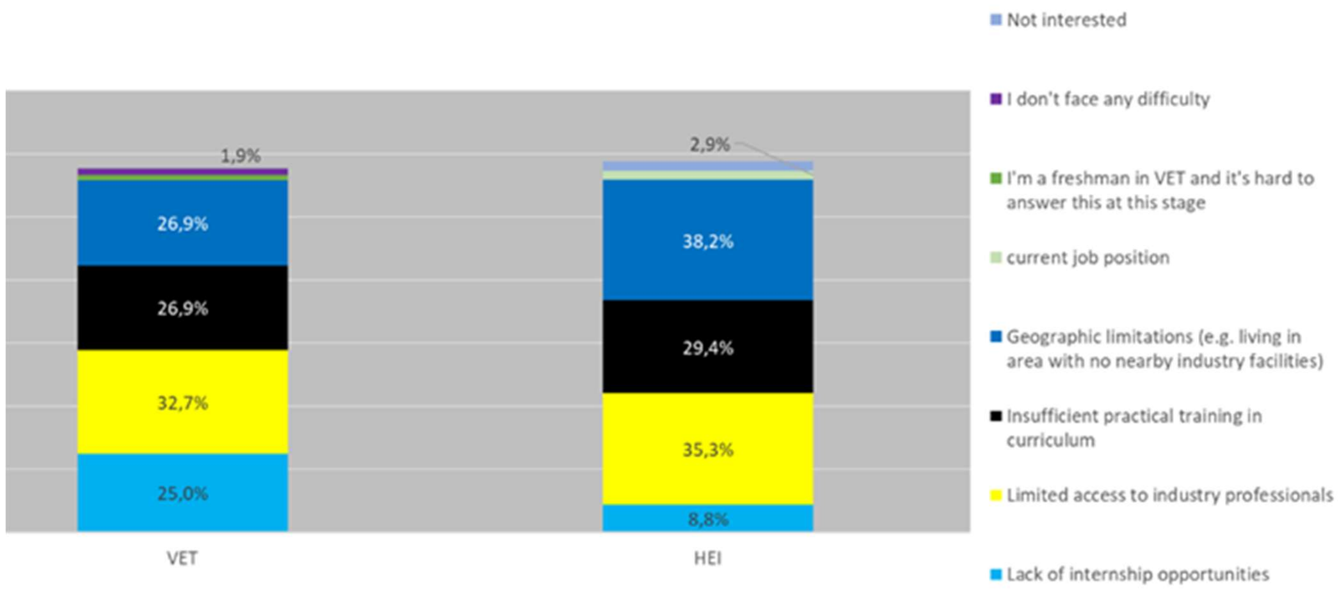

Figure 69. Distribution of challenges faced in gaining practical experience in the offshore renewable energy field among VET learners and HEI students (CoVE GR)

The responses to the question "*What support do you need from your institution to pursue a career in this sector?*" reveal differing priorities between HEI and VET students. Among HEI students, the most frequently mentioned needs are industry networking opportunities (70.6%) and internship placements (64.7%), highlighting their desire for stronger industry connections and hands-on experiences. Similarly, scholarships/

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funding was also a significant need for HEI students (67.6%), suggesting financial support is a major concern for this group.

For VET students, the highest priority was internship placements (63.5%), reflecting their focus on practical, real-world training. Industry networking opportunities were also critical (44.2%), though less frequently mentioned than by university students. Scholarships/funding were cited by 30.8% of VET students, indicating a lower demand for financial aid compared to their university counterparts.

The “Other” responses, which included competent management executive, research laboratory visits, and site visits, were minimal, representing only 2.9% of HEI students and 1.9% of VET learners. These responses suggest specific needs that could be addressed through targeted institutional efforts.

Overall, the data highlight that while both groups seek stronger industry engagement and internship opportunities, HEI students emphasize financial and networking support, whereas VET learners prioritize practical training. Tailoring support programmes to these differing needs could enhance career readiness across both educational pathways.

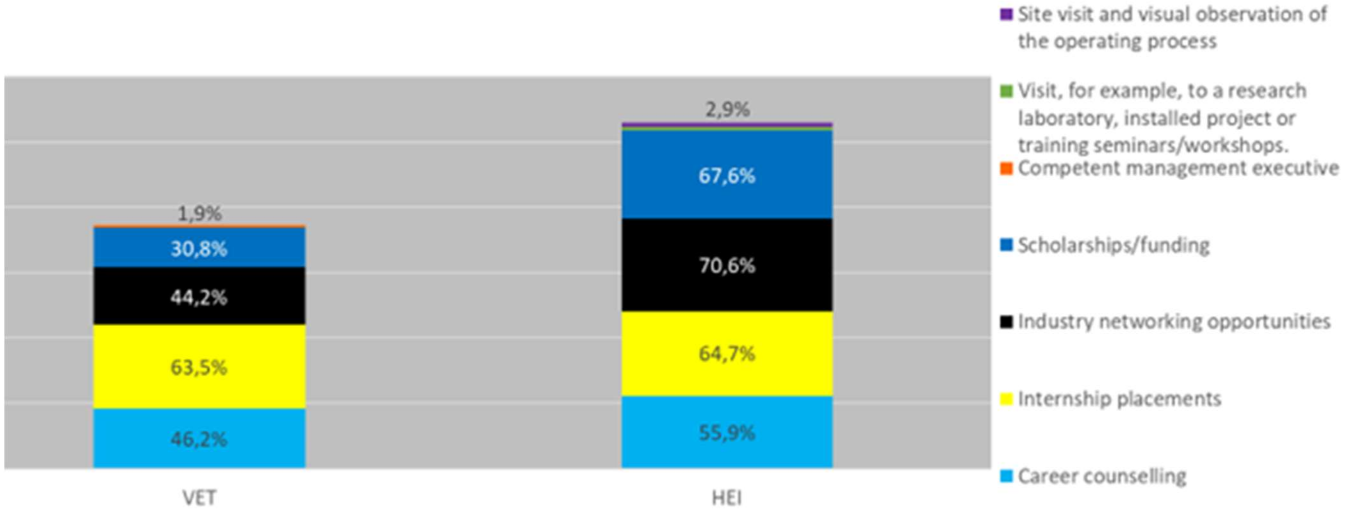

Figure 70. Distribution of support needed from institutions to pursue a career in the offshore renewable energy sector among VET learners and HEI students (CoVE GR)

2.4.2 Identification of improvements in the VET offer

This section focuses on identifying concrete opportunities to improve the Vocational Education and Training (VET) offer in Greece, based on the results of national surveys and curriculum analysis conducted during the SHOREWINNER project. It includes a review of course content, learning outcomes, and delivery methods (2.4.2.1), an assessment of feedback on training effectiveness from key stakeholders (2.4.2.2), and an analysis of inclusion and accessibility challenges in the current VET system (2.4.2.3). The insights gathered aim to inform the modernization of programmes and support the development of a responsive, inclusive, and future-oriented training ecosystem for the offshore renewable energy (ORE) sector.

2.4.2.1 Evaluation of course content, learning outcomes, and delivery methods

Vocational Education and Training (VET) serves as a cornerstone in the development of a workforce that can meet the complex technical, environmental, and regulatory demands of the Offshore Renewable Energy

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(ORE) sector. Within the context of the SHOREWINNER project, the Greek CoVE has undertaken a detailed assessment of current training offerings, pedagogical practices, and learning outcomes, in order to determine the readiness of the Greek VET and HEI system to support this fast-growing industry.

This evaluation builds upon the insights gathered in Deliverable 2.1, complemented by an extensive national survey involving industry professionals, instructors, and students. The objective is to assess whether existing programmes sufficiently equip learners with the hard and soft skills required in the ORE sector, and to identify strategic areas for curricular enhancement and pedagogical reform.

The following table summarises the key findings and recommendations, while next subunits provide further details.

Table 14: Key findings and recommendations retrieved through the evaluation of course content, learning outcomes, and delivery methods (CoVE GR)

Key Findings	Strategic Recommendations
Offshore wind topics are underrepresented or only generically addressed.	Integrate offshore-specific modules covering floating systems, offshore cabling, and marine logistics into core curricula.
Safety training is not aligned with GWO standards.	Revise programmes to comply with GWO requirements and incorporate internationally recognised safety certifications.
Learning outcomes are not systematically aligned with ORE sector demands.	Define learning objectives that reflect offshore operations, transversal competencies, and interdisciplinary knowledge (e.g., policy, economics).
Delivery methods lack practical, immersive components.	Expand internships, simulation labs, and VR/AR-based teaching, and strengthen ties with offshore wind developers and marine operators.
Digital competencies are not sufficiently developed.	Incorporate content on predictive maintenance, data analytics, and digital twin technology as standard across technical programmes.
Industry collaboration remains ad hoc and dependent on individual initiative.	Institutionalise co-designed training programmes, employer feedback loops, and shared learning platforms across the CoVE network.

Overview of VET and HEI offerings in Greece

The Greek VET and HEI ecosystem includes a wide variety of institutions involved in renewable energy education. Notably, the University of the Aegean, the HCMR (Hellenic Centre for Marine Research), the Hellenic Wind Energy Association (ELETAEN), and the SAEK Egaleo play leading roles in shaping education in technical, marine, and environmental sciences.

Despite this active landscape, survey findings indicate that current course offerings remain more aligned with onshore wind and solar energy technologies than with offshore-specific topics. While engineering fundamentals, environmental science, and technical safety training are generally well represented, the

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systematic inclusion of offshore wind–specific content—such as floating turbine structures, marine logistics, and underwater cabling—is limited.

Furthermore, many programmes lack formal mechanisms to ensure alignment with international frameworks such as the European Qualifications Framework (EQF) or standards set by the Global Wind Organization (GWO). This disconnect raises concerns about the international portability and practical relevance of the qualifications currently awarded.

Evaluation of course content

Survey data and course review reveal the following trends and gaps:

- **Offshore Wind Content:** Programmes often reference wind energy in general terms but rarely focus on offshore-specific systems. Critical technical domains such as floating platform design, offshore installation procedures, and subsea systems are largely absent.
- **Digitalisation & Emerging Technologies:** While instructors report teaching tools such as simulation software and programmeming languages, coverage of AI, digital twins, or predictive maintenance is minimal or inconsistent.
- **Safety & Risk Management:** Safety training is present in various programmes; however, alignment with GWO standards is not yet institutionalised, reducing the international recognition of graduates' competencies.
- **Environmental Regulation:** Environmental content is broadly included, yet offshore-specific regulatory processes and impact assessment methodologies are seldom addressed in a targeted way.

Despite strengths in foundational engineering and general renewable energy principles, the absence of structured offshore wind content significantly limits the ability of current VET and HEI graduates to transition directly into ORE sector employment.

Evaluation of learning outcomes

Learning outcomes across most programmes focus on **broad academic or technical competencies**, with limited translation into specific, measurable capabilities required by the offshore wind sector. Key observations include:

- **Lack of Offshore-Specific Objectives:** Few programmes define learning outcomes related to offshore wind technologies, such as marine engineering, mooring systems, or floating wind turbine operations.
- **Limited Focus on Transversal Skills/Soft Skills Integration:** Industry professionals highlight the importance of critical thinking, teamwork, and problem-solving, yet these are not consistently embedded in learning objectives or assessment frameworks. While instructors recognize the relevance of skills such as communication and adaptability, their formal integration into curriculum outcomes remains limited and often relies on individual initiative.

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- **Interdisciplinary Gaps:** Business accumulate, regulatory compliance, and project management—key for offshore project lifecycles—are largely underrepresented, particularly in technical courses.

This analysis demonstrates that many programmes do not yet deliver clear, sector-aligned learning outcomes. A transition toward competency-based curricula, explicitly focused on real-world offshore energy operations, is necessary to enhance graduate employability.

Evaluation of Learning Outcomes

Effective preparation for careers in offshore wind requires learning environments that combine theory with applied, practice-based experiences. Current delivery methods in Greece, while evolving, remain weighted towards traditional approaches:

- **Lecture-Based Dominance:** Course delivery still predominantly relies on lectures, with limited integration of fieldwork, labs, or simulations that mimic offshore environments.
- **Experiential Learning Gaps:** Internships and hands-on training opportunities are limited, with many students lacking exposure to real-world equipment, sites, or safety protocols.
- **Digital & Remote Tools:** While some instructors employ programming and simulation software, broader use of virtual reality (VR), augmented reality (AR), or remote lab environments remains at an early stage.
- **Industry Partnerships:** Guest lectures and field trips exist but are not yet institutionalised across the system, limiting consistent access to experiential learning and job placements.

This lack of immersive learning undermines the readiness of graduates to operate effectively in high-risk, high-performance offshore conditions. Addressing this challenge requires systemic investment in work-based learning, digital labs, and co-developed modules with industry stakeholders.

2.4.2.2 Assessment of training programme feedback and effectiveness

This section evaluates the quality, relevance, and perceived impact of vocational and higher education programmes in Greece targeting the offshore renewable energy (ORE) sector. Drawing on the national survey data collected from 22 industry professionals, 36 instructors, and 86 students during the first year of the SHOREWINNER project, the assessment highlights stakeholder perspectives on programme design, delivery, and responsiveness to labour market needs. By triangulating feedback from these three key groups, the analysis provides a comprehensive understanding of existing strengths, persistent shortcomings, and the strategic adjustments required for training provision to better align with the demands of the growing ORE workforce.

Perceptions of programme quality and relevance

Across stakeholder groups, the foundational quality of technical education in onshore renewable energy—particularly in engineering disciplines—was viewed positively. Educators noted that many programmes offer a solid baseline in energy systems, wind mechanics, and environmental sciences, forming an essential knowledge base for future specialization. Similarly, students expressed moderate to high satisfaction with the overall structure of their courses, especially those with a strong emphasis on technical fundamentals.

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However, this positive assessment was tempered by widespread concerns over the limited offshore-specific content and insufficient practical training opportunities. Industry professionals, in particular, consistently highlighted a mismatch between graduate competencies and real-world job requirements in offshore settings. One respondent commented:

"There is a significant difference between knowing how a wind turbine works and being able to operate or maintain one 50 kilometres offshore in harsh marine conditions."

This concern was repeated by students, who—despite showing interest in ORE careers—reported a lack of internships and field-based learning. Among VET learners, 63.5% identified internships as the most needed institutional support, while HEI students emphasized the lack of real-world experiences as a barrier to effective preparation. Many students stated that their current education "*does not adequately reflect the practical conditions of the offshore sector*", particularly regarding safety procedures, marine equipment handling, and offshore logistics.

Educators acknowledged these gaps, describing challenges in integrating new offshore technologies, practical modules, and industry-aligned content. Notably, over 50% of instructors had less than three years of teaching experience in renewable energy, with even fewer experienced specifically in offshore topics. This limited exposure contributes to slower curriculum adaptation and reduced pedagogical confidence in emerging fields such as floating wind or smart maintenance systems.

Employability and industry readiness

Stakeholder feedback reveals a consensus that current VET and HEI programmes fall short in producing job-ready graduates for the offshore wind sector. Industry representatives frequently cited a lack of practical competencies among new hires, particularly in:

- Offshore safety protocols (e.g., working at height, emergency procedures)
- Installation and maintenance of offshore platforms
- Operation of marine-specific equipment and navigation systems

This detachment was further emphasized in responses regarding smart specialization: while over 64% of instructors recognized the need to adapt programmes to smart specialization objectives, many admitted that they lacked the necessary content or institutional support to do so effectively. Instructors also reported facing obstacles in forming meaningful collaborations with employers. Only 20% cited joint curriculum development with industry, and a significant portion (25%) admitted to having no collaboration at all with other training providers. These gaps limit the system's ability to integrate workplace trends and technological advances into programme design.

Structural barriers to training effectiveness

Survey data also highlighted **structural constraints** that undermine training effectiveness, including:

- **Resource limitations**, especially in simulation technologies, safety equipment, and offshore field access

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- **Inconsistent curriculum review cycles**, with over 40% of instructors updating content only every 2–3 years or less
- **Gender and geographic disparities**, particularly underrepresentation of women and lack of regional training centres close to port cities or offshore zones

Instructors themselves cited the lack of updated teaching materials, access to industry experts, and limited field infrastructure as pressing issues. These findings suggest that programme quality is not only a matter of curriculum content, but also a function of access to modern tools, cross-sector collaboration, and institutional agility.

Summary of key insights and stakeholder consensus

Next figure could synthesize feedback across the following dimensions: theoretical content quality, offshore relevance, practical training opportunities, alignment with industry demands, and institutional resources. Such a synthesis would likely reveal high marks for foundational theory, but significantly lower scores in offshore specialization, experiential learning, and graduate readiness.

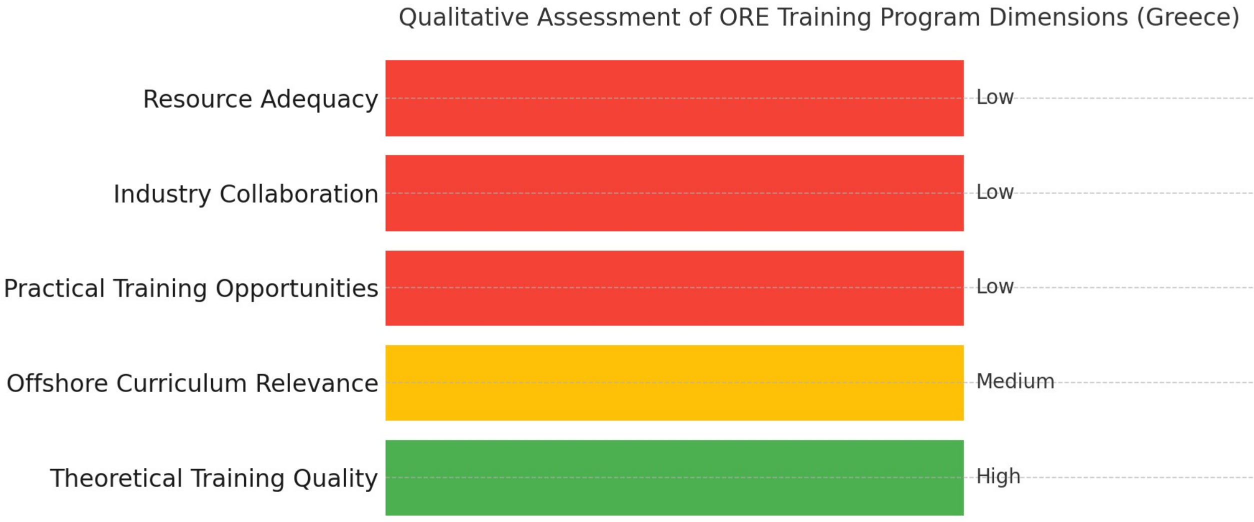

Figure 71. Qualitative Assessment of ORE Training Programmes' Dimensions in Greece (CoVE GR)

A clear consensus has emerged across stakeholders on the following priorities:

- Expanding practical training through simulations, internships, and industry visits.
- Embedding offshore wind content (including marine logistics, floating structures, and offshore safety) into existing curricula.
- Enhancing collaboration between VET/HEI institutions and ORE sector employers.
- Supporting instructor development through access to training, experts, and real-world site engagement.

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2.4.2.3 Identification of barriers and enhancements for inclusion and accessibility

Ensuring equitable access to training opportunities in the Offshore Renewable Energy (ORE) sector is essential to building a future-ready workforce that reflects the diversity and skills of the wider population. This section draws on the SHOREWINNER project's findings from national surveys and stakeholder feedback in Greece to analyse existing barriers to inclusion and accessibility in Vocational Education and Training (VET), and to propose targeted interventions that can help address these limitations.

The following challenges have been identified based on insights from students, instructors, and industry professionals. These obstacles, if not addressed, may hinder the participation of underrepresented groups and limit the sector's capacity to meet evolving workforce needs.

Table 15. Barriers to Inclusion and Accessibility in Offshore Wind Training (Greece) (CoVE GR)

Barrier	Description
Perception of VET	Despite the increasing relevance of VET, many young people and their families still perceive vocational pathways as inferior to academic routes. This cultural bias discourages participation, particularly in technical fields like offshore energy.
Gender gap in technical sectors	Survey data confirm limited female participation in engineering and maritime-related studies. Outreach and support mechanisms targeting women remain weak, resulting in underrepresentation across training programmes and careers.
Geographic disparity	Training centres are often concentrated in urban or coastal regions, particularly Athens and Thessaloniki. Learners from the Aegean islands or inland rural areas face difficulties accessing hands-on learning opportunities or internships.
Economic constraints	The cost of travel, safety training, and specialised offshore modules (e.g., working at height, underwater welding) can be prohibitive. Financial aid or subsidy programmes are either lacking or not widely known.
Limited flexible and digital delivery	Current training delivery is heavily lecture-based and in-person. This structure excludes learners with full-time jobs, caregiving responsibilities, or mobility limitations who require flexible, blended, or remote learning options.
Insufficient pathways for adult learners	Adults looking to reskill or switch careers lack access to introductory courses or bridge programmes that cover STEM foundations relevant to offshore wind roles.
Lack of inclusive pedagogy and support	Few institutions offer structured mentoring, accessible teaching materials, or accommodations for learners with disabilities or language barriers. This gap increases dropout risk and limits retention in more advanced training phases.
Weak industry training partnerships	While the value of internships and apprenticeships is widely acknowledged, there are limited formal co-financing models or diversity-focused initiatives involving employers. This restricts work-based learning for learners from low-income backgrounds.

To address the identified barriers, the Greek CoVE proposes a series of practical interventions that aim to broaden participation in offshore wind education and ensure that training is inclusive, accessible, and aligned with real-world demands.

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Table 16. Proposed Enhancements for Inclusion and Accessibility (Greece) (CoVE GR)

Enhancement	Description
Repositioning VET in public discourse	National and regional awareness campaigns should showcase successful graduates and female professionals in offshore wind to counter stigma and promote VET as a first-choice option.
Community-based outreach events	Organise visits to local schools, island municipalities, and youth centres with interactive demonstrations and mobile labs (e.g., virtual wind farm tours, safety drills) to inspire participation from remote communities.
Targeted scholarships and mobility support	Introduce tuition subsidies and travel/accommodation stipends for learners from underrepresented backgrounds (e.g., women, migrants, low-income individuals).
Work-based training with diversity goals	Develop employer partnerships that offer internships and apprenticeships with a focus on gender equity and inclusion. Formalise diversity goals within sectoral agreements.
Blended and remote learning modules	Expand asynchronous and virtual content (e.g., digital twin simulations) to offer flexible learning for working adults and geographically distant learners.
STEM bridging courses	Provide introductory courses in mathematics, digital literacy, and marine basics targeted at career-switchers or adult learners lacking foundational qualifications.
Inclusive teaching materials and environments	Produce multilingual, captioned, and accessible resources. Invest in adapted lab spaces and virtual platforms to support learners with disabilities and varying language needs.
Monitoring diversity and access metrics	Track enrolment and progression data disaggregated by gender, geography, and socio-economic status to inform targeted interventions.
Policy integration and funding alignment	Align inclusive VET reforms with Greece's Smart Specialisation Strategy, National Energy and Climate Plan (NECP), and leverage funds for infrastructure and curriculum development.

Implementing the proposed enhancements will support Greece's ambition to create a diverse, equitable, and future-ready offshore wind workforce, fully aligned with the SHOREWINNER project's strategic vision.

Anticipated outcomes:

1. **Expansion of the Emerging Skilled Workforce**
    - Engaging women, island populations, and underserved groups will help alleviate skill shortages in engineering, safety, and digitalisation—key areas for ORE development.
    - Encouraging inclusion will also increase innovation and ensure the workforce reflects the communities it serves.

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2. **Improved Socioeconomic Access and Regional Balance**
    - Scholarships, mobility support, and digital delivery will help remove cost and location-related barriers, particularly benefiting learners from the Aegean islands and rural areas.
    - Expanded access contributes to fairer regional development and stronger public support for energy transition.
3. **Policy and EU alignment**
    - The proposed actions directly respond to the SHOREWINNER Needs & Trends analysis, the European Green Deal, and REPowerEU goals of a just and inclusive transition.
    - They also create potential for enhanced collaboration with other Southern European regions, fostering a cross-border approach to training and workforce mobility.

2.4.3 Development of actions to deliver labour-market relevant skills

This section outlines targeted actions to enhance the alignment between VET provision in Greece and the evolving needs of the offshore renewable energy (ORE) labour market. Building on the identified training gaps and industry trends, it presents a roadmap for updating training offerings (2.4.3.1) and proposes a modular, micro-credential-based structure for VET curricula and qualifications (2.4.3.2). These actions aim to equip learners with relevant, portable, and in-demand skills, while also supporting innovation, flexibility, and stronger links between education and industry.

2.4.3.1 Updating training offerings for ORE sector

The ORE sector—particularly offshore wind—is emerging as a strategic development area in Greece. National priorities toward clean energy transition, combined with the untapped potential of the Greek maritime space, underscore the need for rapid upskilling of the local workforce. Insights derived from the SHOREWINNER survey (see previous Section) reveal high levels of interest among students, professionals, and educators, but also, highlight important skill and training gaps—particularly in offshore safety, digital tools for remote operations, and specialised engineering techniques related to floating wind systems and marine logistics.

While Greece hosts several vocational and higher education programmes focusing on renewable energy, engineering, and environmental technologies, most curricula remain centred on onshore systems. Offshore-specific content—including turbine foundations, subsea cable management, and offshore safety protocols—is rarely integrated in a systematic manner. Similarly, while some programmes lead to formal degrees, a significant portion of available training consists of non-accredited seminars or certificate courses, limiting their transferability across Europe.

Given these findings, there is a clear need to reform and expand the current training offers to reflect emerging industry needs and ensure alignment with international standards. This section presents an analysis of existing offerings and outlines a roadmap for the development of new and updated curricula that equip learners with labour-market relevant skills for the ORE sector.

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Partial Alignment with Existing Curricula

Several higher education and VET institutions in Greece already offer modules in marine engineering, renewable energy technologies, and environmental management. However, offshore-specific challenges such as floating foundations, turbine-to-vessel transfers, or subsea cable routing are only partially addressed. Existing courses often lack integration with safety frameworks such as those set by the Global Wind Organization (GWO), and rarely offer hands-on training through simulations or work placements in offshore environments.

Lack of offshore-specific content

The analysis of Greek programmes shows a pronounced underrepresentation of critical offshore modules:

- *Floating Wind and Anchoring Systems:* Content on floating platforms or mooring technologies is largely absent.
- *GWO-Aligned Safety Training:* Few courses reflect internationally recognised offshore safety procedures such as working at height or sea survival.
- *Marine Logistics and Subsea Infrastructure:* Curriculum rarely includes planning for vessel coordination, dynamic cable systems, or offshore grid integration.
- *Digital Offshore Systems:* AI-enabled maintenance, digital twins, and offshore data analytics are not yet embedded in relevant modules.

Integration potential within existing programmes

Despite the gaps, several courses can be enhanced to incorporate offshore content:

- Renewable energy programmes can be updated with offshore components including floating structures and environmental permitting.
- Safety training modules can integrate internationally recognised sea survival and vessel-access scenarios.
- Courses on digital technologies and engineering tools can adopt offshore data analytics, predictive maintenance systems, and simulation environments.
- Marine environmental courses may introduce offshore spatial planning, ecosystem impact studies, and regulatory compliance elements.

Need for accredited and portable qualifications

Many current offerings—particularly short courses or seminar-based training—lack alignment with national or European qualification frameworks. Embedding certifications such as GWO standards and pursuing alignment with EQF levels would greatly enhance learners' mobility and employability in the broader European ORE sector. Examples of New Micro-Credentials or Short Courses could include:

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- **Introduction to Offshore Wind** – For students or career-switchers, covering basics of turbine operation, environmental impacts, and offshore permitting.
- **Offshore Project Management** – Focused on supply chain logistics, marine operations planning, and regulatory frameworks.
- **Advanced Offshore Safety Training** – GWO-aligned intensive training including hands-on simulations and certification.

To respond to labour market needs and support Greece's offshore wind development, we propose both the integration of new modules into existing courses (see next table) and the creation of targeted short courses or micro-credentials.

Table 17. Integration into Existing Curricula (Greece) (CoVE GR)

Thematic Area	Proposed Enhancements	Intended Outcome
Floating Wind Systems	Introduce modules on mooring dynamics, floating substructures, and environmental loads.	Equip learners with foundational knowledge in deep-water ORE design.
Offshore Safety	Integrate GWO-based content (sea survival, emergency response, working at height).	Prepare learners for operational conditions and international compliance.
Marine Logistics & Subsea Systems	Add content on cable-laying, subsea inspection (ROVs), and vessel coordination.	Enhance applied technical knowledge in offshore deployment.
Digital Innovation	Include modules on digital twins, AI maintenance tools, remote sensing.	Build digital capabilities aligned with emerging offshore operations.

Implementation roadmap and anticipated outcomes

Strategy

- **Short-Term (1–2 years):**
  - Pilot integration of offshore modules within existing renewable energy and engineering courses.
  - Launch a GWO-aligned safety training short course.
  - Form stakeholder advisory committees with ORE industry representatives.
- **Medium-Term (3–4 years):**
  - Develop certified micro-credentials in marine logistics and digital offshore systems.
  - Invest in simulation labs or VR-supported training spaces.
  - Align courses with EQF and industry-recognised accreditation bodies.

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- **Long-Term (5+ years):**
  - Create dedicated ORE specialisation tracks within VET and HEI institutions.
  - Foster international partnerships and exchange programmes with institutions in other EU countries active in offshore wind.

Expected impact

- Increased graduate readiness for offshore roles through practical and accredited training.
- Stronger alignment between VET/HE curricula and industry requirements.
- Enhanced attractiveness of Greek professionals for European offshore wind markets.
- Development of Greece's position as a skilled workforce hub in the Eastern Mediterranean ORE sector.

2.4.3.2 VET curricula and qualifications proposals

This section outlines proposals for the development and refinement of vocational education and training (VET) curricula and qualifications in Greece to better meet the evolving needs of the offshore renewable energy (ORE) sector. Drawing from the previous sections, the proposed actions aim to modernize training programmes, incorporate practical learning, promote inclusion, and ensure transparency and comparability of credentials through the adoption of micro-credentials. The following table presents a proposed structure for VET curricula and qualifications in Greece, updated to reflect the micro-credentials approach.

Table 18. Proposed VET Module Structure Based on Micro-Credentials (Greece) (CoVE GR)

Module Component	Description
Title and Level	E.g., 'Offshore Wind Technology I' - aligned with national qualification levels.
Topics and Objectives	Focus areas such as floating platforms, digital maintenance, and offshore safety.
Delivery Methods	In-person, online, blended learning, with simulations and industry placements.
Target Audience	Students, professionals, unemployed individuals, and career switchers.
Duration	20–120 hours depending on module intensity; stackable for full qualification.
Learning Outcomes and Skills	Practical and theoretical competencies in offshore renewable energy tasks.
Evaluation and Assessment	Project work, simulations, exams, and employer feedback.
Inclusion Measures	Scholarships, flexible learning, support for STEM gaps and underrepresented groups.

Curriculum Enhancement with Offshore-Specific Content

A primary recommendation is the integration of offshore-specific content into existing VET courses. While general engineering, maritime studies, and renewable energy topics are already present in various

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programmes, deeper-water installations, floating foundations, offshore logistics, and safety procedures remain underrepresented. Updating curricula to include these areas is essential for equipping learners with the competencies necessary to operate in offshore environments.

Standalone short modules—issued as micro-credentials—can further support learners by offering focused training in specialized domains such as offshore turbine inspection, subsea cable installation, vessel transfer safety protocols, or data-driven maintenance practices. These micro-credentials can be stacked to build comprehensive profiles aligned with the specific needs of the offshore wind industry.

A harmonized syllabus template will help standardize learning outcomes, assessment criteria, delivery modes, and expected duration across providers, facilitating recognition of competencies and portability of qualifications at national and European levels.

Expansion of practical and work-based training

Beyond theoretical instruction, emphasis must be placed on applied learning through internships, work placements, and simulated offshore environments. Greek training institutions should collaborate with offshore wind developers, maritime firms, and ports to arrange structured placements and practical assignments.

Where physical access to offshore sites is limited, simulation-based training—including virtual and augmented reality—can recreate critical offshore tasks such as turbine maintenance, vessel-to-turbine transfers, and emergency response scenarios. These hands-on experiences ensure that learners are better prepared for real-world demands.

To further address emerging skill gaps, a Skills Acceleration model can be introduced. This model involves short, intensive workshops led by industry professionals and covering advanced or niche topics such as artificial intelligence applications in offshore wind, condition monitoring, and marine robotics.

Resource development and strategic partnerships

Implementing these improvements requires dedicated resources and cross-sectoral collaboration. Investments in simulation labs, safety training infrastructures, and offshore equipment prototypes will be critical. These resources may be shared among institutions through regional or thematic alliances.

Additionally, closer collaboration between VET providers, industry, and public agencies is needed to ensure curricula remain responsive to industry developments. Stakeholder advisory boards—including educators, employers, unions, and student representatives—should be established to offer continuous input and guide curriculum alignment with market realities.

Monitoring, evaluation, and continuous improvement

A robust monitoring system will track implementation progress and identify areas for adjustment. Regular feedback will be collected from students, graduates, and employers via surveys and focus groups. Particular attention will be paid to indicators such as employment rates, skill transferability, and workplace readiness.

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Annual evaluation reports, including a "State of Offshore Skills in Greece" snapshot, will synthesize findings and inform future policy and curriculum adjustments. These reports will also support transparency, accountability, and cross-border knowledge exchange.

Design of micro-credential-based modules

To improve flexibility and modularity, future courses should be organized around micro-credentials. Each module or unit should define:

- **Learning Outcomes and Competencies**: What the learner will know and be able to do (e.g., apply offshore safety procedures, perform turbine diagnostics).
- **Assessment Methods**: Including practical simulations, technical assignments, and/or oral/written evaluations reflecting offshore-specific tasks.
- **Workload and Duration**: Estimated hours of study and practice, enabling learners to pursue training part-time or alongside work.
- **Qualifications and Recognition**: Micro-credentials can be accumulated toward full qualifications, enabling lifelong learning pathways.

This modular structure will support learner mobility, foster interoperability among Greek VET institutions, and enhance the transparency and comparability of qualifications for both learners and employers.

Inclusive curriculum design and delivery

To ensure accessibility, all proposed curricula must incorporate inclusive pedagogical strategies. This includes:

- **Targeted outreach campaigns** to women, migrants, and underrepresented groups.
- **Financial support mechanisms** such as scholarships, grants, and subsidized placements.
- **Flexible delivery formats**, including blended learning and asynchronous online components.
- **Adapted learning resources** for learners with disabilities or language barriers.

By modernizing curricula, embedding offshore-specific content, leveraging micro-credentials, and fostering strong industry partnerships, Greece can position its VET ecosystem as a key enabler of the offshore renewable energy sector's growth in the Eastern Mediterranean and beyond.

2.4.3.3 National CoVE workshop

During both workshops a total of 70 participants were introduced to the SHOREWINNER project, the initial strategic plan and the suggested design of the Technical Training for Offshore Wind Technicians. The workshop brought together stakeholders from industry, academia, and vocational training institutions to discuss the design and implementation of the under-development training programme for offshore wind turbine technicians. The sessions were characterized by active dialogue, constructive critique, and the exchange of ideas aiming to enhance the alignment of training curricula with industry needs. More than 25

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participants (f-2-f and online) provided their feedback and initial thoughts and concerns about the strategic plan, focusing on the Technical Training for Offshore Wind Technicians.

The participants began by identifying the fundamental responsibilities of offshore wind turbine technicians. These include performing preventive and corrective maintenance on offshore wind turbines, conducting mechanical, electrical, and hydraulic inspections and repairs, ensuring safety compliance during all field operations, monitoring turbine performance and reporting anomalies, participating in installation and commissioning processes, engaging in troubleshooting and emergency response protocols. Given the challenging working conditions—ranging from extreme weather to remote offshore sites—participants emphasized the importance of resilience, teamwork, and fast decision-making.

A major focus of the workshop was the identification of the key technical skills and certifications necessary for this demanding profession. A solid grounding in electromechanical systems, hydraulics, and electronics was identified as essential. Furthermore, the participants highlighted the need for a range of specialized certifications, such as the GWO modules (Basic Safety Training, Working at Heights, First Aid, Fire Awareness, Sea Survival), BOSIET, Electrical Safety Authorization, and Confined Space Entry Training. Beyond theoretical knowledge, the ability to perform welding, rigging, bolting, cable handling, rope access operations, mechanical assembly, fault diagnostics, and marine navigation were cited as vital core competencies. There was an active debate regarding whether all of these competencies should be embedded in the training curriculum. While some argued that including them all would make the programme exhaustive and inaccessible, others maintained that they are indispensable for the actual job requirements offshore.

However, several participants voiced concerns regarding the current accessibility of these certifications. It was highlighted that while certifications such as those issued by the Global Wind Organization (GWO) are mandatory for anyone seeking to work and gain experience in offshore wind farms, these certifications are not yet readily available through providers based in Greece. At present, Greece lacks certified training providers offering the full suite of required offshore safety and technical certifications. This limitation is compounded by bureaucratic hurdles that impede the accreditation of new providers, creating barriers to workforce development. Participants also noted that the rigid scheduling of Greek VET schools—combined with limited funding options—poses significant challenges for students seeking external certifications, often at the expense of their academic progress. Additionally, participants expressed concern about the timing of when trainees could realistically obtain these certifications. Given the rigorous academic schedules of Greek VET (Vocational Education and Training) schools, which include mandatory attendance and strict limits on absences, it is difficult to find a suitable window for trainees to complete these external certification programmes without risking their academic standing. Exceeding the allowed number of absences could prevent students from continuing their formal education. Furthermore, questions were raised about how these certifications would be financed. Public VET schools often operate under limited funding, and many students may lack the personal financial resources to pay for certifications themselves. Without dedicated funding mechanisms, there is a risk that essential certifications will remain out of reach for many trainees.

In terms of aligning education with the needs of the offshore wind sector, stronger cooperation between industry and training providers was repeatedly emphasized. Co-creation of curriculum content, the integration of recognized international certifications, and the establishment of apprenticeships and

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mentorship programmes were proposed as viable solutions. Moreover, the development of career guidance services and job placement mechanisms within training institutions was deemed essential. Beyond classroom training, participants emphasized that trainees should undergo substantial real-life field training, ideally in partnership with existing offshore wind facilities.

The thematic agenda of the workshop also included the integration of sustainability and digital transformation into the training curriculum. Participants proposed embedding topics such as floating wind technologies, underwater cabling, energy storage systems, and AI- or AR/VR-based maintenance tools. Sustainability was described not only as a topical theme but as a pedagogical principle that should permeate all aspects of the training programmeme.

Finally, inclusion and accessibility were discussed as guiding principles in the programmeme's design. Blended learning models, micro-credentials, and the use of flexible learning paths were all seen as effective ways to reach a wider range of learners, including those with disabilities or limited financial means.

Critical Observations and Gaps

The discussions during the workshops revealed several critical gaps in the current Greek context. Firstly, there is no institutional framework that enables the delivery of certified offshore safety and technical training within the country. This results in an over-reliance on international providers and limits access for many aspiring technicians.

Secondly, the alignment of existing vocational qualifications with offshore job requirements remains inadequate. Many technical skills, such as welding and bolting, are classified at EQF Level 3, which does not reflect the complexity and responsibility of offshore roles. The current VET titles are overly broad (e.g., “RES Technician”) and do not provide clear pathways for specialization in offshore operations.

Another observation concerned the limited exposure of trainees to real-world offshore environments. Without meaningful internships, site visits, or simulation-based labs, students graduate with theoretical knowledge but lack practical readiness. Furthermore, the integration of small and medium-sized enterprises, startups, port authorities, and civil society organisations into the VET ecosystem remains fragmented or entirely absent.

Recommendations for Future Project Steps

In light of the insights gathered, several strategic directions are proposed for the refinement of the SHOREWINNER project:

- **Curriculum Development:** The curriculum should be modular, allowing for tailored specialisations that reflect current and emerging roles in the offshore sector. High rates of practical exposure—either through real placements or simulation—is recommended. Sustainability and digital competences should be systematically integrated, using frameworks like GreenComp and DigComp.
- **Certification Infrastructure:** Project stakeholders should work toward the accreditation of Greek-based training centres by international bodies such as the GWO. Parallel to this, funding mechanisms should be explored (e.g., Erasmus+, ESF+, national funds) to subsidise certification fees for students.

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- **Stakeholder Engagement:** The creation of regional advisory boards including VET institutions, industry representatives, SMEs, and academia can help institutionalise stakeholder involvement. These boards should participate in curriculum validation and feedback loops, ensuring that the curricula remain up to date with evolving technologies and job roles. Apprenticeship and mentorship programmes should be supported in partnership with energy companies, while job placement services and career counseling should be provided with the stakeholders' support.
- **Innovative and Inclusive Learning Models:** Blended learning, VR-based simulations, and flipped classrooms should be adopted as standard delivery modes. Micro-credential systems will allow for greater flexibility and skill targeting. Special attention should be paid to the accessibility of training programmemes, including linguistic support, economic aid, and accommodations for learners with disabilities.
- **Transnational Coordination:** Efforts should be made to align training structures across partner countries, contributing to a shared European qualification framework for offshore roles. Cross-border internship schemes, recognition of certifications, and the co-development of shared training tools can strengthen the coherence and impact of SHOREWINNER's transnational efforts.

As a concluding remark, the collaborative workshops served as a productive forum to bridge the gap between training providers and the offshore wind industry. The consensus was clear: for Greece to fully harness the potential of offshore wind energy, it must cultivate a highly skilled, safety-conscious, and practically trained workforce. Certification, practical training, and soft skills must be embedded into the very core of any future educational programmes. Ultimately, the workshops reflected a shared commitment to excellence in vocational education, ensuring that trainees are not only academically prepared but professionally empowered to meet the complex demands of offshore wind operations.

2.4.4 Opportunities for cross-border collaboration

This section outlines the potential for transnational collaboration between VET providers in Greece and their counterparts across the SHOREWINNER partner countries. Building on the strategic priorities already set out in Greece's CoVE activities, cross-border cooperation presents a compelling opportunity to elevate the quality, scope, and impact of ORE training. These collaborations align closely with Greece's ambition to become a regional knowledge hub in the Eastern Mediterranean, leveraging partnerships to promote innovation, learner mobility, and shared excellence in VET.

Rationale for cross-border collaboration

As the offshore wind and broader sector expands across Europe, no single country can address the complex and evolving skills challenges in isolation. The diversity of operational environments, regulatory frameworks, and technical standards necessitates a collaborative response that transcends national borders. Greek stakeholders—including VET providers, universities, industry actors, and policymakers—have already demonstrated a strong commitment to such cooperation through ongoing participation in SHOREWINNER's community of practice and related EU initiatives.

Cross-border collaboration enables:

- **Alignment of training content** with shared industry needs.

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- **Standardization of micro-credentials and qualifications** for better mobility.
- **Resource pooling**, especially for high-cost simulation and safety training.
- **Exposure of learners and educators** to diverse practices and innovations across countries.

The following figure represents the Priority Areas for Collaboration in Greece.

Co-development of Joint Curricula

Greek VET providers, notably SAEK Egaleo in collaboration with the University of the Aegean, are already working on modular offshore-specific courses. Collaborating with other CoVE partners to design shared training units—covering floating wind foundations, marine logistics, and AI-based turbine maintenance—would ensure mutual recognition and facilitate cross-enrolment. These shared curricula can be certified through mutually agreed-upon micro-credential frameworks.

Shared Access to Training Infrastructure

High-end equipment such as VR labs or offshore safety simulators can be prohibitively expensive. Cross-border agreements to co-invest in or grant access to such infrastructure (physically or virtually) would benefit all parties. Greece could, for example, offer digital twin platforms or environmental monitoring tools in exchange for access to partners' marine robotics labs or GWO-certified safety facilities.

Mobility of Learners and Instructors

The SHOREWINNER network provides a strong foundation for establishing international placements and staff exchanges. Greek learners could participate in short-term mobility experiences in partner countries, and vice versa, enhancing their readiness for an international ORE job market. Instructors, too, could benefit from co-teaching opportunities or joint summer schools.

Innovation and Applied Research Hubs

Cross-border VET collaboration can support applied R&D through joint student projects, capstone collaborations, and innovation challenges. These activities can link directly to local ORE development projects, contributing practical solutions while embedding innovation into the learning process.

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Figure 72. Priority Areas for Collaboration in Greece (CoVE GR)

Steps toward implementation

1. **Formalize a Cross-Border Collaboration Network**

   Greece will actively support the creation of a SHOREWINNER Working Group for Cross-Border Cooperation. This group will include representatives from each national CoVE, VET institutions, industry partners, and relevant ministries.

2. **Pilot Transnational Activities**

   In the first year, small-scale activities—such as a virtual joint Skills Accelerator or a cross-national internship pilot involving two to three countries—will be prioritized. These will serve as proof-of-concept for wider adoption.

3. **Agree on a Micro-Credential Recognition Framework**

   Building on Greece's recent push for micro-credentials, partners will work to align training units across countries to enable stacking and recognition. This will ensure learners can pursue modular learning paths that span institutions and borders.

4. **Establish Thematic Working Groups**

   Partners will form specialized cross-country working groups focused on key topics such as offshore wind safety, digital maintenance, or marine logistics. These groups will coordinate the co-creation of training content, exchange good practices, and ensure the continuous alignment of curricula with evolving industry needs.

Expected impact

Cross-border collaboration will strengthen Greece's position within the European ORE training ecosystem by:

- Elevating the quality and international recognition of Greek VET offerings.
- Creating stronger ties with industry actors abroad, enhancing relevance and job placement.
- Enabling innovation transfer and accelerating the adoption of emerging training technologies.
- Expanding the professional horizons of Greek learners and educators.

More broadly, these collaborations will contribute to a resilient and future-ready workforce for the offshore renewable energy sector across Southern Europe, helping ensure that VET institutions collectively keep pace with market dynamics and technological evolution.

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Through targeted, equitable, and well-coordinated cross-border collaboration, Greece's VET providers will not only scale their impact but also lead the way in setting new standards of excellence, inclusion, and innovation in offshore energy education.

2.5 Cyprus

2.5.1 Results and recommendation analysis of ORE sector needs and trends

The following analysis of findings and recommendations relates to the surveys conducted in Cyprus during the first year of the SHOREWINNER project. These surveys concerned VET and HE teachers (10 responses), professionals (11 responses) and students (34 responses).

2.5.1.1 VET and HE teachers

The survey results clearly indicate that Higher Education (HE) institutions constitute the primary type of educational organization among respondents. Vocational Education & Training (VET) and colleges follow this group (Figure 73).

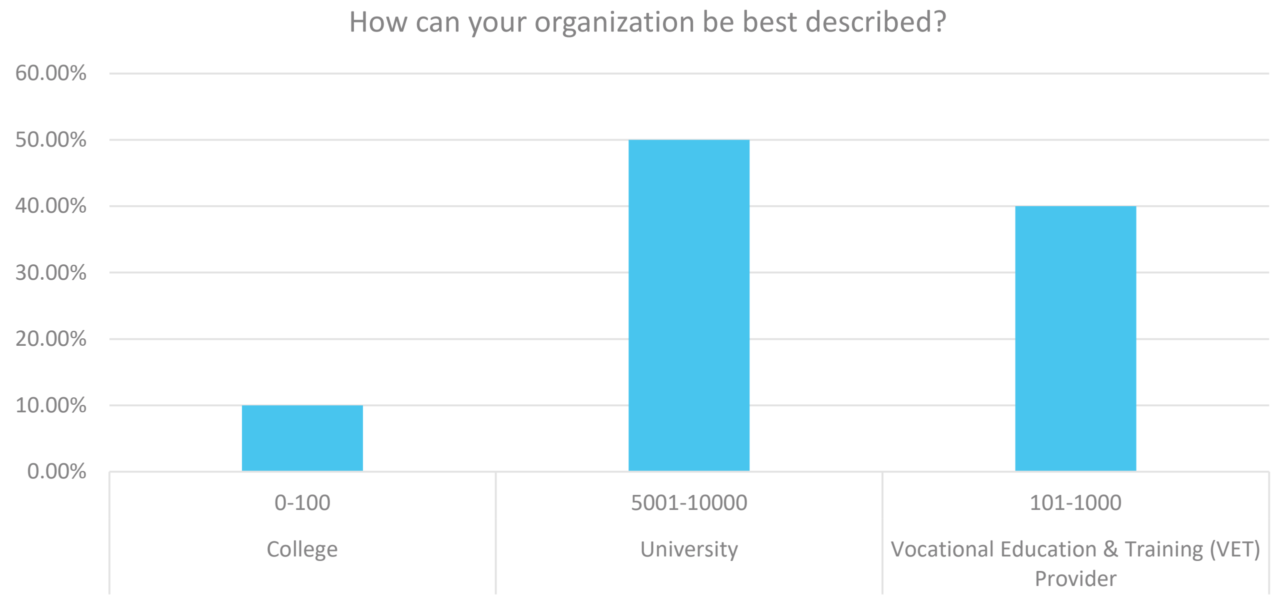

Figure 73. Distribution of surveyed institutions by type and size (CoVE CY)

Career pathways promoted differ notably between Higher Education (HE) and VET institutions. HE institutions strongly emphasize engineering pathways, while VET institutions prioritize training for technicians, installers, and professionals in health and safety. It is important to highlight that critical occupations within the Offshore Renewable Energy (ORE) value chain, such as metalworkers, assemblers, divers, and plant operators, were not addressed in the survey, indicating potential gaps in the current focus of training programmes (Figure 74).

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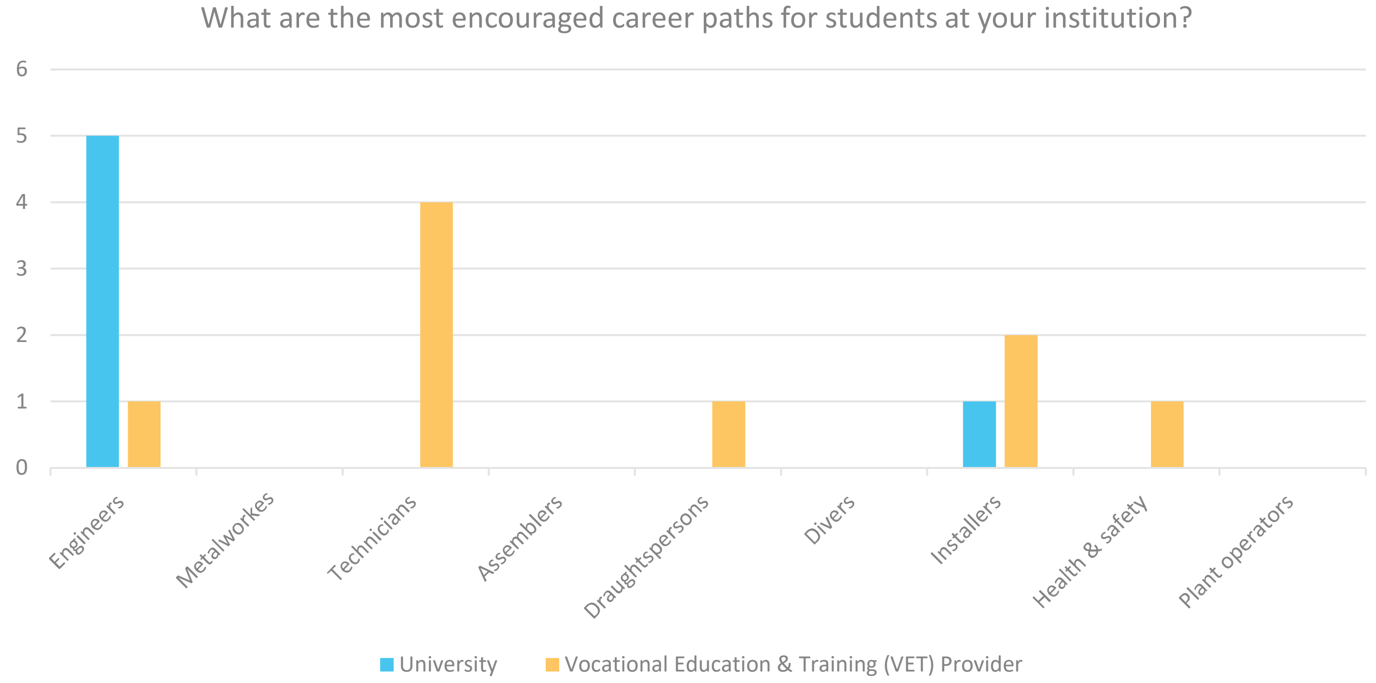

Figure 74. Most encouraged career paths within surveyed institutions (CoVE CY)

Regarding skill gaps, the survey identified substantial deficiencies in students' hard skills, particularly in digital skills, offshore specific technical skills, and health and safety skills. These gaps underline an urgent requirement for customized educational programmes designed explicitly to address industry demands, thereby enhancing employability and efficiency within the sector (Figure 75).

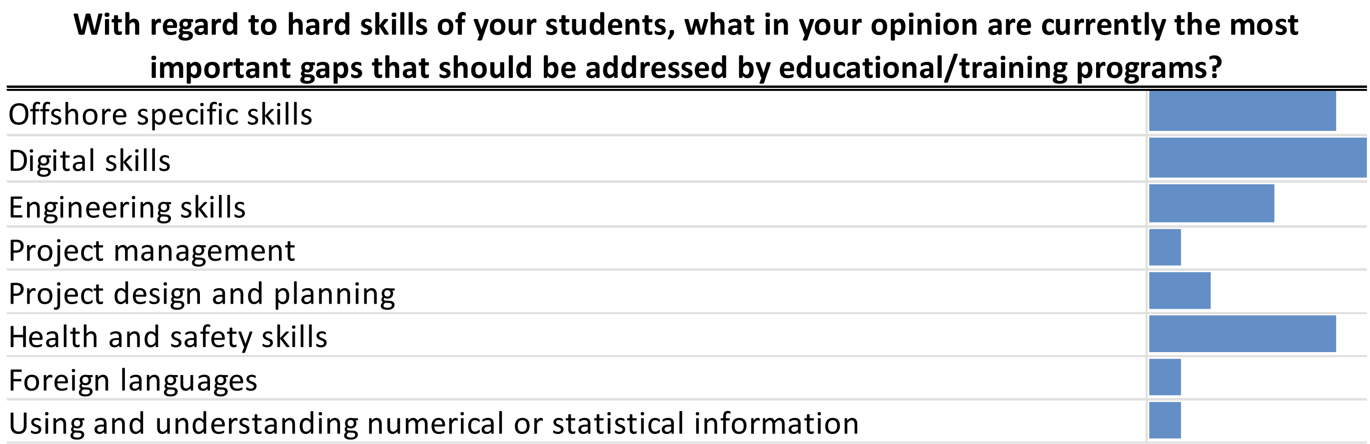

Figure 75. Identified gaps in hard skills among students (CoVE CY)

In terms of soft skills, educators emphasized significant gaps in initiative and self-direction, critical thinking and problem-solving, and communication and collaboration. This suggests the need for curricula that explicitly incorporate and prioritize these transversal competencies, which are vital in the dynamic and rapidly evolving offshore renewable energy sector (Figure 76).

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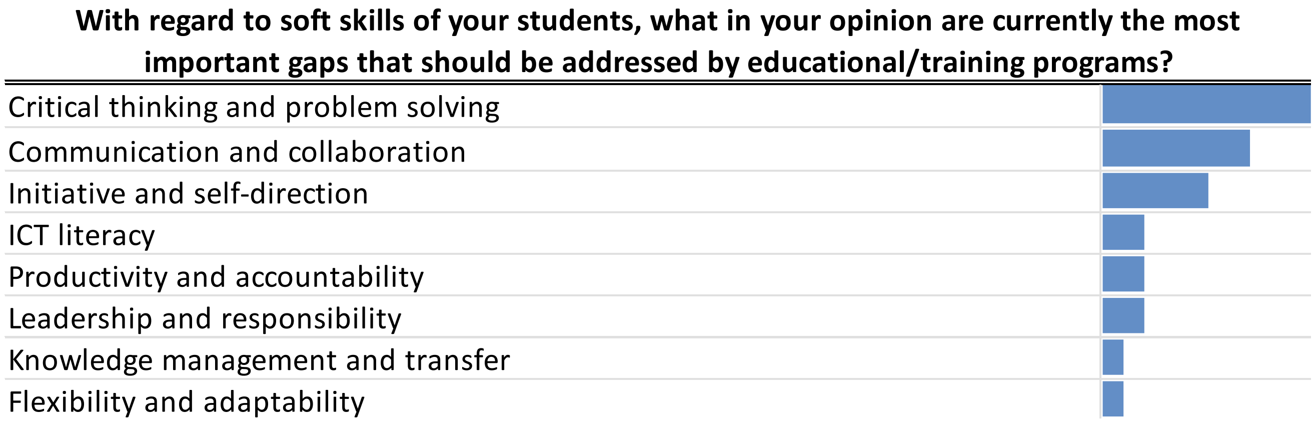

Figure 76. Identified gaps in soft skills among students (CoVE CY)

Technological coverage within existing educational programmes varies significantly. Energy storage, automation, advanced robotics, and energy management systems are extensively covered, whereas emerging digital technologies like digital platforms, Internet of Things (IoT), blockchain, and 3D printing remain largely unaddressed. The absence of these technologies from educational curricula might present challenges in preparing students adequately for future industry trends and demands (Figure 77).

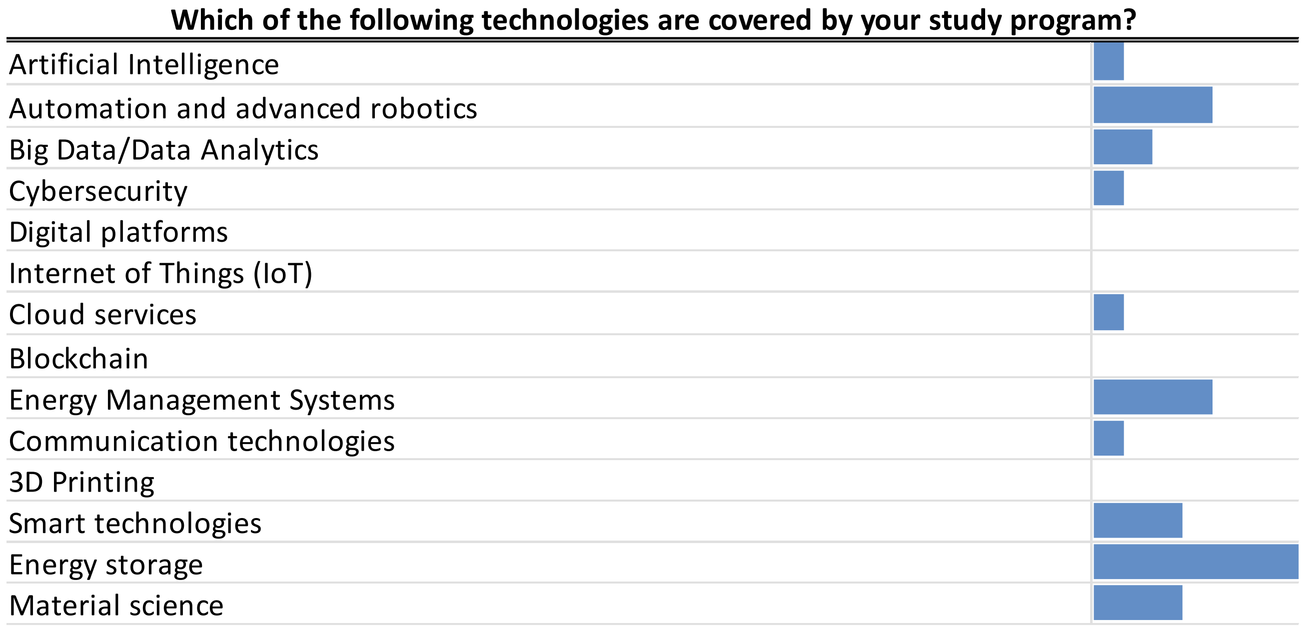

Figure 77. Technologies covered by study programmes (CoVE CY)

Institutions demonstrate varied approaches to updating course content in response to industry changes. While 40% of respondents update courses annually, an equal percentage reported updates only every five years, with a smaller proportion (20%) updating every 2-3 years. This disparity highlights differing institutional responsiveness and adaptability to rapidly evolving industry needs. To enhance educational effectiveness, respondents emphasized critical resources such as direct access to industry experts, participation in industry workshops, and the availability of practical training facilities. Preferred teaching methods that incorporate practical experience, such as internships, hands-on laboratories, field trips, and

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guest lectures, underscore the importance of experiential learning in preparing students for real-world challenges. Significant educational delivery challenges include student engagement, limited opportunities for practical training, and difficulties keeping pace with rapid industry changes. These factors reflect broader systemic issues in vocational education and highlight areas requiring targeted interventions to improve educational outcomes. A notable cultural observation among respondents highlights that vocational education in Cyprus is perceived less favourably compared to tertiary education. Respondents call for initiatives promoting VET to attract young individuals and support the development of technically oriented careers.

Curriculum alignment with regulations and standards is predominantly achieved through adopting industry standards, and regular consultation with policy makers. However, a minority indicated minimal engagement with policymakers, suggesting potential for improved collaboration and more structured dialogues between educational institutions and regulatory bodies (Figure 78).

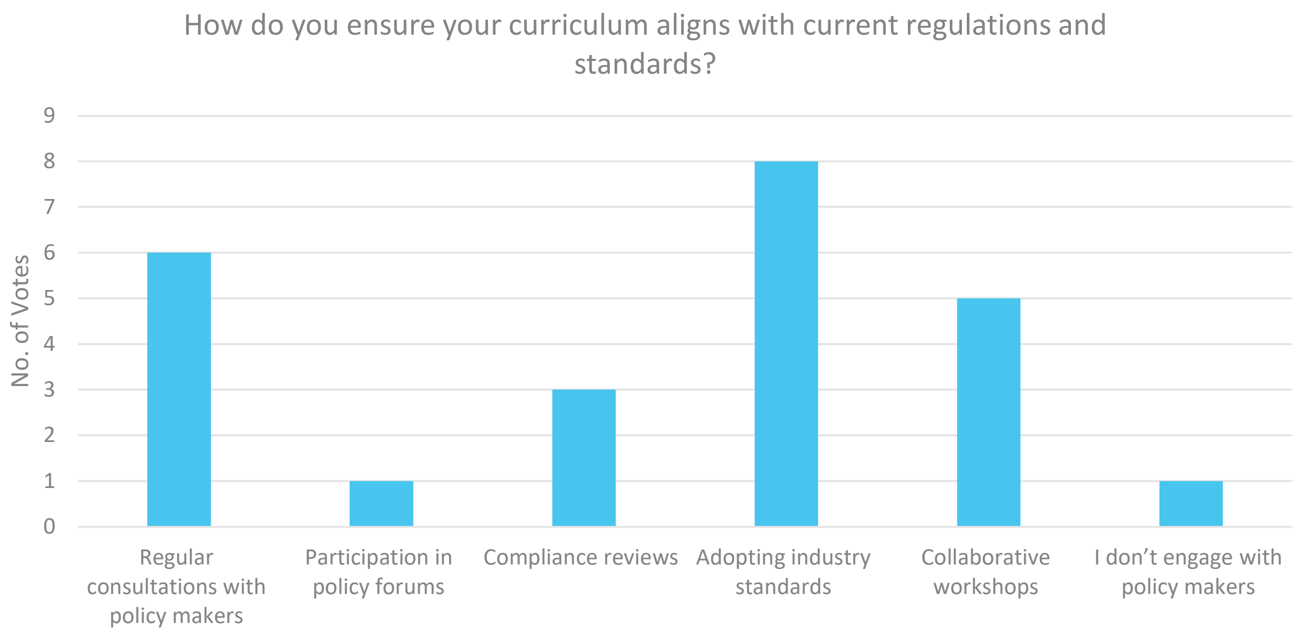

Figure 78. Methods for ensuring curriculum alignment with regulations and standards (CoVE CY)

Cross-institutional collaboration frequently involves joint curriculum development, shared training facilities, and teacher exchange programmes. Few institutions reported no collaboration, suggesting generally active engagement among educational providers aimed at enhancing teaching quality through collective efforts (Figure 79).

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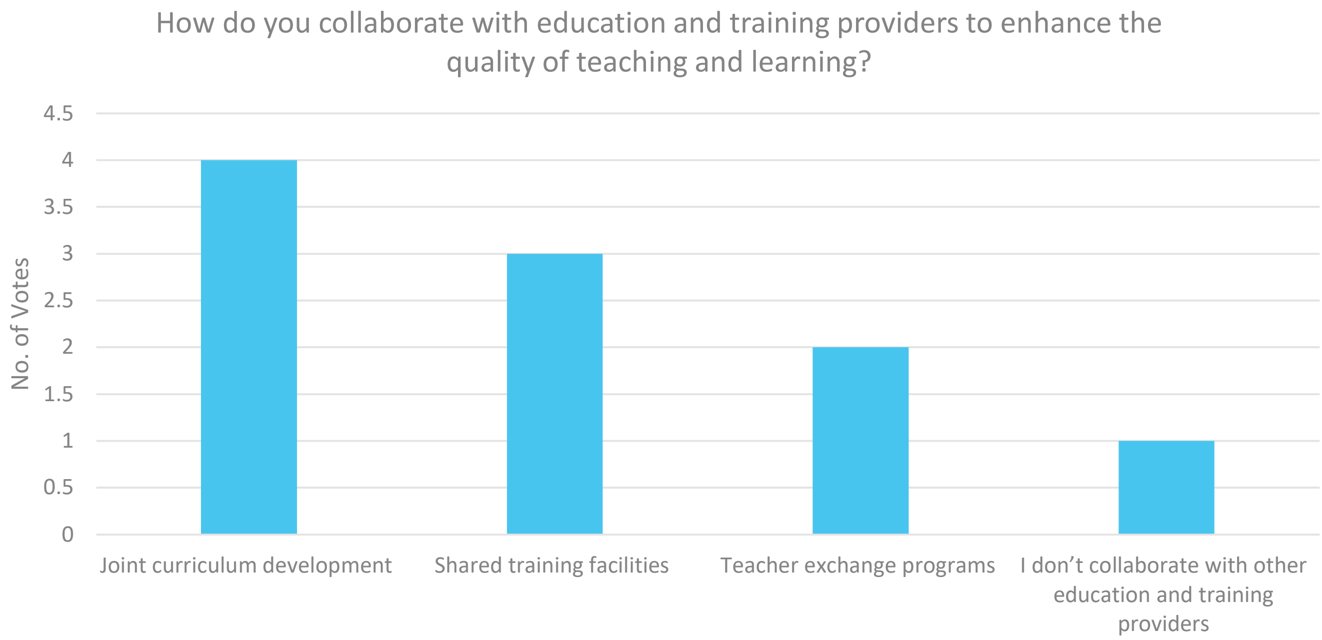

Figure 79. Methods of collaboration with other education and training providers (CoVE CY)

Collaboration challenges with employers mainly revolved around limited employer engagement and misalignment between academic curricula and industry needs. However, logistical issues related to organizing internships were less frequently reported. Educators expressed a significant need for increased networking opportunities and career counselling services provided by social partners to better prepare students for the workforce. To address rapid technological changes, educators pointed to the critical role of access to the latest tools, software, and continuous professional development. These findings reinforce the importance of integrating current technological advancements into educational frameworks to remain relevant and effective.

Regarding alignment with industry standards, the main challenges reported were updating the curriculum, coordination with certification bodies, and understanding certification requirements. These responses reflect the necessity for streamlined, clear guidance and support from industry certification authorities

Figure 80 illustrates the predominant challenges faced by educators in ensuring student readiness for the offshore renewable energy sector. The most significant challenges highlighted include practical training opportunities, safety training for working in offshore environments, alignment of academic curricula with current industry technologies, and availability of specialized equipment and facilities for training. This emphasizes educators' recognition of hands-on learning as crucial for students' effective entry into this highly technical field.

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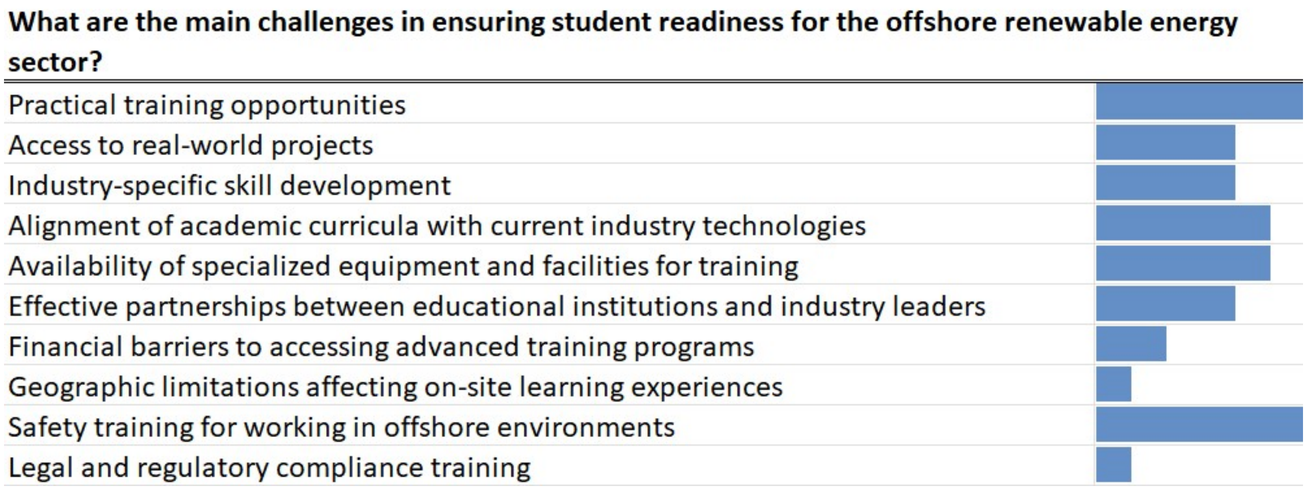

Figure 80. Key challenges in aligning educational programmes with industry standards (CoVE CY)

Figure 81 illustrates the level of transversal skills cultivated in each organization to which the respondents belong. Teamwork and communication skills are the most prominent, while innovation and creativity and cross-disciplinary technical skills come last.

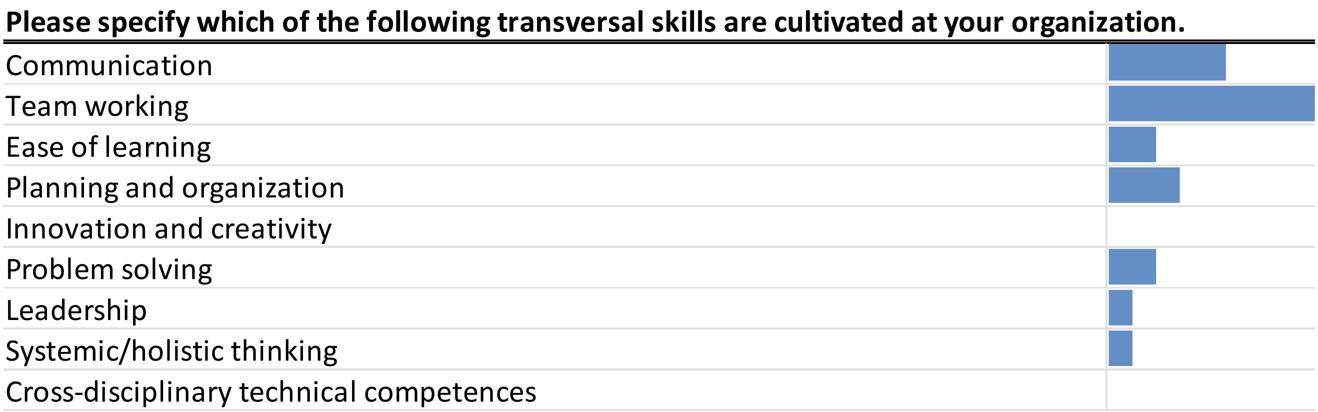

Figure 81. Transversal skills cultivated at each organisation (CoVE CY)

Transversal skills highlighted by respondents included critical and innovative thinking, interpersonal skills, media and information literacy, critical thinking, time management, and lifelong learning. Notably, lifelong learning is emphasized as an essential skill deeply embedded in community culture, vital for ongoing personal and professional growth.

Finally, most respondents indicated that their institutions face challenges adapting study programmes to smart specialization goals and policies. There is also a recognized need to adapt new skills for smart specialization that were previously not required, underscoring the evolving landscape of vocational training demands.

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2.5.1.2 Professionals

The surveyed companies predominantly fall within the smaller enterprise category, with most respondents indicating that their companies employ between 1 to 50 employees. This reflects the scale of the offshore renewable energy sector in Cyprus, where smaller firms appear to dominate the market (Figure 82).

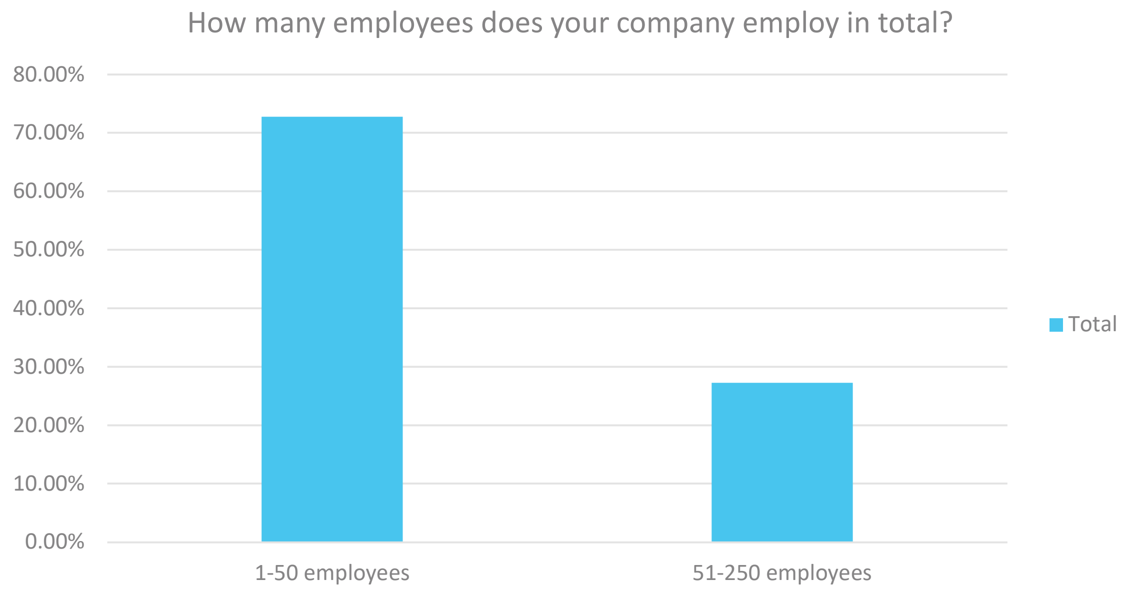

Figure 82. Distribution of companies by employee numbers (CoVE CY)

Engineers are identified as the most representative occupational group within the companies surveyed, with technicians following. Occupations such as metalworkers, installers, and assemblers have a notably lower representation. This emphasizes the high reliance of the sector on engineering expertise, indicating a need for robust educational pathways to continually support this demand. Regarding the minimum education and training requirements for engineers, there is an equal preference for tertiary education at the bachelor's (BSc) and master's (MSc) level, each accounting for 36% of responses. This indicates the industry places significant value on advanced educational qualifications for technical positions, recognizing their importance for specialized knowledge and skills in the sector.

Companies show varied preferences in terms of supported training methods. Specialization-focused workshops (45%) are the most favoured form of in-company training, followed closely by specialization-based distance learning and in-house training (36% each). Conversely, general knowledge training is more popular in summer/winter schools (64%). This variety highlights the sector's appreciation for specialized and practically applicable training modalities.

Most companies (64%) conduct employee skills and training needs reviews annually, emphasizing the sector's dynamic nature and the necessity of continuously updating employee competencies. However, a notable percentage (18%) report never reviewing employee skills, raising concerns about some companies potentially lagging behind in workforce development.

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The skills review process mainly targets engineers, which aligns with their predominant representation in the sector. Interestingly, other roles such as technicians or plant operators receive limited attention, which might suggest gaps in continuous professional development for these categories. Regarding hard skills, critical gaps identified by professionals include health and safety skills, engineering, project management, digital skills, and offshore-specific expertise. These findings underscore a clear demand for targeted educational interventions that can effectively bridge these skill deficiencies (Figure 83). In terms of soft skills, professionals identify knowledge management and transfer, critical thinking and problem-solving, communication and collaboration, and flexibility and adaptability as significant gaps. Leadership and responsibility, along with initiative and self-direction, are also mentioned (Figure 84). These results illustrate the necessity of integrating soft skills training into existing educational frameworks to enhance workforce adaptability and efficiency.

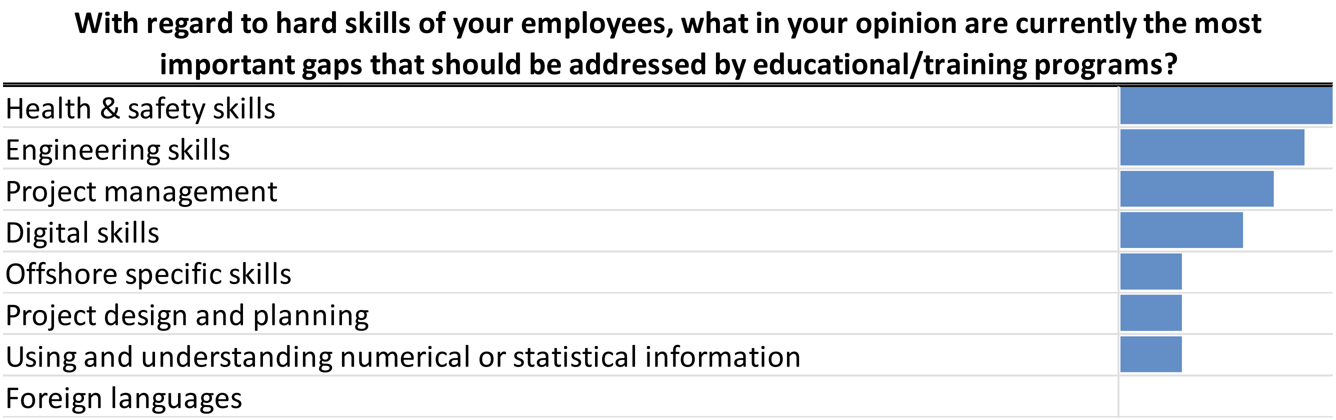

Figure 83. Most important hard skills gaps (CoVE CY)

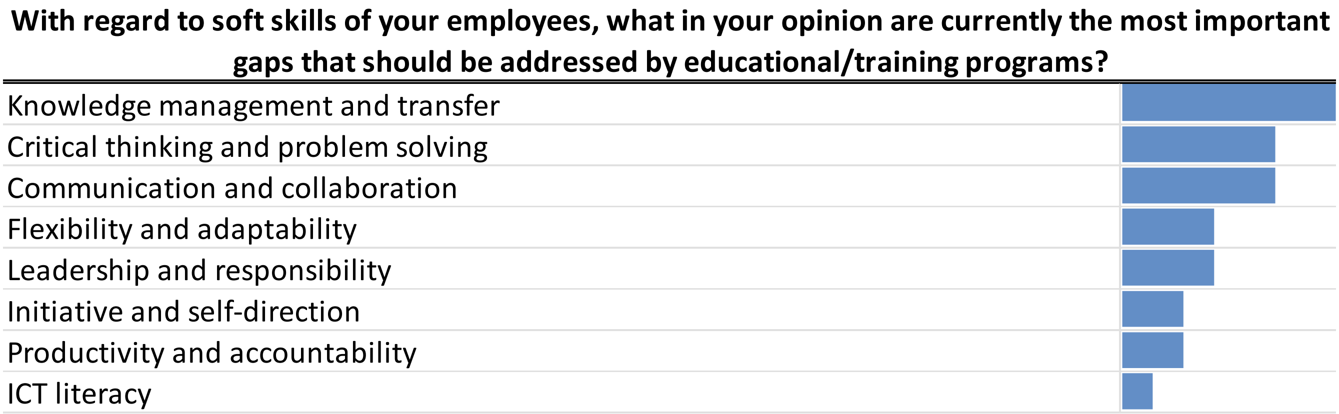

Figure 84. Most important soft skills gaps (CoVE CY)

To ensure compliance with regulations and standards, most companies regularly update their internal policies and procedures. A smaller proportion engages with external consultants or maintains dedicated compliance teams. This demonstrates a proactive industry stance towards regulatory adherence but also suggests room for enhancing dedicated compliance structures within companies.

In engaging with professional associations, participation in association-led initiatives and panels is the most frequent strategy, with fewer companies involved in the direct development of industry guidelines or sector-

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specific event sponsorships. However, several companies report no current engagement with professional associations, suggesting potential gaps in industry networking and collaboration.

Collaboration with technology providers mainly occurs through licensing cutting-edge training tools and platforms, though some companies also participate in co-development projects and pilot programmes. Still, a considerable number of companies do not engage with technology providers, potentially limiting their access to innovative advancements that could enhance performance.

Support structures for continuous learning primarily include access to continuing education funds and mentorship programmes, though these structures appear relatively limited. Many companies report only minimal support for continuous employee learning, indicating a potential area for strategic improvement to enhance workforce skills and retention.

Figure 85 highlights the importance that surveyed companies place on specific technological areas. Energy Management Systems, and Artificial Intelligence clearly emerge as the most significant technologies, followed by energy storage and smart technologies. Interestingly, advanced digital technologies such as IoT, automation and advanced robotics, data analytics, cybersecurity, digital platforms, and blockchain are not addressed thus suggesting potential areas for future industry development and training focus.

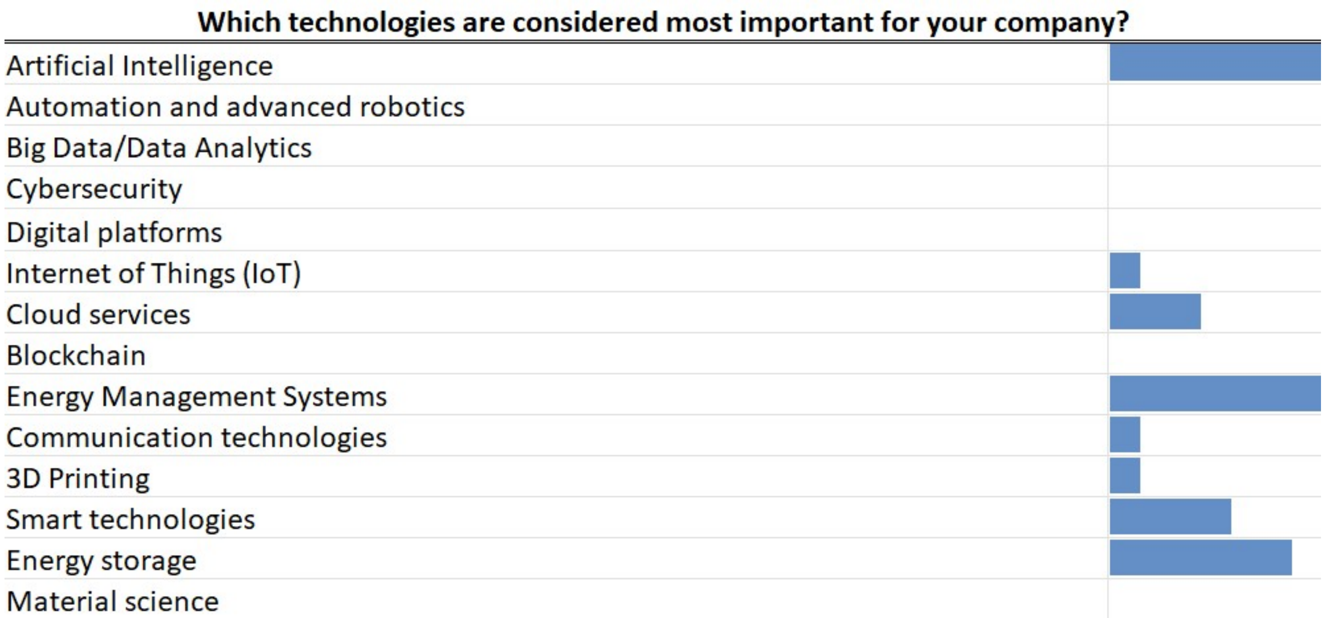

Figure 85. Technologies considered most important by surveyed companies (CoVE CY)

Transversal skills cultivated within companies prominently include teamwork, communication and problem-solving. However, leadership, innovation and creativity, and systemic thinking receive comparatively less emphasis, suggesting that these areas might benefit from additional developmental focus (Figure 86)

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Figure 86. Transversal skills cultivated within companies (CoVE CY)

Lastly, there is uncertainty among respondents regarding adapting to smart specialization goals and policies. The divided responses (equal numbers responding "Yes," "No," or "Don't know") suggest a lack of clear direction or awareness about strategic alignment with regional smart specialization priorities, highlighting an area for increased clarity and policy communication.

2.5.1.3 Students

The distribution of student respondents is diverse, primarily consisting of undergraduate students, followed by graduate (PhD) students, and secondary education students. College-level associate degree students represent a smaller proportion of the surveyed group (Figure 87).

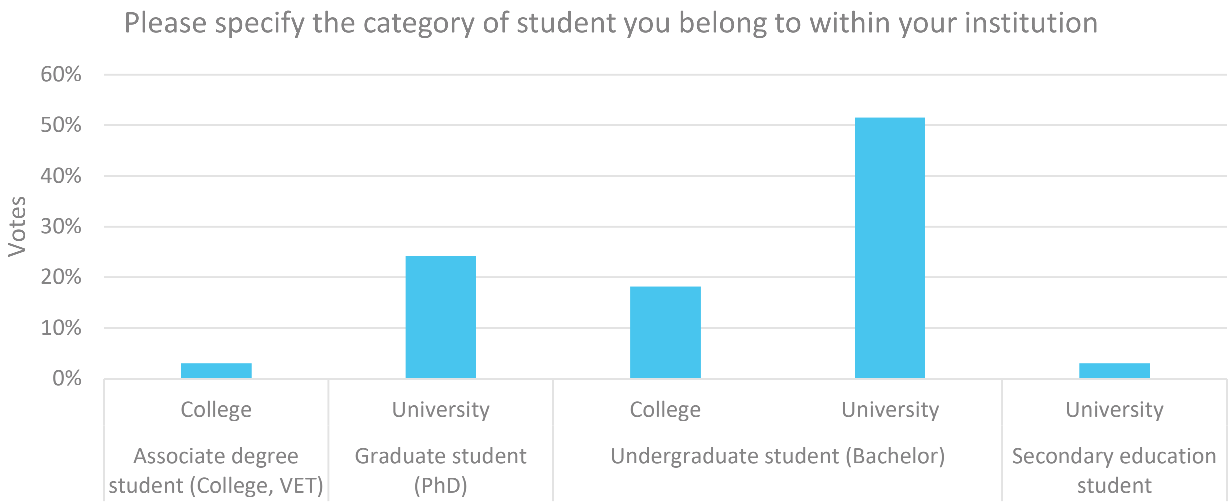

Figure 87. Distribution of student respondents by educational level (CoVE CY)

Student interest in pursuing a career in the offshore renewable energy (ORE) sector varies significantly. A substantial proportion of students (67%) indicated they were either somewhat interested or very interested in careers related to offshore renewable energies, such as wind, solar, tidal, wave, or ocean thermal energy. Notably, only a small fraction (12%) reported no interest, highlighting the considerable appeal of this emerging sector among the student population.

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In terms of the career pathways actively encouraged by their institutions, students perceive engineering as the most frequently promoted pathway. Other relevant pathways, such as health & safety, technicians, and installers, are significantly less promoted. Essential roles, such as metalworkers, assemblers, divers, and plant operators, appear notably overlooked, indicating a possible disconnect between educational offerings and comprehensive industry requirements (Figure 88).

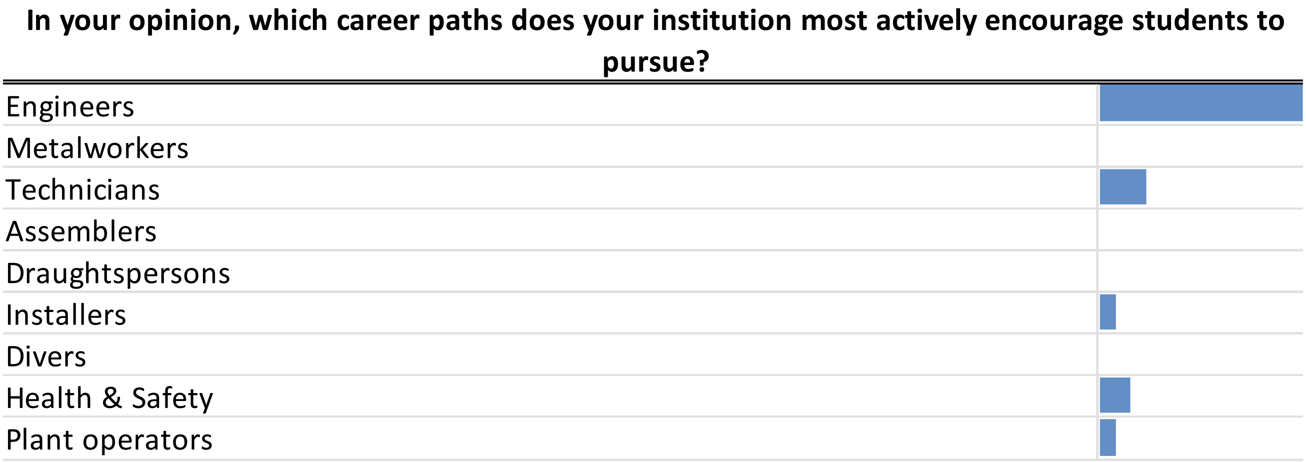

Figure 88. Student interest levels in pursuing a career in offshore renewable energy (CoVE CY)

Regarding the relevance of current academic courses to the offshore renewable energy sector, the majority of students find their courses either moderately relevant (32%) or slightly relevant (29%), with fewer students (21%) perceiving them as highly relevant. Nearly one-fifth (18%) find no relevance at all, suggesting an opportunity for institutions to better align course offerings with industry-specific needs and enhance student preparedness. In terms of information, students predominantly stay informed about offshore renewable energy developments through social media platforms, followed by academic journals and television. Professional networks and online courses are less frequently utilized. The prevalence of social media underscores its potential as a valuable tool for educational institutions aiming to disseminate information effectively to students.

Students express the highest interest in the early stages of the offshore renewable energy value chain, particularly in pre-planning/research and project planning phases. Interest progressively decreases across subsequent phases, with minimal attraction towards decommissioning or recommissioning activities. This distribution highlights students' preferences towards strategic, planning-oriented roles rather than operational or end-of-life cycle activities (Figure 89).

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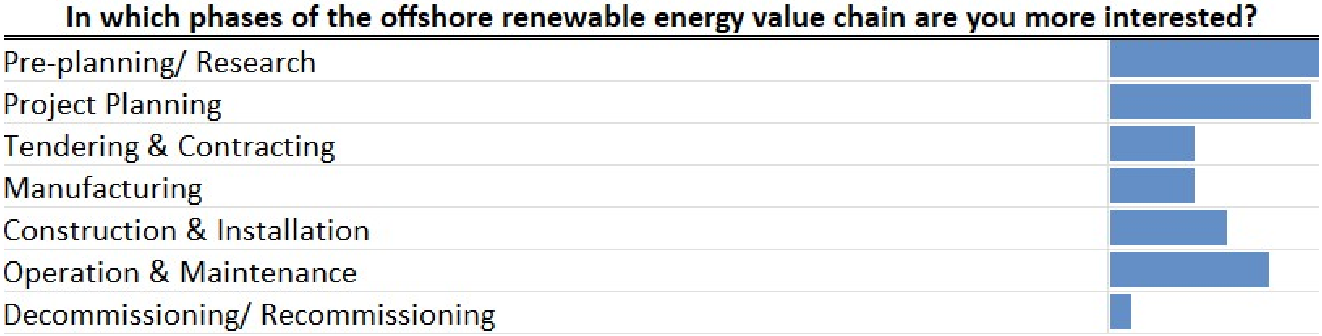

Figure 89. Student interest across phases of the offshore renewable energy value chain (CoVE CY)

Students' self-assessment of confidence in essential hard skills reveals moderate to high levels of confidence overall (Figure 90). Skills such as foreign languages, project design and planning, and digital skills score relatively higher, suggesting strengths in general academic competencies. Conversely, offshore-specific and engineering skills are areas of notably lower confidence, emphasizing targeted areas for potential curriculum enhancements and specialized training.

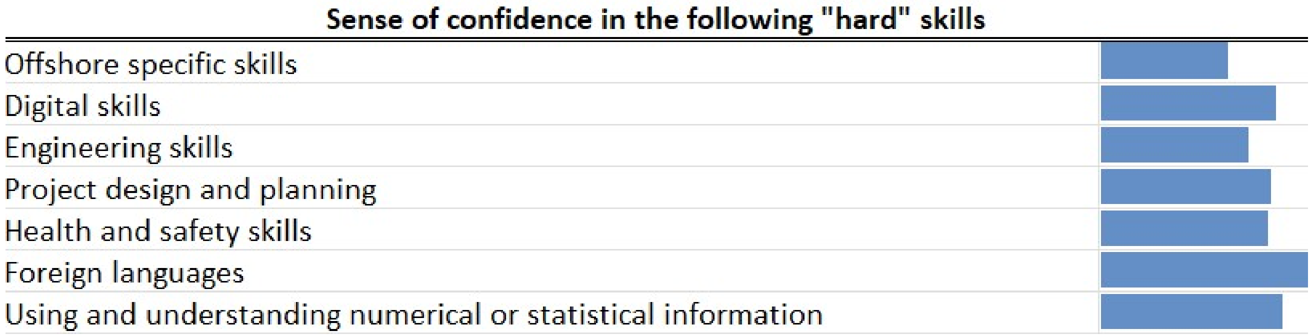

Figure 90. Students' self-assessed confidence in relevant hard skills (CoVE CY)

The respondents expressed a uniformly high level of confidence across all assessed soft skills, indicating no substantial differences among areas such as critical thinking, communication, collaboration, flexibility, leadership, productivity, and ICT literacy (Figure 91).

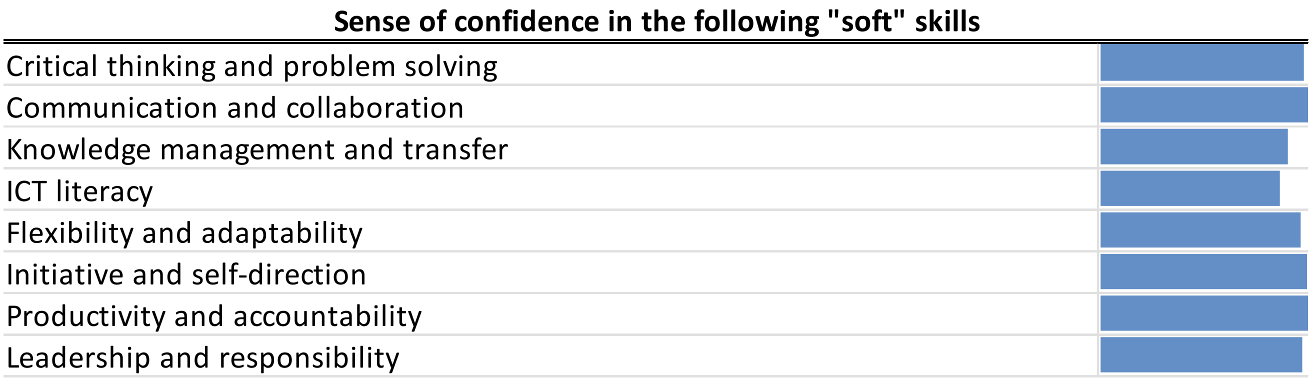

Figure 91. Students' confidence levels in key soft skills relevant to the offshore renewable energy market (CoVE CY)

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Regarding educational preparedness for the offshore renewable energy sector, the majority of students feel their education is at least adequate, with a significant portion rating it as either 'adequate' or 'well'. However, the smaller segment of students rating their preparedness as 'very well' or 'poorly' indicates that, although institutions perform satisfactorily, there is considerable scope for improvement in educational programmes to meet market expectations comprehensively (Figure 92).

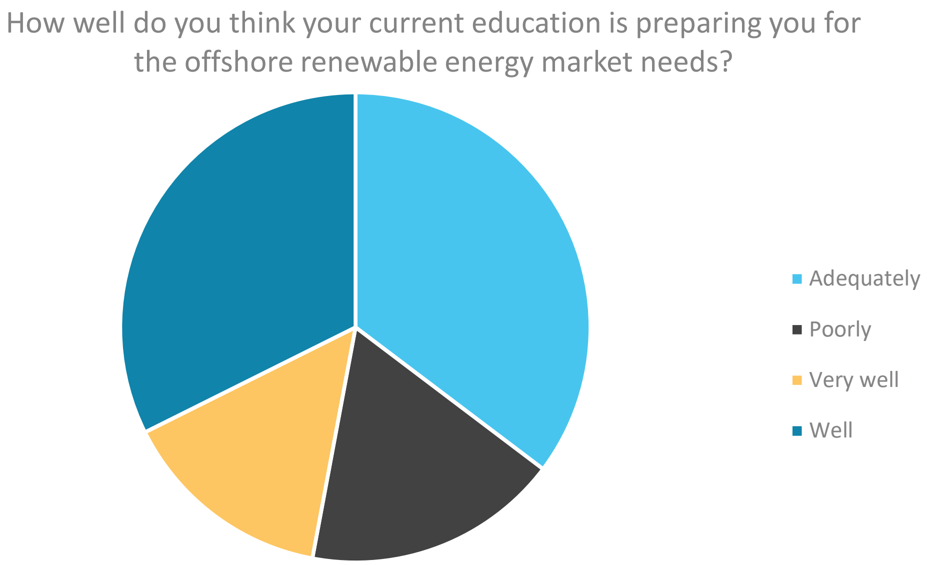

Figure 92. Student evaluation of educational preparedness for offshore renewable energy market needs (CoVE CY)

Regarding practical experiences within the offshore renewable energy sector, students have mostly participated in research projects and internships (Figure 93). A significant proportion, however, indicated having no practical experience, emphasizing a critical gap that institutions could address through increased opportunities for experiential learning (Figure 93). Most students lack direct practical experience in the offshore renewable energy sector, underscoring a significant gap in experiential learning opportunities. Only a few students have participated in internships, workshops, or research projects, highlighting a clear need for enhanced practical training initiatives to adequately prepare graduates for industry-specific demands.

Figure 93. Practical experiences students have had in the offshore renewable energy sector (CoVE CY)

When considering the institutional support students require to pursue a career in offshore renewable energy, respondents identified internship placements and career counselling as primary needs. Industry networking opportunities and scholarship or funding support are also considered important. These results clearly indicate areas where institutions can enhance their support structures to effectively guide and assist students towards meaningful careers in the sector (Figure 94).

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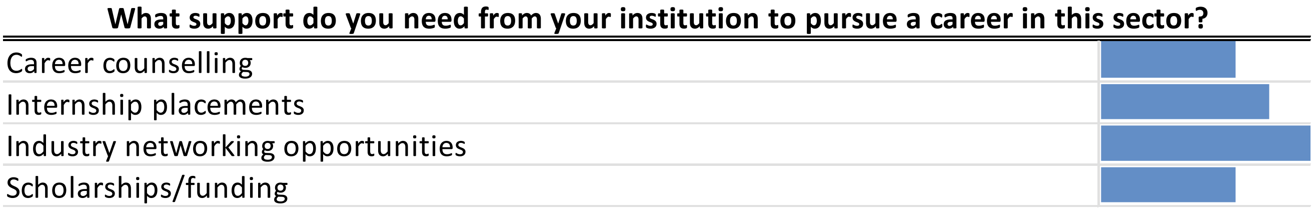

Figure 94. Institutional support identified by students as necessary for pursuing careers in offshore renewable energy (CoVE CY)

2.5.2 Identification of improvements in the VET offer

2.5.2.1 Evaluation of course content, learning outcomes, and delivery methods

Vocational education and training (VET) is a critical pillar in developing a highly skilled workforce for the offshore wind energy sector, a field that is rapidly expanding across Europe. Ensuring that VET programmemes align with industry requirements is essential to meeting the sector's demand for specialised professionals. Within the SHOREWINNER project, this evaluation examines the adequacy of existing VET course structures, learning outcomes, and pedagogical approaches in Cyprus, determining whether current training programmemes equip learners with the competencies required for offshore wind roles while remaining responsive to evolving technological, environmental, and regulatory challenges.

This assessment builds upon the findings of Deliverable 2.1, which identified substantial skills gaps across Southern Europe in areas such as turbine maintenance, offshore safety, and digitalisation. It also stressed the importance of integrating sustainability principles into training curricula. These insights underpin the evaluation of Cyprus's current VET landscape, particularly its ability to address the growing need for offshore wind-related skills. The objective is to pinpoint strengths, gaps, and areas for improvement in course content, learning outcomes, and delivery methods.

A structured mapping of Cyprus's VET offerings (based on desk research) identified institutions currently providing relevant programmemes. Key characteristics - including course content, learning outcomes, accreditation status, and practical training components - were documented to assess whether programmemes truly align with offshore wind industry needs.

Beyond content adequacy, the evaluation considers pedagogy, especially practical, hands-on learning. Effective offshore wind training often requires close industry partnerships, simulations, or work-based experience. Finally, accreditation and recognition—whether by national agencies or industry bodies—are analysed to determine the long-term value of these programmemes for both learners and employers.

2.5.2.2 Overview of VET Offerings in Cyprus

The mapping of vocational education and training courses in Cyprus found 40 distinct programmemes across multiple institutions, including:

- Public Universities: University of Cyprus, Cyprus University of Technology (CUT)
- Private Universities: University of Nicosia, Frederick University, University of Central Lancashire, Cyprus (UCLan Cyprus)
- Specialised Institutes and Training Providers: Cyprus Marine and Maritime Institute (CMMI), PHAETHON CoE, The Cyprus Institute, INTERCOLLEGE

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- Industry-Linked or Professional Centres: AQS Cyprus LTD and Advanced Quality Services, UCLan Cyprus – Institute of Professional Studies (IPS)

While the precise count of institutions can vary depending on how collaborations or different campuses are counted, the data confirm that these organisations collectively deliver 40 courses relevant to the broader marine, energy, and engineering domains. Many courses concentrate on marine engineering, coastal zone management, environmental sustainability, or general renewable energy, but only a small subset touches on wind energy - and fewer still reference offshore-specific content.

Of the 40 identified courses, fewer than half provide formally accredited qualifications (e.g., degrees at Bachelor's or Master's level, professional diplomas recognised by the Cyprus Agency of Quality Assurance and Accreditation (CyQAA) in Higher Education- DIPAE, or globally recognised industry certificates). Many programmemes simply offer a "*certificate of completion*," which does not confer the recognised credentials typically required for offshore wind roles. This gap in accreditation underscores a concern that even where curricula are relevant, the resulting qualifications may not be widely recognised by employers, either locally or within Europe's broader offshore wind sector.

Most course delivery still relies heavily on lecture-based instruction (either face-to-face or blended). Only a minority integrates applied learning components such as laboratory practice, fieldwork, or work-based training - all of which are indispensable for developing the practical skills essential to offshore operations. Where safety-oriented courses do exist, they often lack direct alignment with the Global Wind Organization (GWO) standards that are internationally recognised in the offshore wind industry.

Overall, the VET landscape in Cyprus has notable strengths in engineering fundamentals, safety and risk management, and marine or coastal topics. However, critical gaps remain regarding explicit offshore wind competencies, practical industry placements, and widely accepted safety certifications. Addressing these shortcomings will be vital if Cyprus is to produce a skilled workforce ready to participate effectively in the expanding offshore wind sector.

2.5.2.3 Evaluation of course content

A close review of the 40 mapped courses reveals a mismatch between current offerings and the specialised knowledge demanded in the offshore wind sector. While some programmemes cover general engineering, renewable energy principles, and marine topics, very few explicitly detail offshore wind technology (e.g., turbine design, floating structures, mooring systems, subsea cabling, or offshore logistics) in a dedicated manner.

- Marine & wind energy modules: a few courses (for example, *Marine and Wind Energy (CEE 596)* at the University of Cyprus, or *AEEE362 Wind Energy* within an electrical engineering syllabus) address wind power fundamentals. However, they do so without extensive depth and typically lack components such as site visits or practical, hands-on experience in specialised offshore applications.
- Digital & automation skills: some programmemes (e.g., *Applications of Marine Robotics*, *Remote Monitoring and Observation*, or *Block Code Learning*) introduce digital tools in marine contexts. Nonetheless, none focus on digital twin technology, AI-driven predictive maintenance, or smart grid integration—all crucial for modern offshore wind farm operation.

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- Safety & risk management: although nine courses emphasise safety protocols (e.g., diving safety, maritime risk assessment, or general health and safety in construction), they do not align with GWO training—the industry benchmark for offshore wind jobs.
- Environmental & regulatory content: several courses cover coastal management, environmental sustainability, or marine protection, but do not include offshore wind–specific permitting requirements, marine spatial planning for wind farm sites, or environmental impact assessments tailored to offshore wind.

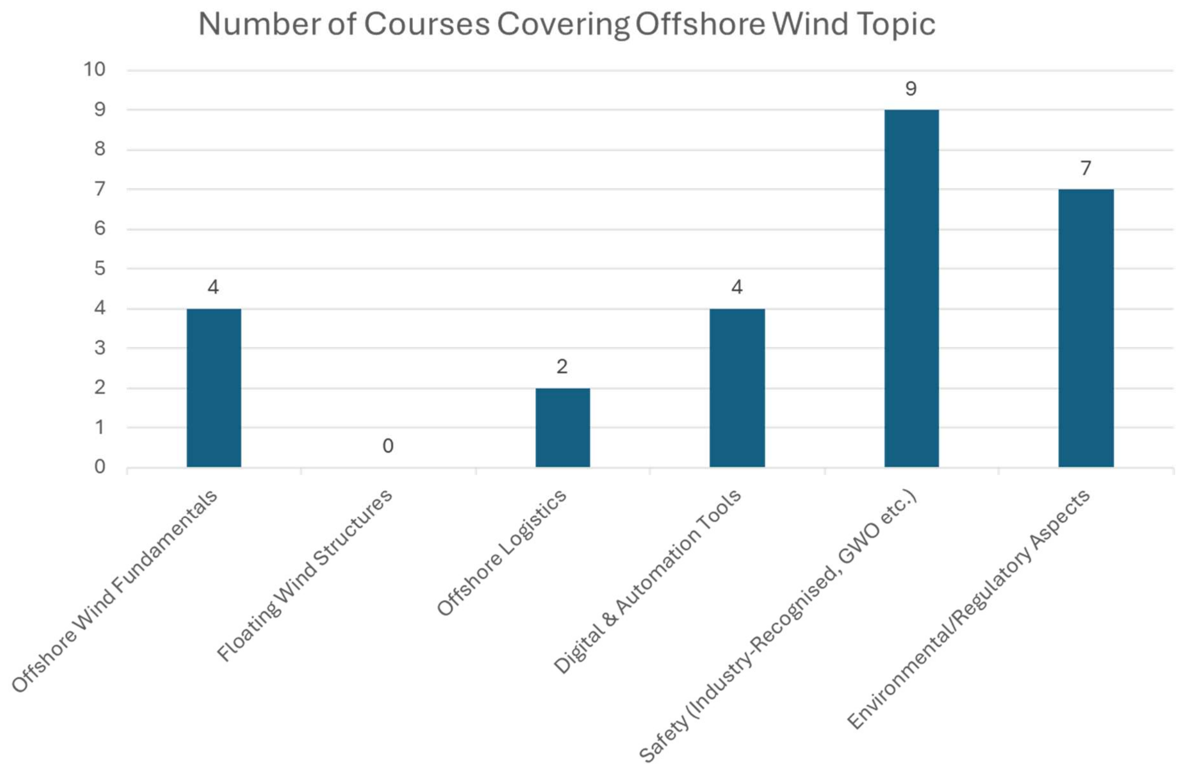

Figure 95. Courses covering offshore wind topic in Cyprus (CoVE CY)

Likewise, while environmental awareness, basic engineering, and maritime safety do appear in the VET landscape, the absence of a robust offshore wind curriculum poses a challenge for anyone seeking direct employment in this industry. Notably missing are modules that teach how to operate or maintain offshore turbines, how to handle the unique structural and logistical demands of floating platforms, and how to meet the stringent safety protocols typical of this sector.

Table 19 summarises how well Cyprus's current VET offerings address key topics in offshore wind energy production:

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Table 19. Cyprus's VET offerings and observations in ORE sector

Key Offshore Wind Energy Topic	Coverage	Observations
Offshore wind fundamentals	Minimal / Indirect	Wind energy is introduced in a few modules, but lacks offshore focus
Floating wind structures	Absent	No mention of floating platforms or mooring technologies
Offshore logistics	Very limited	A few logistics/safety aspects appear, but not offshore-specific
Digital & automation tools	Partially covered	Robotics and remote monitoring exist; no coverage of digital twins or AI
Safety (industry-recognised)	Present but not GWO-aligned	Safety training is common, but lacks GWO certification pathways
Environmental regulation	Present (general)	Basic coastal/environment modules, but not offshore wind–specific

Although some fundamentals are in place, this evaluation highlights the urgent need to update existing courses—or create new ones—to incorporate the specialised concepts, technical skills, and global standards demanded by the offshore wind industry.

2.5.2.4 Evaluation of learning outcomes

Clear, industry-relevant learning outcomes are critical for ensuring that VET graduates possess the competencies needed to excel in offshore wind roles. While many courses in Cyprus define general outcomes related to engineering principles, environmental protection, or maritime safety, few explicitly translate these into the skill sets that modern offshore wind employers require.

1. Offshore wind specialisation
   - Very few courses identify learning objectives around offshore wind farm development, turbine operations, or floating wind—an indication that students are not graduating with targeted offshore capabilities.
2. Digital & AI-Driven skills
   - Although some programmemes teach coding (e.g., block-based programmeming) or general robotics, the learning outcomes do not extend to predictive maintenance, advanced sensors, or data analytics, all of which are increasingly central to offshore wind farm operations.
3. Safety competencies

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- While safety, risk assessment, and diving protocols are included in multiple courses, none set out to achieve GWO-compliant learning outcomes (such as working at heights or sea survival). Without these, trainees are not considered industry-ready for offshore wind environments.

4. Practical & interdisciplinary focus
   - Most learning outcomes emphasise theoretical understanding or limited case studies. Hands-on competencies—especially in an offshore context—are absent. Additionally, there is a lack of business, finance, or policy elements, which are vital for overseeing major offshore projects that involve complex permitting and high investment costs.

By neglecting explicit offshore learning outcomes, current VET programmemes risk producing graduates with partial or generic skill sets that do not translate seamlessly into real-world offshore wind employment. To address these gaps, future curricula should define learning objectives around specific offshore wind technologies, industry safety standards, interdisciplinary project management, and digital innovations, thereby ensuring that every student emerges with the proficiencies demanded by cutting-edge wind projects in deep-water settings.

2.5.2.5 Evaluation of delivery methods

An industry as operationally intensive as offshore wind requires extensive hands-on and applied training. However, the delivery methods observed in Cyprus's VET landscape remain predominantly lecture-based (Figure 96):

- Lecture-centred approaches: Over half of the mapped courses rely primarily on lectures, leaving little room for immersive or project-based experiences.
- Limited practical labs: Only a small number of programmemes incorporate tangible laboratory practice, and none appear to use offshore wind simulations (e.g., virtual reality or digital twin) to replicate high-risk marine settings.
- Insufficient work-based learning: Internships, apprenticeships, and structured placements - key pathways into real-world offshore operations - are seldom mentioned. The absence of such opportunities is a major hurdle for bridging the gap between theoretical knowledge and offshore practicality.
- Digital tools: While a few courses explore robotics or remote monitoring, the broader integration of advanced digital methods (e.g., AI-driven maintenance or digital twins) is missing. These tools are increasingly standard in offshore wind training elsewhere in Europe.

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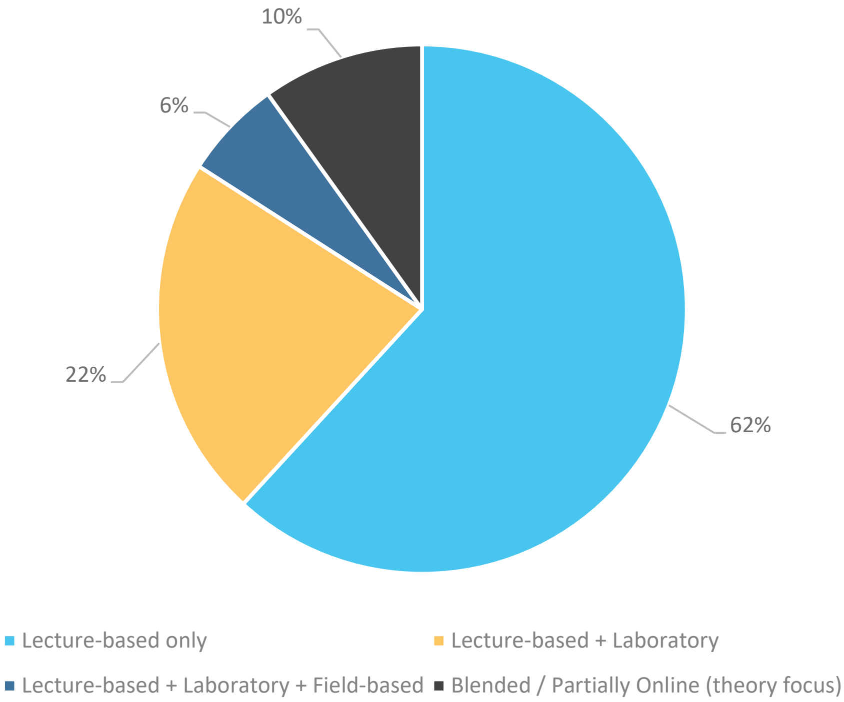

Figure 96. Evaluation of delivery methods (CoVE CY)

This shortfall in practice-oriented methods diminishes the immediate readiness of graduates to work under dynamic offshore conditions. Offshore wind technicians and engineers must frequently perform tasks in harsh marine environments, manage high-stakes logistics, and adhere to stringent safety protocols. Without hands-on training or robust simulation exercises, students may find themselves underprepared for the realities of offshore deployment.

Moreover, this theoretical bent raises questions about accreditation and industry recognition. Most global or European frameworks for offshore wind training require evidence of practical skill mastery, typically through labs, simulation, or field-based learning. Strengthening these components in Cyprus's VET programmemes would not only improve student preparedness but also support alignment with EU qualifications frameworks and recognised industry standards.

2.5.2.6 Conclusion and strategic recommendations

This evaluation highlights a clear gap between Cyprus's current VET offerings and the specialised demands of the offshore wind energy sector. Although there is a solid foundation in marine engineering, general wind energy, environmental topics, and safety, the lack of dedicated offshore wind content, practical training opportunities, and industry-recognised certifications is limiting the development of a job-ready workforce. In Table 20 the key findings and recommendations of our study are summarized:

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Table 20. Key findings and recommendations (CoVE CY)

Key findings	Recommendations
Courses rarely mention offshore wind technology or floating structures, focusing instead on onshore systems or general marine engineering.	Develop offshore wind–specific curricula by integrating dedicated offshore modules into existing marine or energy programmemes, covering floating structures, mooring systems, deep-water turbine installation, subsea cabling, and vessel logistics.
Existing safety training does not match Global Wind Organization (GWO) requirements, limiting graduate employability internationally.	Adopt internationally recognised safety standards by revising courses to fully comply with GWO protocols, ensuring mandatory modules in sea survival, working at height, and emergency response are included in final qualifications.
Predominantly lecture-based education with limited practical experiences such as internships, apprenticeships, or simulation training.	Enhance practical training and industry links through apprenticeships, internships, and placements with offshore wind developers, and invest in simulation labs or VR systems for realistic training in turbine maintenance, safety, and offshore procedures.
Lack of advanced digital competencies training (predictive maintenance, AI, digital twins), despite some existing coverage of robotics and remote monitoring.	Strengthen digital & automation training by adding modules on data analytics, AI-driven maintenance, and digital twins, and encouraging real-time simulation projects involving turbine monitoring, fault detection, and supply chain management.
Technical curricula currently neglect aspects of business, finance, and policy that are critical for managing offshore wind project lifecycles.	Promote interdisciplinary learning by embedding business, finance, and policy content within technical courses to enable graduates to effectively handle feasibility studies, environmental assessments, and permitting processes.
Current qualifications have insufficient alignment with international standards and industry requirements.	Improve accreditation pathways by aligning curricula with the European Qualifications Framework (EQF) and GWO standards, and actively engaging industry stakeholders in curriculum development to ensure ongoing relevance.

By implementing these measures, Cyprus can begin to close the current skill gaps and position its workforce to take full advantage of offshore wind opportunities—both in the Eastern Mediterranean and across Europe. As the EU continues expanding its offshore renewable energy capacity, aligning national VET systems with industry standards becomes ever more crucial. With targeted reforms, Cyprus's VET providers can become catalysts for producing highly competent offshore wind professionals, driving innovation and sustainable growth in this key emerging sector.

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2.5.2.7 Assessment of training programme feedback and effectiveness

This section evaluates stakeholder insights on Cyprus' VET programmes for the ORE sector, drawing on feedback from 11 surveys from trainees, educators, and industry professionals conducted during the first year of the SHOREWINNER project. By analysing programme quality, relevance, and impact, we have identified critical strengths, gaps, and opportunities to better align training with the fast-evolving demands of the ORE workforce.

Feedback reveals a mixed picture of programme quality. On the positive side, educators emphasise that the curriculum's foundation in onshore renewable energy provides a strong theoretical base. One educator notes, *"Educational activities and programmemes were predominantly aligned with the onshore renewable energy sector,"* underscoring its value in teaching foundational concepts like wind turbine mechanics or grid integration.

However, stakeholders unanimously highlight a notable weakness: insufficient practical training tailored to offshore environments. Trainees report frustration with the lack of hands-on experience, stating, *"Practical experience in the ORE sector was largely lacking,"* while educators acknowledge *"limited practical training opportunities"* as a systemic challenge. Industry experts echo this, stressing that offshore roles require specialised skills (e.g., marine equipment operation, offshore safety protocols) that classroom-only training cannot deliver.

While instructor expertise is not explicitly addressed in the provided feedback, the emphasis on integrating "industry workshops and access to industry experts" from educators suggests a desire to enhance instructor knowledge and practical insights relevant to the ORE sector. Resources are also flagged as a challenge, with educators mentioning a "lack of resources" for effective course delivery.

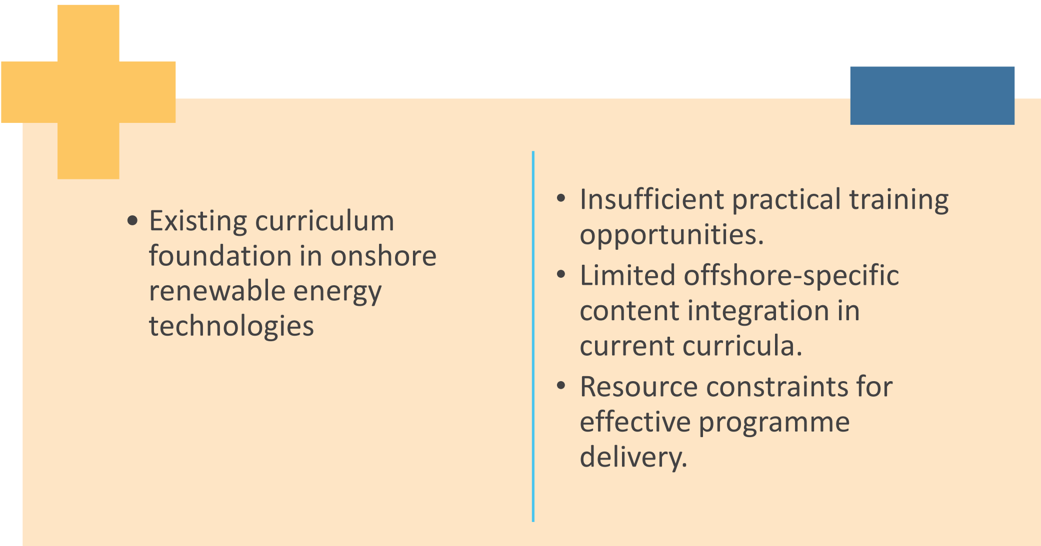

Figure 97. Key strengths and weaknesses in quality of programme delivery (Source: CoVE Cyprus interviews)

While trainees express interest in ORE careers ("most students are 'somewhat interested' in pursuing ORE roles"), the curriculum's focus on onshore technologies fails to meet the industry's offshore-specific demands. Industry representatives highlight a "shortfall in specialised offshore capabilities," pinpointing

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critical gaps in areas like offshore construction, marine logistics, and floating wind turbine maintenance. One employer notes, “We need personnel trained to deploy offshore infrastructure—this isn’t just about theory, but hands-on work in challenging marine environments.”

Educators recognise this disconnect, advocating for *“integrating offshore renewable energy topics into curricula”.* Yet, progress remains slow, with programmes still prioritising onshore content. This mismatch risks leaving graduates unprepared for the technical realities of offshore projects, which demand skills like underwater cable installation or offshore safety management.

Moreover, the limited practical training and offshore focus directly hinder trainee employability. Internships—critical for workplace readiness—are scarce, with trainees reporting *“significant challenges in securing internship opportunities”.* Without hands-on experience, graduates struggle to apply theoretical knowledge, reducing their appeal to employers.

Industry feedback reinforces this concern. Employers report *“significant hard skill gaps”* among workers, particularly in offshore-specific competencies. One industry leader notes, *“Adapting to smart specialisation goals is difficult when new hires lack practical experience with marine technologies”.* While VET programmes provide a baseline understanding, they fall short of producing *“job-ready”* graduates, impacting employer satisfaction and sector growth.

Given all the above, a clear consensus emerges: Cyprus’ VET programmes must pivot toward offshore-specific training to meet labour market needs. All stakeholders agree on the urgency of:

- Expanding hands-on learning (e.g., simulations, offshore site visits).
- Updating curricula to include marine energy technologies and safety standards.
- Strengthening industry partnerships to ensure training mirrors real-world demands.

2.5.2.8 Identification of barriers and enhancements for inclusion and accessibility

This section builds on the analyses presented in Section 2.5.2.1 (Evaluation of Course Content, Learning Outcomes, and Delivery Methods) and Section 2.5.2.7 (Assessment of Training Programme Feedback and Effectiveness). While those sections highlight critical skill gaps in Cyprus’s vocational education and training (VET) programmemes for the offshore wind sector, it is also necessary to examine the barriers that may prevent diverse learner groups—such as women, rural communities, low-income students, and individuals with disabilities—from enrolling in and completing emerging offshore energy courses.

As identified in the companion D2.1 report *“Needs and Trends on the Southern European Offshore Wind Energy Sector,”* the rapid expansion of offshore wind across Southern Europe emphasises the need for both a highly qualified and a socially inclusive workforce. Existing shortages in areas such as advanced engineering, digital competencies, and maritime logistics can only be effectively addressed if VET providers reach out to all potential learners, ensuring broad participation rather than perpetuating current demographic imbalances.

Cyprus’ strategy to diversify its renewable energy mix—driven by the National Energy and Climate Plan (NECP) and the REPowerEU initiative—calls for a sufficient supply of offshore wind specialists. However, stakeholder feedback and mapping data indicate that women remain underrepresented in technical

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programmemes, rural learners face logistical and financial constraints when accessing specialised facilities, and bridging modules for those lacking prior STEM qualifications are scarce. These factors threaten to reduce the talent pool that is essential for floating wind, digitalised maintenance, and advanced maritime logistics.

Promoting inclusive and accessible training pathways is therefore pivotal. Efforts to widen participation—through scholarship schemes, blended learning formats, and dedicated support structures—can mitigate skill gaps while reinforcing the social and economic benefits of offshore wind development. By targeting underrepresented groups and minimising practical barriers, Cyprus is better positioned to meet its offshore wind ambitions and contribute to sustainable, equitable growth in the Eastern Mediterranean.

Current barriers to inclusion and accessibility

Table 21 outlines the main challenges that limit broader participation in VET programmemes relevant to offshore wind. Insights from stakeholder feedback and observed data can be categorised into four main types of barriers: social and cultural, geographic and delivery, economic and funding, and curriculum and pedagogical. Recognising these constraints lays the groundwork for practical measures aimed at making offshore wind–related training more inclusive and accessible.

Table 21. Barriers to inclusion and accessibility

Barriers	Description
Ongoing stigma around VET	Many students view vocational pathways as less prestigious than academic options, discouraging enrolment in specialised fields like marine engineering or advanced maintenance, particularly among underserved or non-traditional groups. This perception can significantly limit the pool of skilled workers available to industries where demand is already high.
Limited representation of women and other marginalised groups	Low involvement of women in engineering or maritime studies mirrors broader European trends, indicating a persistent gender gap in STEM fields. Additionally, the absence of targeted outreach or support for migrants, individuals with disabilities, or other marginalised populations further restricts diversity and innovation within the offshore wind sector workforce.
Urban-centric training facilities	Advanced laboratories and specialised training centres are primarily located in major coastal or urban areas (e.g., Limassol, Larnaca). Learners from rural or remote regions face logistical and financial hurdles, such as increased travel and accommodation costs, limiting their ability to participate in essential hands-on training, internships, or work placements.

Limited digital or online options	The heavy reliance on traditional, in-person lectures without incorporating modern digital learning tools, such as virtual reality simulations, restricts participation for learners with mobility issues, caregiving responsibilities, or those engaged in full-time employment. This rigidity in training delivery excludes many potential learners unable to relocate or adapt their personal schedules.
Tuition, travel, and equipment expenses	Offshore wind–specific courses often require additional, specialised modules like safety-at-height or advanced welding, incurring extra costs. Institutions lacking sufficient resources transfer these financial burdens to students, potentially deterring economically disadvantaged learners from pursuing essential qualifications for employment in offshore wind roles.
Employer and industry partnerships	Despite recognition of the value of industry-academia collaborations, stable co-financing and structured apprenticeship opportunities remain scarce. This shortfall particularly affects learners from lower-income backgrounds, who find themselves without adequate financial support for necessary equipment, travel, or living expenses during their training period.
Shortage of preparatory or bridge courses	There is limited provision of foundational STEM education required for offshore wind careers, such as rotor design, deep-water technologies, or marine logistics. Adult learners and career-switchers often lack the necessary preparatory knowledge to succeed in advanced, specialised courses, presenting a substantial barrier to workforce entry.
Lack of inclusive teaching approaches	Current educational practices do not commonly include accommodations or flexible scheduling options to support learners with disabilities, language barriers, or significant work commitments. Moreover, structured tutoring or mentoring support is lacking, raising the risk of learner dropout and reducing the pool of adequately trained personnel for offshore wind projects.

Proposed enhancements for inclusion and accessibility

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The following measures (Table 22) are intended to address the barriers outlined above, ensuring that VET for offshore wind becomes more inclusive and accessible. Each category highlights practical interventions—ranging from awareness campaigns to policy alignment—that aim to broaden participation, strengthen the talent pipeline, and foster a diverse, well-prepared workforce for Cyprus's emerging offshore renewable energy sector.

Table 22. Proposed enhancements for inclusion and accessibility (CoVE CY)

Proposed Enhancements	Description
Rebranding VET for offshore wind	Launch local awareness campaigns using success stories from floating platforms and data-driven maintenance. Organise sessions in secondary schools highlighting achievements of female and minority role models in maritime engineering and renewable energy to boost VET attractiveness and diversify enrolment.
Industry visits	Facilitate community visits by offshore wind developers, port authorities, and HRDA to rural and underrepresented areas. Use mobile labs and VR demonstrations for practical engagement. Organise short "live-lab" events to showcase cable-laying or maintenance skills and address misconceptions around VET careers.
Scholarships and grants	Provide tuition waivers or fee reductions for women, migrants, and low-income learners. Offer micro-grants to support travel and accommodation for participants from remote areas, making training opportunities more accessible.
Employer co-investment	Establish sponsored internships with maritime or energy companies to connect theory with practice. Formalise diversity-focused targets (e.g., quotas for female trainees) in collaboration with training providers to encourage inclusive participation.
Blended/online learning	Introduce digital twin simulations and asynchronous modules that support learners with time or mobility constraints. These options provide flexible access for upskilling in offshore wind technologies.
Bridging STEM modules	Offer condensed preparatory courses in subjects such as math, physics, and ICT to help career-

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	switchers and learners without strong STEM foundations enter advanced offshore wind programmemes. Link these courses to practical applications for stronger engagement.
Adapted learning materials	Develop resources that support inclusivity, including captioned videos, accessible lab equipment, and multilingual materials. These enhancements serve learners with disabilities and migrant backgrounds more effectively.
Diversity targets and metrics	Set clear annual targets for underrepresented learner enrolment and systematically collect demographic data. Use the insights to evaluate and refine inclusion strategies within VET programmemes.
Synergy with national strategies	Embed inclusive training reforms in broader policy frameworks such as NECP, MSP, and Smart Specialisation Strategy. Leverage funding mechanisms like HPC and ESIF to support curriculum and infrastructure upgrades aligned with offshore wind development goals.

Anticipated outcomes and alignment with SHOREWINNER goals

The measures described above aim to create a more inclusive and accessible VET environment for offshore wind, ultimately strengthening Cyprus's capacity to meet both national energy targets and broader European objectives. The following anticipated outcomes also align with the SHOREWINNER project's core aim of developing a future-ready VET system that supports a dynamic, equitable offshore wind sector.

1. **Wider talent pool**
    - Addressing skill shortages: engaging rural learners, women, and migrant communities directly mitigates the documented deficits in advanced engineering, digital literacy, and other technical areas related to offshore wind.
    - Fostering diversity: a broader set of participants ensures the next generation of marine engineers, digital technicians, and safety specialists reflect the diverse communities benefiting from renewable energy growth.
2. **Enhanced socioeconomic equity**
    - Reducing barriers: scholarships, bridging courses, and remote learning can diminish financial, geographic, and scheduling constraints, helping underrepresented groups access opportunities in the emerging offshore renewable energy (ORE) sector.

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- Empowering communities: better accessibility promotes sustained economic benefits for regions with limited traditional employment, echoing the project's commitment to inclusive local development.

3. **Fulfilment of EU priorities**

   - Policy alignment: the emphasis on "Diversity and Inclusion Initiatives" resonates with the *Needs and Trends on the Southern European Offshore Wind Energy Sector* report, as well as the broader European Green Deal and REPowerEU principles advocating a just transition.
   - Broader collaboration: by aligning with EU objectives, these steps can attract additional funding or technical support and facilitate stronger cross-border partnerships in Southern Europe.

Ensuring that VET for offshore wind is inclusive and accessible contributes both to social equity and to the development of a strong workforce capable of meeting Cyprus's evolving energy objectives. Broadening participation—through scholarships, adapted curricula, blended learning, and sustained outreach—removes barriers that often deter women, rural learners, and low-income communities from pursuing maritime renewable careers. These measures also respond to the skill gaps outlined in the *Needs and Trends on the Southern European Offshore Wind Energy Sector* report, enabling VET institutions to train specialists with advanced engineering, digital, and maritime competencies vital for offshore wind's future.

By prioritising inclusive approaches, Cyprus and its partners can more effectively address workforce needs identified across the SHOREWINNER project. A more diverse learner base will reflect the full range of talent and ideas required to promote innovation, ease technology adoption, and stimulate sustainable growth in marine renewables. Ultimately, combining equitable access with industry-focused training positions Cyprus's VET ecosystem to play a pivotal role in the region's offshore wind development, delivering both social benefits and economic resilience.

2.5.3 Development of actions to deliver labour-market relevant skills

2.5.3.1 Updating training offerings for ORE sector

Offshore renewable energy—especially offshore wind—has gained increasing momentum in the Eastern Mediterranean. As highlighted by the survey findings (Section 2.1), learners and professionals alike express significant interest in pursuing careers within this evolving sector. However, the evaluation of existing vocational and higher education programmes (Section 2.2) points to pronounced skill gaps, ranging from hands-on offshore safety training to advanced digital and engineering competencies tailored to floating wind systems and maritime logistics.

The recent course mapping (**Error! Reference source not found.** – ANNEX II) confirms that Cyprus offers a wide range of marine, coastal, and renewable-energy-focused programmes, but most still lean toward onshore wind, coastal engineering, or solar photovoltaic content. Very few cover the distinctive aspects of offshore deployments, such as floating platforms, specialized anchoring systems, offshore logistics, and safety procedures aligned with global industry standards (e.g., GWO — Global Wind Organization).

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While some of the programmes listed lead to formal degrees or recognized qualifications, several short courses merely provide certificates of completion without alignment to international frameworks. This gap limits the cross-border portability of skills essential for thriving in the European ORE market. Furthermore, though certain subjects—such as marine robotics, diving safety, or advanced engineering—show promise, they rarely incorporate specific offshore wind applications.

Within this context, updating the training offerings is essential to ensure that education in Cyprus remains responsive to the sector's needs. By adapting existing curricula to include modules on offshore turbine design, installation, and maintenance—underpinned by standardized safety certifications—VET providers can enhance graduate employability and support the nation's ambition to diversify its energy portfolio with marine renewables. The subsequent analysis explores how these upgrades can be effectively integrated into existing programmes.

2.5.3.1.1 Analysis

Alignment with existing courses

From the 40 mapped courses, many already address topics relevant to the maritime or renewable energy fields. For example, some modules focus on marine and wind energy (e.g., *Marine and Wind Energy (CEE 596)*) and coastal or offshore geotechnics (e.g., *Coastal and Offshore Geotechnical Engineering (CEE 557)*). However, these typically offer only partial coverage of specific offshore-related challenges, such as floating foundations, marine logistics, or subsea electrical systems.

Meanwhile, shorter certificate-based courses in marine robotics, remote monitoring, or dive planning show how hands-on learning is valued in the local training ecosystem. Yet these do not explicitly address offshore wind environments—where specialized safety drills, vessel transfer protocols, and the application of robotics for turbine inspection are essential.

Gaps in offshore-specific content

Despite the breadth of the courses mapped, most remain oriented around onshore energy or generic maritime concepts. Several wind-related modules (e.g., *AEEE362 Wind Energy*) concentrate on resource assessment and turbine maintenance for land-based contexts. In reviewing these programmes:

- *Floating Wind & Mooring*: none delve comprehensively into floating substructures or advanced anchoring—crucial for deeper waters.
- *Offshore Safety (GWO-Aligned)*: while some courses cover general maritime safety, few reference GWO standards for working at height or sea survival in offshore wind farms.
- *Subsea Logistics & Power Systems*: topics like cable-laying, offshore substation design, or large-scale marine logistics are seldom included.

Potential for cross-module enhancement

Despite the noted gaps, there are clear opportunities to embed or expand offshore content:

1. *Marine and wind energy (CEE 596)*

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   - Could add case studies on large-scale offshore wind installations, including logistical planning, port infrastructure requirements, and specialized construction vessels.
2. *Coastal and offshore geotechnical engineering (CEE 557)*
   - Could broaden its scope to address floating foundations for wind turbines, wave-induced cyclic loading, or the design and stability of offshore anchor systems.
3. *Short courses in diving safety or marine robotics*
   - Could incorporate offshore turbine inspection methods, emergency response specifics for turbine-to-vessel transfers, or remote data collection on wind farm integrity.
4. *Diploma-level curricula in renewables*
   - Some modules focusing on solar or onshore wind (e.g., *MTECH 230, MTECH 270*) could integrate an offshore track with specialized instruction on sea-based resource assessment, floating structures, and relevant risk management strategies.

Importance of industry standards and accreditation

Many short courses (14–25 hours) listed in the **Error! Reference source not found.** do not map to formal professional qualification frameworks. Securing accreditation—possibly through national authorities or recognized industry bodies—would increase the credibility and transferability of these programmes. Notably, integrating GWO-based modules into safety or engineering diplomas could significantly improve graduates' acceptance in the offshore sector, both in Cyprus and internationally.

Practical skills and digital tools

Feedback from industry consistently emphasizes hands-on experience in real or simulated offshore conditions. While some existing offerings explore marine robotics and remote monitoring, these should be enhanced with advanced simulation labs or field placements focusing on offshore wind environments. For example, digital twins, AI-driven maintenance, or remote turbine diagnostics could be introduced in relevant courses to meet growing industry demand for data-centric skill sets.

2.5.3.1.2 Proposed curriculum enhancements

Building upon the gaps identified in Section 2.5.3.1.1, this section proposes specific updates that can be integrated into existing course frameworks or introduced as standalone modules. The goal is to provide a comprehensive and industry-aligned offering that covers both the technical and practical demands of the ORE sector, particularly offshore wind.

Embedding offshore-focused content into existing modules

1. Floating wind & anchoring systems

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- *Objective:* extend the coverage of wind energy modules to include floating platforms and advanced anchoring.
- *Implementation:* add lectures on mooring design, materials, and inspection. Integrate assignment tasks on deep-water resource assessment and the design of anchoring systems under cyclic loads.
- *Outcome:* graduates gain insight into engineering constraints of floating turbines, an area identified as lacking in current offerings.

2. Offshore-ready safety training
    - *Objective:* augment existing safety or maritime courses with standardized offshore safety protocols recognized by the global wind industry (e.g., GWO modules).
    - *Implementation:* incorporate sea survival, first aid, and manual handling curricula relevant to turbine-access vessels and platform transfer. Offer practical simulations or scenario-based exercises in a controlled environment.
    - *Outcome:* learners develop the competencies required for safe operation in offshore environments, thereby meeting a critical employer demand.
3. Marine logistics and subsea infrastructure
    - *Objective:* enrich select modules on logistics, diving safety, or marine robotics to cover the infrastructure challenges of offshore wind, such as subsea cable-laying and vessel coordination.
    - *Implementation:* include case studies of cable installation, dynamic cable management, and remote-operated vehicle (ROV) inspections. Develop practical assignments emphasizing planning, risk mitigation, and environmental considerations.
    - *Outcome:* learners acquire hands-on knowledge of coordinating vessels, equipment, and personnel in the demanding offshore environment.
4. Digital innovation and data analytics
    - *Objective:* introduce more advanced modules on digital twin technology, predictive maintenance, and AI for ORE.
    - *Implementation:* add practical lab sessions involving sensor data, drone or ROV footage of offshore assets, and software-based fault detection systems.
    - *Outcome:* learners are prepared to operate and maintain modern offshore wind farms where data analytics and remote monitoring form an integral part of daily operations.

Developing new short courses or micro-credentials

In addition to updating existing curriculum components, short courses or micro-credentials focusing on specific offshore skill sets would address pressing industry needs:

1. Offshore wind fundamentals
   - *Content:* introduction to offshore turbine technology, floating foundations, operational logistics, environmental impacts, and relevant legislation.
   - *Target audience:* mid-career professionals transitioning from onshore renewables or related maritime fields.
   - *Delivery:* 30–40 hours, combining lectures with site or port visits where possible.
2. Offshore wind project management
   - *Content:* end-to-end planning of offshore wind projects, from site selection to decommissioning. Emphasis on risk assessment, supply chain coordination, and cross-disciplinary team management.
   - *Target audience:* professionals in civil, mechanical, or maritime roles seeking leadership responsibilities.
   - *Delivery:* weekend-based workshops, potentially integrating online simulations.
3. Advanced Offshore Safety
   - *Content:* GWO-aligned modules (sea survival, working at height, rescue drills) and specialized knowledge of vessel-to-turbine transfer protocols.
   - *Target audience:* technicians, engineers, and divers needing to meet international offshore standards.
   - *Delivery:* short intensive courses (16–24 hours) with practical scenarios, culminating in recognized safety certifications.

By combining these enhancements—both integrated into existing modules and offered as standalone short courses—learners can acquire a robust technical foundation alongside the specialized, practice-oriented skills required in today's offshore renewable energy market.

2.5.3.1.3 Implementation and expected outcomes

Phased rollout strategy

A structured, phased approach can ensure that updates are both feasible for providers and responsive to immediate industry demands:

1. *Short-term actions (1–2 years)*

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- *Pilot offshore modules:* revise wind-focused courses to include introductory content on floating turbine technology and sea-based safety.
- *Launch GWO-aligned safety pilot:* develop an offshore-specific safety module or short course that aligns with recognized global standards, targeting immediate skill shortages.
- *Industry engagement:* form a stakeholder advisory group (educators, local maritime/energy companies) to review curricula and secure internship/placement opportunities.

2. *Medium-term actions (3–4 years)*
    - *Expand micro-credentials:* offer specialized short courses in floating foundation design, subsea power transmission, and digital maintenance tools, validated by key industry bodies.
    - *Upgrade facilities:* invest in simulation labs or VR environments that replicate offshore turbine inspection, vessel transfers, and emergency scenarios.
    - *Accreditation pursuits:* pursue alignment with local or international frameworks (e.g., European Qualifications Framework) and embed recognized safety certifications to enhance portability of credentials.
3. *Long-term actions (5+ years)*
    - *Dedicated offshore specializations:* consider developing full-fledged offshore wind specialization tracks within existing diplomas or degree programmes.
    - *Sustained collaboration:* maintain ongoing ties with ORE stakeholders to ensure curricula remain current as technology evolves (e.g., deeper-water floating designs, new safety protocols).
    - *Cross-border cooperation:* explore joint courses or exchange programmes with other countries active in the offshore sector, aligning with broader SHOREWINNER objectives.

Anticipated outcomes

1. *Enhanced workforce competitiveness*
    - Learners equipped with specialized offshore skills, improving job prospects both locally and internationally.
    - Employers can more readily fill positions requiring advanced marine engineering, safety, and digital competencies.
2. *Greater alignment with industry demands*
    - Adoption of GWO-aligned safety and recognized technical standards increases the credibility of local qualifications, supporting the labor market's evolving needs.
    - Stronger collaboration between educators and employers fosters practical, real-world training approaches.

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3. *Accelerated growth of the ORE sector*
    - A skilled, readily available workforce can facilitate the development of local offshore projects, attracting further investment into the region.
    - Wider availability of specialized courses contributes to the maturation of an ORE ecosystem, potentially positioning Cyprus as a knowledge hub in the Eastern Mediterranean.
4. *Robust pathways for future innovation*
    - Strengthened interdisciplinary connections—spanning marine robotics, digital analytics, and engineering—lay the groundwork for further R&D collaborations.
    - Enhanced training infrastructure opens avenues for continuous professional development, ensuring the workforce remains agile in adapting to emerging offshore technologies.

Through the combination of revised curricula, new short courses, and strategic investments in training environments, Cyprus can create a robust pipeline of offshore-ready professionals. By addressing both technical depth and practical application, these measures will help bridge current skill gaps, enabling the local workforce to thrive in a rapidly expanding global market for offshore renewable energy.

2.5.3.1.4 Ensuring inclusion, accessibility, and synergy

In developing updated ORE training offerings, it is vital to address the inclusion and accessibility considerations discussed in Section 2.5.2.8. By actively supporting diverse learner pathways, the proposed curriculum changes can help broaden participation while strengthening the overall talent pool for the offshore sector. Furthermore, a strong commitment to collaboration—both domestically and internationally—can enhance programme relevance and ensure continuous refinement.

A. Inclusive Pathways and Support Mechanisms

1. *Targeted outreach*
    - *Strategy:* incorporate awareness-building efforts that specifically highlight offshore wind career opportunities for women, rural communities, low-income learners, and other underrepresented groups.
    - *Outcome:* more diverse applicant pools, resulting in a broader and more innovative workforce.
2. *Financial assistance*
    - *Strategy:* develop scholarships, micro-grants, or co-funded internships (in partnership with industry) to offset the higher costs often associated with specialized offshore training, such as sea survival drills or advanced labs.
    - *Outcome:* reduction of economic barriers, making it feasible for a wider range of learners to pursue offshore-focused credentials.
3. *Flexible delivery formats*

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- *Strategy:* where feasible, adapt select modules for blended or online study to accommodate those balancing work or caregiving responsibilities. Incorporate asynchronous learning materials and digital platforms for theory-based segments (e.g., marine logistics, regulatory frameworks).
- *Outcome:* increases accessibility for a broader demographic, including adult learners and geographically dispersed communities.

B. Collaboration and knowledge-sharing

1. *Industry and public-authority engagement*
   - *Strategy:* establish or expand advisory boards that include maritime employers, energy-sector representatives, and government stakeholders. This collaborative forum ensures that curriculum content remains closely aligned with current offshore practices, safety standards, and regulatory policies.
   - *Outcome:* streamlined adoption of curriculum updates, enhanced internship or placement opportunities, and improved feedback loops for continuous course improvement.
2. *Cross-Institutional Partnerships*
   - *Strategy:* encourage resource sharing among VET/HE providers—particularly for high-cost training equipment (e.g., simulation labs) and specialized instructors. Joint delivery of niche offshore modules can prevent duplication and foster synergy.
   - *Outcome:* more efficient use of limited training resources, yielding richer learning environments and stronger networks among learners and instructors.
3. *International Linkages*
   - *Strategy:* connect with regional or EU-wide ore initiatives, including cross-border training collaborations, exchange programmes, or digital platforms offering specialized offshore content.
   - *Outcome:* access to cutting-edge offshore technology, broader recognition of qualifications, and alignment with best practices from leading offshore wind markets.

By integrating targeted outreach, flexible delivery formats, and collaborative stakeholder involvement, these training enhancements can effectively widen participation, improve course quality, and facilitate ongoing alignment with the evolving offshore renewable energy sector.

2.5.3.2 VET curricula and qualifications proposals

This section introduces ideas for strengthening Cyprus' VET programmes to better support the ORE sector. Building on previous findings (Sections 2.5.1 and 2.5.2), these proposals emphasize curriculum modernization and practical training. They also take into account the European Credit System for Vocational Education and Training (ECVET) to ensure that local qualifications align with industry and EU standards.

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Curriculum modernization

A key recommendation is to include more offshore-focused content in existing VET programmes so that students gain a clear understanding of ORE-specific requirements. Currently, many courses address general wind or maritime topics without covering deeper-water installations, floating foundations, or specialized logistics. By revising relevant syllabi to incorporate these areas, learners can develop the foundational knowledge they need to work effectively in offshore environments.

In addition, some programmes would benefit from short, specialized modules—or "micro-credentials"—that focus on distinct technical or safety skills. These might include GWO-aligned safety procedures, digital monitoring of offshore structures, or basic design principles for floating platforms. Because these modules would be based on ECVET guidelines, learners could accumulate recognized credits for each competency they master. This approach makes qualifications more transparent and easier to transfer between different providers.

To support this update process, a common syllabus template may be adopted. This template, shared by partners helps standardize the learning outcomes, assessment methods, and credit values for each module. By using the same structure across multiple institutions, it becomes simpler for learners to combine modules from different programmes or move between courses without losing progress.

Practical training expansion

While theoretical knowledge is important, industry feedback shows that hands-on experience is essential for working in demanding offshore conditions. One way to address this need is to enhance existing internship or work-placement arrangements by partnering with ORE companies. Such placements would let students observe and participate in real tasks related to offshore turbine maintenance, vessel transfers, or subsea cable operations. This exposure helps them gain critical practical experience and become more attractive to future employers.

In cases where direct access to offshore sites is limited, simulation labs offer an effective alternative. These can range from virtual reality setups that replicate vessel-to-turbine transfer activities to mechanical simulators used for practicing maintenance tasks in a controlled environment. Over time, these labs could serve multiple training providers, sharing costs and expertise while offering students an immersive learning experience.

Finally, a "Skills Accelerator" concept can help institutions respond quickly to emerging industry demands. Under this format, short, intensive workshops run by experienced professionals would focus on advanced or niche topics—such as artificial intelligence for turbine monitoring or specialized anchoring systems for floating wind. By gathering participants from various backgrounds (students, unemployed, or employed professionals), these workshops can encourage diverse discussions, peer learning, and strong networking with industry experts.

Resource and partnership investments

To achieve the proposed curriculum enhancements and expand practical training opportunities, VET providers require appropriate resources and strategic partnerships. One priority is to secure specialized

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equipment—for instance, simulation tools or marine energy training platforms—that can replicate the conditions of working offshore. Since these technologies often involve high upfront costs, a collaborative model could be adopted, allowing multiple institutions to share both expenses and expertise.

In parallel, strengthening partnerships between training providers, industry, and public authorities is vital. Engaging representatives from maritime and energy companies in curriculum planning can help ensure that programme content remains current with technological advances, safety standards, and real-world operational needs. Likewise, closer coordination with national agencies—such as the Human Resource Development Authority (HRDA)—can open doors to relevant funding opportunities or subsidy programmes. Over time, these joint efforts can improve the quality and reach of VET programmes, contributing to a more skilled ORE workforce.

Finally, clear communication channels benefit all parties. Establishing an advisory board or working group that includes educators, industry representatives, local authorities, and even student voices can facilitate ongoing feedback. This approach helps maintain alignment with emerging trends—such as digital twin technology or floating wind design—while ensuring that resource allocation and capacity-building decisions reflect shared priorities.

Monitoring and evaluation

A structured monitoring and evaluation framework is essential for tracking how effectively these proposals translate into tangible improvements. One practical method involves collecting feedback from graduates and employers to gauge satisfaction with new or updated courses, as well as to identify any persistent skill gaps. This feedback could be obtained through questionnaires, interviews, or focus groups, and it should occur regularly—ideally once or twice a year.

Tracking employment outcomes of programme graduates is also a key indicator of success. By monitoring how many learners transition into ORE-related roles, and how quickly, VET providers can measure how well their training aligns with industry demands. In addition, qualitative data—such as how well graduates adapt to offshore environments—can highlight strengths in the curriculum or areas needing further refinement.

Finally, producing an annual “State of ORE Skills” report can help each institution benchmark its progress and share lessons learned. Such a publication might summarize employment rates, employer feedback, and updates on resource development, all of which can guide continuous improvement. By establishing clear metrics and open reporting, Cyprus’ VET system can remain responsive to the offshore sector’s evolving requirements while maintaining transparency and accountability.

ECVET-Based syllabus templates

To ensure that new and updated offshore renewable energy (ORE) courses meet high standards of consistency and transparency, the project partners will draw on the ECVET. This framework helps define clear learning outcomes, estimate appropriate workloads in credit points, and specify rigorous assessment

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methods for each module or unit. By organizing modules in this way, both learners and employers can more easily understand what each credential represents in terms of skills and competencies.

Under an ECVET-based approach, every course or module is detailed through:

- Knowledge, Skills, and Competences (KSC): specific statements clarifying what learners should know, be able to do, and how they should behave by the end of each unit (for example, understanding offshore wind installation, applying GWO safety rules, or performing basic subsea inspections).
- Assessment methods: transparent tools for evaluating whether learners have met these outcomes, such as practical demonstrations, written exams, portfolio submissions, or simulated field exercises that mimic real offshore environments.
- Credit points: a quantification of the time and effort required to complete the learning content. By assigning credits, courses become more transferable, allowing learners to combine modules from different providers or have their existing skills recognized more readily.

This shared methodology also supports alignment across diverse VET institutions. When each partner uses common syllabus templates, students can more easily move between programmes or collect credits for specific competencies, regardless of where they initially enrolled. At the same time, employers gain a clearer picture of what each qualification entails, making it simpler to match new hires to the needs of the offshore sector.

Proposed structure for vet curricula and qualifications

Building on these ECVET guidelines, partners will collaborate to shape a structured outline for each VET qualification or module. The aim is to provide enough detail for effective teaching and assessment while keeping each course adaptable to different learner profiles and delivery formats. Below is an example of how the final structure might look:

1. *Title and level*

   A concise course or module title (e.g., “Offshore Wind Technology I”) plus an indication of its position within a broader qualification (e.g., EQF Level 5 or 6).

2. *Topics and objectives*

   A summary of the main themes, such as floating platform design, vessel-to-turbine transfer methods, or data-driven maintenance. Objectives should clearly connect these themes to the ORE industry, showing learners how the course content applies in practice.

3. *Delivery methods*

   An outline of the teaching format—whether in-person lectures, online seminars, lab-based sessions, or field simulations. If a blended model is used, the proportion of classroom, online, and practical components should be specified.

4. *Target audience*

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A description of which learners the module is intended for: for instance, students in engineering programmes, experienced maritime professionals seeking to branch into ORE, or unemployed individuals looking to retrain. This helps define the technical depth and pace of the course.

5. *Duration and ECVET credits*

An estimate of the overall study hours (including classroom time, self-study, and assessments) and how many credits the module will carry under the ECVET system. This credit allocation should reflect the complexity and workload involved.

6. *Learning outcomes and skills*

A detailed list of competencies that learners are expected to acquire, aligning with industry requirements. For example, they might learn to conduct a safety assessment using GWO guidelines, run diagnostics on a floating turbine, or interpret data from real-time monitoring systems.

7. *Evaluation and assessment*

A brief explanation of how progress is measured—whether through written exams, group projects, individual practical tasks, or presentations on simulated offshore scenarios. Where possible, assessments should mirror real-world ORE tasks, reinforcing students' readiness for the workplace.

8. *Measures to foster inclusion*

A plan for addressing different learner needs, whether through flexible scheduling, adapted study materials, targeted scholarships, or additional support for those with limited prior STEM background. Taking such measures can widen participation and expand the pool of skilled workers in the ORE sector.

By adopting this structure, each VET programme will be easier to compare, update, and share among institutions. Partners will soon compile these outlines into a collective resource, ensuring that future modules not only satisfy ECVET requirements but also reflect the evolving demands of the offshore renewable energy market. Over time, feedback from pilot runs and employer surveys will help refine course content, ensuring that Cyprus' VET ecosystem remains both dynamic and responsive to industry needs.

2.5.3.3 National CoVE workshop

The primary objective of the workshop was to present the draft roadmap for VET in the ORE sector in Cyprus. Hosted by the national CoVE, the session aimed to initiate a structured dialogue with local stakeholders to validate the roadmap, discuss actionable short- and long-term priorities, and collaboratively explore implementation strategies aligned with industry needs. The event took place at the University of Cyprus gathering 20 participants from vocational and higher education institutions, industry, and public sector stakeholders. The presentation, structured around the main findings of D2.1 report "Needs and Trends in the Southern European offshore wind energy sector", emphasized the urgent need for Cyprus to adapt its training ecosystem to match the emerging energy landscape. The roadmap proposed four strategic priorities:

- **Curriculum modernization**: Integration of offshore-specific topics such as floating turbines, subsea systems, logistics, and digital technologies (e.g., digital twins, AI, smart grids). While Cyprus

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currently lacks offshore installations, the most realistic pathway, as derived from previous co-design sessions and reaffirmed in the workshop, is to initially emphasize onshore wind energy training. This would serve as a technical foundation from which future offshore competencies can be developed.

- **Practical training**: The roadmap acknowledged a significant gap in field-based and simulation-supported education. VR and AR were widely accepted as valuable tools to complement practical components, particularly in a context where real offshore environments are not available locally. Furthermore, the roadmap proposed facilitating onshore wind farm visits for VET students.
- **Safety and accreditation:** Adoption of GWO safety standards was proposed as a future requirement for all training programmes. However, further research is needed to standardize and incorporate GWO-aligned health and safety measures within the joint curriculum structure.
- **Cross-border collaboration:** Engagement with EU partners through mobility schemes, simulator sharing, and curriculum exchange were also proposed to build capacity in the absence of local offshore facilities.

The workshop featured two thematic discussions:

1. **Thematic A – Immediate implementation actions**: This session focused on what can be realistically accomplished within the next 12 months. Priority options discussed included:
    - Updating existing technical courses with offshore content (adapted initially for onshore systems).
    - Developing a structured course format with three core elements: a theoretical foundation, a software-based project for ORE design and management (including technoeconomic analysis), and alignment with international certification pathways.
2. **Thematic B – Partnership and stakeholder engagement**: The lack of existing offshore renewable energy (ORE) activity in Cyprus highlighted the difficulty of engaging companies in collaborative efforts. The group emphasized the need for financial incentives to attract industry participation, especially in a context where there is little tangible sector activity to showcase. Without demonstrable market presence, companies may be reluctant to invest resources in training initiatives. Moreover, participants pointed out that Cyprus currently faces a significant energy storage challenge, as the grid often produces more renewable energy than it can absorb, leading to frequent curtailments. This reality increases the urgency for energy storage solutions over further energy conversion technologies like RES, making stakeholder engagement in relevant training and innovation even more critical. Proposed strategies included government-industry initiatives to enhance recognition of industry certifications, the formation of advisory boards, and the joint planning of training programmes aligned with actual market and grid needs.

Stakeholders offered thoughtful validation of the roadmap while also emphasizing critical limitations and opportunities:

- **Complementary focus on onshore wind**: Participants acknowledged that without existing offshore installations, Cyprus must capitalize on the onshore segment for immediate training development, especially in technical areas and safety procedures.

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- **GWO standardization as a future target**: The GWO framework was well-received, but stakeholders cautioned that additional study is needed to ensure alignment with national training accreditation mechanisms.
- **VR/AR as an enabler**: VR/AR-based simulations were identified as essential tools in bridging the gap between theory and real-world application. These tools could simulate offshore conditions and thus serve as viable substitutes in early-stage training.
- **Incentivizing stakeholder collaboration**: Financial support mechanisms were emphasized as a prerequisite to industry engagement. In the absence of current ORE economic activity in Cyprus, incentives could stimulate partnerships and raise awareness of the sector's potential.
- **Government-industry alignment**: The group highlighted the importance of establishing clear pathways for industry certification recognition. Such pathways would not only add credibility to the training but also signal a commitment to international standards.
- **Course structure**: A consensus emerged around a feasible training format: a solid theoretical component, followed by a guided project utilizing industry-grade software for ORE system design, allowing trainees to explore objectives, system layout, and technoeconomic viability.

The workshop concluded with a shared agreement that the roadmap is a strong foundation for modernizing VET in the ORE sector. Key outcomes included validating a Cyprus-focused approach centered on onshore systems, agreeing to explore GWO certification pathways, and recommending pilot courses with project-based and simulation elements. Participants also emphasized the need to define stakeholder roles, supported follow-up actions to establish partnerships, and endorsed onshore site visits and modular training as practical early steps toward future offshore readiness.

2.5.4 Opportunities for cross-border collaboration

2.5.4.1 Potential areas of collaboration

A. Joint curriculum development

One of the most promising avenues for collaboration involves creating and harmonizing curricula. By working together, VET institutions can ensure that newly developed or updated programmes reflect a shared set of offshore wind competencies—ranging from floating platform design to digital monitoring. Co-developed modules may be recognized across borders through the ECVET, facilitating learner mobility and enabling providers to share best practices.

B. Resource and facility sharing

Many of the practical components essential for offshore wind training—such as simulation labs or specialized workshops—carry significant setup costs. Institutions in different regions can cooperate by exchanging access rights or co-investing in costly equipment. This approach broadens each partner's capacity for hands-on instruction without overextending individual budgets. It also encourages regular communication and coordination among VET providers, fostering deeper, long-term ties.

C. Cross-border internships and work placements

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Structured international internships or apprenticeships can expose learners to varied operating conditions and practices in ORE, from vessel transfers to environmental monitoring. Agreements among participating institutions and regional energy companies would allow students to rotate among different sites, gaining diverse experiences that ultimately bolster their employability. Coordinating these placements ensures that each host environment aligns with the educational goals of the respective training programme, maximizing the benefits for both trainees and employers.

2.5.4.2 Practical recommendations and next steps

To capitalize on these collaboration opportunities, stakeholders are encouraged to adopt a phased and strategic approach:

1. **Establish a cross-border collaboration network**

   Form a dedicated working group or committee that includes VET providers, industry representatives, and government agencies from multiple regions. This entity would oversee the planning and implementation of joint initiatives, including joint curricula, shared training facilities, and exchange programmes.

2. **Standardize course recognition and credit transfer**

   Align qualifications with ECVET guidelines so that learners can seamlessly accumulate credits from courses taken in different countries. Drafting formal agreements on equivalences and recognition standards can help reduce administrative barriers and promote mobility.

3. **Pilot joint activities**

   Start with smaller-scale pilot projects or short workshops—such as a cross-border "Skills Accelerator" focusing on offshore wind safety or digital maintenance. Gathering initial feedback from participants and host organizations can guide refinements before expanding these collaborations into larger, more permanent programmes.

4. **Secure sustainable funding and resources**

   Explore EU-level funding sources, national support schemes, or industry co-financing to underwrite the costs of shared equipment, internships, or training facility upgrades. Transparent communication on resource needs and distribution ensures that all parties benefit equitably.

By methodically following these steps, VET institutions across Southern Europe can strengthen their collective capacity to develop the specialized workforce required for a thriving offshore renewable energy sector. With ongoing collaboration, the region can enhance its competitiveness, foster innovation, and support the long-term sustainability of offshore projects in the Mediterranean and beyond.

2.5.4.3 Expected impact and benefits

By establishing robust cross-border collaborations, Cyprus and its partners in Southern Europe can develop a more resilient, competitive, and future-ready workforce for the offshore renewable energy (ORE) sector. Jointly developed curricula will help standardize competencies across regions, making qualifications easier

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to recognize and supporting student mobility. Shared resources, such as simulation labs and specialized equipment, can enhance the quality of practical training without overburdening any single institution.

For learners, these collaborations open doors to diverse experiences—ranging from international internships to advanced technical workshops—that greatly improve their employability. Meanwhile, local and regional employers benefit from a larger pool of graduates trained to consistent standards and prepared for offshore-specific challenges. Over time, this collective effort can stimulate innovation, attract further investment in ORE projects, and promote sustainable economic growth in coastal communities.

In essence, cross-border collaboration acts as a multiplier for each partner's strengths, creating a shared platform for exchanging knowledge, refining training methods, and jointly tackling emerging trends in offshore wind and other marine renewables. Through ongoing dialogue, pilot programmes, and coordinated resource allocation, the SHOREWINNER project and its network of stakeholders can ensure that vocational education across Southern Europe remains both responsive and impactful in an increasingly dynamic offshore energy landscape.

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3 Global Roadmap: Synthesis of National Roadmaps

3.1 Strategies for Enhancing VET Offerings

The collective insights from the national CoVE roadmaps reveal a clear consensus on the need to significantly enhance VET provision to meet the growing demands of the ORE sector. While each country faces unique contextual factors, a consolidated set of strategic priorities emerges, focusing on curriculum modernization, pedagogical innovation, increased industry linkages, and improved accessibility and international collaboration. The CoVEs collectively propose a move towards dedicated ORE-specific modules and qualifications (Figure 98).

Integration of core ORE topics

Curricula must be updated or newly developed to include fundamental ORE concepts such as offshore wind farm design (fixed and floating), marine engineering principles, turbine technologies, subsea cabling, mooring systems, installation procedures, and operation and maintenance (O&M) specific to the offshore environment.

Emphasis on safety and regulatory compliance

A critical component is the systematic integration of internationally recognized safety standards, particularly GWO (Global Wind Organization) protocols, covering aspects like sea survival, working at heights, first aid, and emergency response in offshore settings. Furthermore, understanding the specific environmental regulations and permitting processes pertinent to ORE is essential.

Incorporation of digital and emerging technologies

The rapid digitalization of the ORE sector necessitates the inclusion of training in digital skills such as data analytics, IoT applications, AI in predictive maintenance, digital twin technology, and cybersecurity. Proficiency in relevant software for design, simulation, and project management is also key.

Development of Modular and Flexible Learning Pathways

To cater to diverse learner needs, including upskilling and reskilling of the existing workforce, the development of modular training programmes and micro-credentials is a widely supported approach. This allows for stackable qualifications and more flexible learning journeys.

Figure 98. Unified CoVE proposals in modernization and specialization of VET curricula

Complementing curriculum content, pedagogical approaches require significant enhancement to bridge the gap between theoretical knowledge and practical application. The CoVEs advocate for a shift towards more experiential and work-based learning methodologies (Figure 99).

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Expansion of practical training

There is a strong call to increase hands-on training opportunities. This includes more laboratory work, workshops, and, crucially, access to simulation technologies (e.g., VR/AR for turbine maintenance, vessel transfer, or emergency scenarios) to replicate the challenging offshore environment where direct site access may be limited.

Strengthening work-based learning

Increasing the availability and quality of internships, apprenticeships, and structured work placements within ORE companies is paramount. This provides learners with invaluable real-world experience and facilitates a smoother transition into employment. The Spanish CoVE, for instance, notes the shift towards mandatory in-company training phases with the new VET law.

Industry involvement in delivery

Encouraging industry professionals to participate in VET delivery through guest lectures, co-teaching, and mentorship programmes can enrich the learning experience and provide students with current industry perspectives. ndustry professionals can also play a valuable role in student assessment, particularly in evaluating practical projects or capstone work, providing authentic feedback aligned with workplace expectations.

Figure 99. Unified CoVE proposals for enhancement of pedagogical approaches

A cornerstone of an effective VET system is robust and systemic collaboration between VET providers, industry stakeholders, and regulatory bodies. The roadmaps emphasize moving beyond ad hoc interactions to more structured partnerships (Figure 100).

Joint curriculum development and review

Establishing formal mechanisms for industry input into the design, development, and regular review of VET curricula ensures alignment with current and future labor market needs. This includes the formation of advisory boards or sectoral skills councils with strong industry representation.

Facilitating teacher and trainer development

Continuous professional development for VET educators and trainers is crucial to keep their knowledge and skills up-to-date with technological advancements and industry practices in the ORE sector. This can involve industry placements for teachers, specialized training programmes, and knowledge-sharing platforms.

Shared resources and infrastructure

Collaboration can extend to the sharing of expensive training equipment, simulation facilities, and even specialized personnel, particularly relevant for smaller VET providers or in nascent ORE markets.

Figure 100. Unified CoVE proposals on collaboration between different bodies

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Furthermore, a crucial strategic focus involves guaranteeing inclusion and accessibility while enhancing the appeal of VET careers within the ORE sector. This necessitates targeted outreach and awareness campaigns to promote ORE careers among diverse demographics, specifically addressing gender disparities by encouraging women in technical roles and engaging younger individuals and those in regions with substantial ORE prospects. Moreover, improving the public perception of VET pathways, as emphasized by various CoVEs, is essential. To overcome economic obstacles, providing financial and logistical support for learners through scholarships, grants, or subsidized travel and accommodation can broaden participation, particularly for those from disadvantaged backgrounds or remote areas. The development of transparent career pathways and the recognition of qualifications are also vital, ensuring that VET qualifications are clearly defined, aligned with national and EQF, and acknowledged by employers, thereby facilitating learner mobility and career advancement.

Finally, capitalizing on cross-border collaboration through initiatives such as the SHOREWINNER project serves as a significant driver for VET improvement. This includes the sharing of best practices in successful VET models, teaching methodologies, and curriculum innovations across nations, the joint development of common training standards, learning materials, and assessment tools to ensure quality and comparability, and the facilitation of student and teacher exchanges to broaden perspectives, enhance skills, and cultivate a European ORE VET community.

3.2 Framework for VET Curricula and Qualifications

The transition to a robust ORE sector in Southern Europe demands a highly skilled workforce. This consolidated framework outlines a path for developing and modernizing VET to meet this critical need.

Our approach is fundamentally industry centric. VET programmes will be demand-driven, co-designed with ORE employers to ensure graduates possess job-ready skills. This necessitates a strong emphasis on practical application and immersive work-based learning, moving beyond theory to include significant internships, apprenticeships, and dual training.

Recognizing diverse career paths, the framework promotes learner-focused flexibility through modularity. Micro-credentials and stackable qualifications will support lifelong learning for both new entrants and existing professionals. All programmes will adhere to high-quality standards and be subject to periodic peer reviews and independent audits. A proposed regional Quality Assurance Taskforce will oversee alignment with national and European frameworks (EQF, ECVET) and ensure integration of internationally recognized certifications such as GWO.

An inclusive and accessible VET system is paramount. We will actively work to remove barriers - including geographic isolation, economic disadvantage, and gender-based underrepresentation - by offering scholarships, launching mobile training units in remote areas, and conducting targeted outreach campaigns to underrepresented communities in order to encourage participation from all societal groups. Finally, in this rapidly evolving field, curricula will be "living programmes," continuously updated to reflect technological and industry advancements.

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A consolidated approach to the integration of essential knowledge and competencies in VET is presented below. These are the main and most necessary components that span through the combined country specific preferences. The final adoption and implementation of each structure depends on many social and techno-economic factors, while the horizontal implementation across all Southern European partner countries remains a critical but understandable challenge.

1. **ORE technical foundations:**
   - Principles of offshore wind, wave, and tidal energy.
   - Offshore structures (fixed/floating foundations, mooring, subsea cables).
   - Offshore wind turbine technology, operation, and maintenance (O&M).
   - Marine logistics, port operations, and ORE supply chain.
   - Environmental regulations and marine spatial planning.
2. **Digital skills for ORE:** data analytics, AI in O&M, IoT, digital twins, simulation, and cybersecurity.
3. **Health, safety, and environment (HSE):** GWO-aligned safety training (sea survival, working at heights, first aid), risk assessment, and emergency response specific to offshore environments.
4. **Transversal skills:** critical thinking, problem-solving, communication, teamwork, adaptability, project management basics, and English proficiency.
5. **Emerging areas:** predictive maintenance, robotics, green hydrogen integration, and decommissioning.

The delivery of content will be facilitated through innovative pedagogical approaches. Blended learning models will offer flexibility, while extensive work-based learning ensures practical relevance. Where direct offshore access is challenging, simulation and immersive technologies like VR and AR (if available) will provide realistic training environments. Hands-on laboratory work, coupled with insights from industry expert involvement through guest lectures and site visits, will further enrich the learning experience.

Assessment will be equally multifaceted, moving beyond traditional exams to include practical demonstrations, project-based evaluations, and portfolio development, with valuable feedback incorporated from employers involved in work-based learning. Qualifications will be built upon a modular structure, allowing for the accumulation of micro-credentials into comprehensive, recognized certifications. This approach will support the development of new, dedicated VET specialization courses at various EQF levels, as well as the integration of elective ORE modules into existing VET programmes.

3.3 Framework for Cross-Border Collaboration and Knowledge Exchange

The expansion of the ORE sector across Southern Europe demands a unified, high-quality approach to VET. This framework outlines strategic collaborations among the partners to enhance VET quality, relevance, and international recognition, fostering a skilled regional workforce prepared for the sector's dynamic needs. To

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achieve these ambitious goals and ensure a cohesive approach to VET development within the ORE sector, the SHOREWINNER CoVEs will focus on the following key collaborative strategies:

- Joint curriculum development & harmonization
    - CoVEs will collaboratively define core ORE competencies and develop shared or mutually recognized VET modules and qualifications.
    - This leverages diverse national strengths (e.g., industrial capacity, training expertise, research innovation) and ensures alignment with frameworks like ECVET for learner mobility.
- Resource & facility sharing:
    - Establish agreements for co-investment or shared access to high-cost ORE training infrastructure, such as simulation labs and specialized safety facilities.
    - A SHOREWINNER directory of available resources will promote wider accessibility and efficient use of assets.
- Transnational mobility for learners & trainers
    - Implement structured international internships, apprenticeships, and exchange programmes for students to gain diverse operational experience.
    - Facilitate educator exchanges and joint workshops for trainers to share pedagogical best practices and update technical knowledge.
- Structured collaborative networks
    - Form thematic working groups with representatives from CoVEs, VET institutions, industry, and ministries to coordinate content co-creation and ensure ongoing curriculum relevance.
    - Initiate pilot projects (e.g., virtual "Skills Accelerators," cross-national internship programmes) to test and refine collaborative models before wider implementation.

Through shared expertise, infrastructure, and mobility, the SHOREWINNER will establish a high-impact Southern European ORE VET ecosystem — one that delivers consistent training quality, increases employability, and enables full credit portability. Over time, this partnership will serve as the foundation for a regional “ORE Qualification Passport,” supporting skilled worker mobility across national borders.

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4 ANNEXES

4.1 ANNEX I: CoVE Italy

Table 23. Mapping of trends and needs analysis (CoVE IT)

#	Organization	Course Title	Course Highlights	ORE Sector Specific or Cross-Sector	Soft skills included	Target age / target groups	Delivery method	Internship offer	Type and level of certification	Duration
1	**ELIS**	Talent Academy	Offshore wind, renewable energy, maintenance, soft skills	Cross-Sector	Y (communication, teamwork, problem-solving, adaptability)	18-35	Hybrid	Y	Technical Wind Power Systems Course	8 weeks (240 hours)
2	**ELIS**	Technical Wind Power Systems Course	Wind systems, maintenance, workplace safety	Sector Specific	N	18+	In-person	Y	• GWO First Aid • GWO Manual Handling • GWO Working at Heights • GWO Fire Awareness	200 hours
3	**Dinamiche Verticali**	Certified GWO Training Compulsory Safety Training	Safety, height operations, first aid	Cross-Sector	N	18+, industry professionals	In-person	N	GWO Certificate Basic Safety Training (FA; WAH; MH; FAW) – 2 years validity	32 hours
4	**Associazione Nazionale Energia del Vento (ANEV)**	Seminars – among them: Offshore Wind Energy Introduction and Definition of Key	Wind power, safety, height operations	Sector Specific	Y (communication, leadership)	18-45	Hybrid	Y	None	8 hours

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		Technological Concepts Recent Developments under the FER2 Decree								
5	**OTI Group**	Working at Heights + Manual Handling	Height operations, manual load handling	Cross-Sector	No	18+	In-person	N	NA	NA
6	**ASL**	BTT (Basic Technical Training Standard)	Basic wind tech skills, safety, maintenance	Sector Specific	No	18+, preferably under 50	In-person	N	BTT Certification (GWO standard)	36 hours
7	**Global Wind Organization**	Crane and Hoist Standard	Crane and hoist operation, safety	Cross-Sector	No	18+	Hybrid	N	GWO certification	NA
8	**Global Wind Organization**	Wind Limited Access Standard	Restricted wind turbine access, safety	Sector Specific	No	18+	Hybrid	N	GWO certification	NA
9	**BSI**	GWO Certification	GWO certification, workplace safety, operations	Cross-Sector	No	18+	In-person	N	GWO certification	NA
10	**Bureau Veritas Italia (certification released by Aliseo Group)**	GWO Training Standard	Safety, maintenance, operations	Cross-Sector	No	18+	In-person	N	GWO certification	NA
11	**Form UP**	GWO - Sea Survival	Offshore survival, safety in offshore environments	Sector Specific	No	18+, under 50	In-person	N	GWO certification	NA

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Table 24. Training courses launched in 2025 (CoVE IT)

#	Organization	Course Title	Course Highlights	ORE Sector Specific or Cross-Sector	Soft skills included	Target age / target groups /entry requirements	Delivery method	Internship offer	Type and level of certification	Duration
1	**ELIS**	Talent Academy Eolico Offshore	• Offshore wind, renewable energy, maintenance, soft skills • Participation is free of charge • Employment contract at the stastart of the training	Cross-Sector	Y	• Age 22 - 29 • Bachelor's degree or High School Diploma in the energy sector • B2 level English proficiency • Willingness to relocate	In person	Y	Certificate of attendance	240 hours
2	**ANEV**	Safety in the Wind Farm	Wind power, safety, height operation	Sector Specific	N	18+, industry professionals	In person	N	The course may grant professional training credits	8 hours
3	**ELIS**	Technical Wind Power Systems Course	• Wind systems • Maintenance • Safety at the workplace	Sector Specific	Y (Organizational and interpersonal skills)	30+ High School Diploma Physical fitness for working at heights and no fear of heights	Hybrid	N	• GWO First Aid • GWO Manual Handling • GWO Working at Heights • GWO Fire Awareness	200 hours
4	**ENEA e-Learn**	Eolic Energy	Basic introductory course on renewable energy and wind energy	Cross-Sector	N	Not specified For technicians and decision makers	E-learning	N	Certificate of attendance	60 hours
5	**University of Cagliari, Royal**	Programme on Offshore Wind Energy	• Offshore wind projects	Sector specific	Y Organizational ability, planning,	Students enrolled in degree programmes	In person and Project	N	3 academic credits	35 hours

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	Danish Embassy, BIP Group and Divento Consortium		• Challenges and development opportunities for the Italian supply chain • The regulatory and market context in Italy		leadership, teamwork, communication skills, multidisciplinary approach	in engineering and economics	work, Hybrid			
6	**360 Life Formazione**	Wind Energy in Europe and Italy	• Renewable Energy • Decarbonization Strategy • Offshore wind Energy	Sector specific	N	Professionals in the energy sector, engineers, technicians, and planners. Suitable also for students and researchers	e-learning Multimedia courseware	N	Certificate for the Validation and Transparency of Competences (Ref.: Framework DigComp 2.1)	2 hours
7	**CFO – Centro Formazione Offshore**	Offshore training programme 5 courses on different NDT methods and levels	Non-Destructive Testing (NDT), Underwater Applications	Cross-Sector	N	No prerequisites	In person	N	Certificate of attendance – Access to the exam for Non-Destructive Testing (NDT) Technician Certification	24 to 40 hours

4.2 ANNEX II: CoVE Cyprus

Table 25. Mapping of ORE related courses (CoVE CY)

No.	Institution/Provider	Course Title	Duration	Target audience	Course Content	Learning outcomes	Assessment methods	Accreditation

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1	Cyprus Marine and Maritime Institute	Applications of Marine Robotics in Transport	14 hours	Professionals in the maritime transport sector, individuals interested in marine robotics and transport applications	Introduction to marine robotics in transport, advanced technologies and automation, environmental sustainability and compliance, future trends and emerging challenges	Knowledge of marine robotics principles and applications in transport, skills in data analysis, technology selection, and safety protocols, attitudes promoting innovation, efficiency, safety, and environmental responsibility	Attendance (minimum 75%) and completion of the programme	A certificate of completion is issued; the programme is not directly linked to formal professional qualification standards.
2	Cyprus Marine and Maritime Institute	Block Code Learning and Programmeming Languages	25 hours	Students of various levels, educators, individuals interested in oceanography and coding	Ocean literacy and coding introduction, basic principles of block coding, programmeming languages for marine robotics, advanced coding for data collection and analysis, integration of coding in ocean education	Knowledge of ocean importance, coding significance, marine robotics integration, and block coding principles, skills in block coding, collaborative coding, programmeming marine robots, and documenting coding achievements, attitudes promoting coding in ocean education and marine robotics, and comparing traditional methods with coding-based robotics programmes	Attendance (minimum 75%) and completion of the programme	A certificate of completion is issued; the programme is not directly linked to formal professional qualification standards.

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3	University of Cyprus, Department of Civil and Environmental Engineering	Coastal Zone Engineering and Management (CEE 587)	3 hours/week (1 semester)	Postgraduate students	Physical phenomena and mechanisms of coastal zone evolution, engineering methodologies for coastline protection and management, impact of coastal zone deterioration, theory and application of waves and nearshore hydrodynamics, design principles for coast protection schemes, integrated coastal zone management strategies	Describe processes of shoreline erosion, differentiate engineering options for coastal defense, predict environmental impact of shore protection, implement analytical methods for morphodynamic evolution, assess coastal zone management schemes, evaluate climate and anthropogenic impacts on coastal environment	Final exam, project and presentation	
4	University of Cyprus, Department of Civil and Environmental Engineering	Coastal Engineering (CEE 477)	3 hours/week (1 semester)	Bachelor students (1st Cycle)	Generation and transformation of waves and currents in coastal zones, interaction of waves and currents with coastal structures, dynamics of coastal environment, design and environmental impact of coastal structures	Describe hydrodynamic processes in coastal zones, implement analytical methods for wave parameter calculation, describe wave-structure interaction and calculate hydrodynamic loads, describe role and construction of coastal structures, calculate dimensions and design layouts of coastal structures, outline coastal zone dynamics and impacts of interventions	Final exams and homework	

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5	Cyprus Marine and Maritime Institute	Unmanned Vessels, Autonomous Research and Rescue Vessels in Shipping	14 hours	Maritime professionals, individuals interested in autonomous shipping and rescue operations	Introduction to unmanned vessels and autonomous shipping, navigation and operations, environmental and sustainability issues, future trends and professional development	Knowledge of unmanned vessel concepts, autonomous navigation principles, safety protocols, and environmental responsibility, skills in data-driven navigation, technology selection, and emergency response, attitudes promoting innovation, safety, efficiency, and ethical considerations in autonomous shipping	Attendance (minimum 75%) and completion of the programme	A certificate of completion is issued; the programme is not directly linked to formal professional qualification standards.
6	Cyprus Marine and Maritime Institute	Capacity Building and Empowerment of Coastal Communities for Sustainable Coastal Development	14 hours	Coastal community members, stakeholders involved in coastal development, individuals interested in sustainable development	Understanding coastal ecosystems and challenges, capacity building for sustainable practices, community empowerment and decision-making, designing sustainable coastal development	Knowledge of coastal ecosystem importance, environmental challenges, community role in management, and disaster preparedness, skills in developing community participation strategies, adaptive strategies for climate change, and coastal development plans, attitudes promoting community engagement, education, critical assessment, and balanced coastal development	Attendance (minimum 75%) and completion of the programme	A certificate of completion is issued; the programme is not directly linked to formal professional qualification standards.

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7	Cyprus Marine and Maritime Institute	Remote Monitoring and Observation	14 hours	Maritime professionals, individuals interested in digital transformation in shipping	Introduction to remote monitoring and digital transformation in maritime, tools for remote observation and data interpretation, operational integration and safety aspects, implementation strategies and future trends	Knowledge of digital transformation in shipping, components of remote monitoring systems, data interpretation importance, and safety measures, skills in applying remote monitoring, data analysis, and emergency response protocols, attitudes critically analyzing digital transformation benefits, emphasizing continuous training, promoting environmentally friendly approaches, and engaging in collaborative discussions	Attendance (minimum 75%) and completion of the programme	A certificate of completion is issued; the programme is not directly linked to formal professional qualification standards.
8	University of Cyprus, Department of Civil and Environmental Engineering	Construction Engineering and Management (CEE 511)	3 hours/week (1 semester)	Postgraduate students	Construction management techniques, project scheduling, cost estimating, engineering economy, cost control, resource management, specialized software, conflict resolution, health and safety, construction law	Understand contracts and project delivery methods, develop quantity takeoffs and bids, analyze financial alternatives, develop project networks and CPM calculations, develop resource-loaded schedules, analyze project progress, perform 'what-if' analysis, develop safety plans,	Term project, final exam & presentation, midterm exam and homework assignments	

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						prepare project execution plan		
9	University of Cyprus, Department of Civil and Environmental Engineering	Computational Hydraulics (CEE 571)	3 hours/week (1 semester)	Postgraduate students	Mathematical models of pollution, surface water bodies, conservation of mass, reaction kinetics, biological processes	Apply mathematics, science, and engineering knowledge, identify and solve engineering problems, communicate effectively, use modern engineering tools	Homework, Mid-term Exam, Final Exam	

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10	University of Cyprus, Department of Civil and Environmental Engineering	Marine and Wind Energy (CEE 596)	3 hours/week (1 semester)	Postgraduate students	Marine renewable energy sources, principles of energy conversion, design fundamentals of marine and wind energy systems, environmental and financial constraints	Identify renewable energy sources, identify technologies for exploitation, describe energy conversion mechanisms, conduct preliminary design calculations, describe environmental impact, communicate complex information	Final exam, project and presentation	
11	University of Cyprus, Department of Civil and Environmental Engineering	Geomechanics (CEE 450)	3 hours/week lectures, 1 hour/week recitation (1 semester)	Bachelor students (4th year)	Geotechnical field investigation, mechanical behavior of soils, bearing capacity of foundation, finite element method, soil improvement, slope stabilization, deep excavations, expansive clays, tunnel support	Prescribe geotechnical investigation, assess field and lab data, determine bearing capacity improvement, analyze problems using FE software, design reinforcement measures, perform stability calculations, design landslide stabilization, consider clay expansion effects, determine tunnel support	Final exam, midterm exam, homework, term project	

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12	University of Cyprus, Department of Civil and Environmental Engineering	Coastal and Offshore Geotechnical Engineering (CEE 557)	3 hours/week (1 semester)	Postgraduate students	Offshore geotechnical engineering, offshore environment, site investigation, piled foundations, shallow foundations, anchoring systems, pipeline geotechnics, coastal projects	Familiar with geotechnical technologies for offshore engineering projects (drilling rigs, pipelines, renewable energy, coastal civil engineering)	homework, project, mid-exam, final exam	
13	ΑνΑΔ, Cyprus Marine and Maritime Institute	Diving Safety, Dive Planning with Risk Assessment	14 hours	Divers, maritime professionals, individuals involved in underwater activities	Understanding diving safety, underwater hazards, dive planning components, risk assessment in dive planning, environmental factors in dive planning, diving equipment and maintenance, legal regulations and certifications	Knowledge of diving safety importance, underwater hazards, dive plan elements, risk assessment process, and legal compliance, skills in emergency response, risk assessment execution, dive planning for variable conditions, emergency response selection, and documenting dive plans, attitudes emphasizing protocol adherence, risk assessment importance, responsible diving behavior, and collaborative emergency simulation	Attendance (minimum 75%) and completion of the programme	

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14	Cyprus Marine and Maritime Institute	Educational Marine Robotics Contribution to Ocean Literacy	25 hours	Educators, individuals interested in ocean literacy and marine robotics education	Introduction to ocean literacy and marine robotics, technology and tools in educational marine robotics, data collection and analysis with marine robotics, ocean literacy through marine robotics education	Knowledge of ocean importance, types of marine robots, benefits of marine robotics in ocean literacy, and principles of underwater exploration, skills in data analysis, interpretation, sensor selection, developing educational programmes with marine robotics, and virtual dives, attitudes promoting ocean literacy, marine robotics as a tool, and comparing marine robotics to traditional methods	Attendance (minimum 75%) and completion of the programme	A certificate of completion is issued; the programme is not directly linked to formal professional qualification standards.
15	Cyprus Marine and Maritime Institute	Social Innovation and Nature-Based Solutions for Sustainable Coastal Development	14 hours	Coastal community members, stakeholders in coastal development, individuals interested in social innovation and nature-based solutions	Introduction to social innovation and nature-based solutions, coastal challenges, nature-based solutions for resilience, collaborative approaches and community engagement, nature-based solutions toolkit and adaptation strategies, economic co-benefits and sustainable livelihoods	Knowledge of social innovation, coastal challenges, nature-based solutions, and community engagement, skills in developing community engagement strategies, collaborative exercises, demonstrating nature-based solutions, selecting climate adaptation strategies, and documenting economic co-benefits, attitudes emphasizing	Attendance (minimum 75%) and completion of the programme	A certificate of completion is issued; the programme is not directly linked to formal professional qualification standards.

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						ethical considerations, long-term impact, and collaboration for effective solutions		
16	University of Cyprus, Department of Civil and Environmental Engineering	Marine GEOTECHNICAL ENGINEERING (CES565)	3 hours/week (1 semester)	MSc students (Level 2)	Marine soils and sediments, marine site investigations, soil behavior under cyclic loading, lateral loading of piles, marine slope stability and seabed anchors, foundations for marine and offshore structures	Classify marine soils, describe cyclic soil behavior, apply methods for lateral pile resistance, assess marine slope stability, calculate seabed anchor capacity, compute bearing capacity for marine foundations, develop skills for relating geotechnical applications in marine engineering	Midterm Exams, Final Exam	

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17	University of Cyprus, Department of Civil and Environmental Engineering	Fundamentals of Operations Research (CEE 417)	3 hours/week lectures, 1 hour/week tutorial (1 semester)	Bachelor students (1st Cycle)	Introduction to operations research, linear programmeming, integer programmeming, non-linear programmeming, special problem types, systems optimization, software solutions	Understand terminology, understand OR concepts, identify and solve OR problems, select appropriate methodology, use algorithms and software, analyze solution results, argue for solution selection	Midterm exam, final exam, homework assignments / projects	
18	University of Cyprus, Department of Civil and Environmental Engineering	Design of Steel Structures II (CEE 441)	3 hours/week (1 semester)	Bachelor students (1st Cycle, 4th year)	Structural steel members and systems, load combinations, structural analysis types, design against buckling, design of thin-walled members, design of simple steel buildings, Eurocodes	Understand structural design concepts, apply Eurocodes, calculate action effects, design steel members against buckling, design simple steel buildings	Final exam, Team project	

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19	Frederickk University (Private University)	BSc in Mechanical Engineering (Oil & Gas Engineering specialization)	4 years (8 semesters, 240 ECTS)	High school graduates (science background). *Prerequisite:* Secondary school certificate (≥75% grade)	Upstream & downstream petroleum engineering fundamentals – drilling & reservoir engineering, pipeline systems design, refinery & petrochemical processes	Prepares graduates for hydrocarbon exploration, production and processing roles as engineers with multi-disciplinary oil/gas expertise	Written exams, coursework, lab work, and final-year capstone project (engineering design or research thesis)	BSc degree (Level 6); **Accredited by** Cyprus Agency of Quality Assurance (CYQAA). Recognized by Cyprus Scientific & Technical Chamber (ETEK) for engineer licensure (mech. eng. with oil/gas focus).
20	Frederickk University (Private University)	**MSc in Oil & Gas and Offshore Engineering** (with specializations in *Oil & Gas*, *Offshore*, *Petroleum*)	1.5 years full-time (90 ECTS, 3 semesters) or 3 years part-time	Engineering graduates (BSc in engineering or related field) early-career engineers or professionals seeking specialization in energy/offshore sector	Advanced topics across downstream, midstream, and upstream sectors – e.g. offshore structures design, drilling systems, pipeline and facilities engineering, computational simulations. Three distinct pathways align with industry needs: Oil & Gas (downstream), Offshore (midstream), Petroleum (upstream)	Broad understanding of oil/gas technology and operations; familiarity with EU/Cyprus regulations on oil & gas and offshore industry; ability to analyze regional & global energy challenges critically; technical competence in extraction, processing, storage and power generation; strong awareness of safety and environmental considerations	Exams and assignments in taught modules; research project/thesis (focusing on energy or offshore engineering innovation); practical case studies and possibly lab simulations. Emphasis on research involvement – students engage in faculty research on fossil fuel exploration and	MSc degree (Level 7); **Accredited by** CYQAA. Degree addresses emerging Eastern Med energy industry needs (developed in response to Cyprus EEZ gas discoveries (No separate license; academic qualification only.)

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							offshore construction	
21	Frederickk University (Private University)	**MSc in Marine Engineering and Management** (Interdepartmental: Mechanical Eng. & Maritime Transport)	~18 months full-time (90 ECTS over 3 semesters)	Engineering graduates or maritime professionals (e.g. marine engineers/officers) aiming for leadership roles. *Prerequisite:* BSc in engineering or related discipline (mechanical, marine, naval, etc.)	Integrates marine engineering (ship propulsion, electrical systems, maintenance) with maritime management (shipping business, maritime law, logistics). Core subjects include marine machinery and systems, ship performance & safety, marine electrical equipment, plus commercial management of ships and maritime law. Optional preparation for professional seafaring license is embedded	Graduates gain a hybrid skillset: advanced technical know-how in marine systems and ship operations and managerial competencies for the maritime industry. Programme uniquely allows combining the MSc with the Engineer Officer of the Watch (EOOW) international maritime license, producing engineers ready to manage ship operations safely and efficiently	Module exams and projects; simulation-based practical assignments (engine room simulators, case studies in ship management); research thesis or comprehensive project. Cadets opting for the EOOW license undertake additional hands-on training and sea service as required, completed within the same	MSc degree (Level 7); Accredited by CYQAA. Optionally, graduates earn the Officer in Charge of an Engineering Watch Certificate of Competency (STCW A-III/1) recognized by international maritime authorities. This dual academic–professional qualification is highly valued by shipping companies.

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							18-month period	
22	University of Nicosia (Private University)	**BSc in Oil and Gas Engineering** (School of Sciences & Engineering)	4 years (8 semesters, 240 ECTS)	High school graduates with strong math and science. *Prerequisites:* Secondary school diploma; proficiency in Mathematics, Physics, and English (per general UNIC admission criteria)	Comprehensive petroleum engineering curriculum covering geology & geophysics, drilling engineering, reservoir engineering, production technology, facilities design, petrochemical processes, and health & safety. Early semesters build foundation in chemistry, physics, calculus and intro to oil/gas; later courses delve into upstream and downstream engineering, e.g. well design, fluid mechanics, thermodynamics, and pipeline/transmission engineering	Equips students to become professional engineers in the oil & gas sector, capable of working as operational leaders, technical experts or researchers. Graduates will be adept at solving complex engineering problems, designing systems for hydrocarbon production, and managing projects with an understanding of industry standards and ethical practices. Emphasis on analytical thinking, teamwork,	Continuous assessment through exams, problem sets and lab work (e.g. fluid lab, materials testing); fieldwork or summer internship in industry (optional); final-year engineering design project. Hands-on experience is integrated via lab courses and a **practical**	BSc degree (Level 6); Accredited by CYQAA and recognized internationally. Programme designed in line with global petroleum engineering standards, preparing graduates for roles in refineries, chemical plants, and onshore/offshore production facilities. Eligible

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						and effective technical communication	**training component** to link theory with real-world applications	for ETEK registration (professional engineer status in Cyprus).
23	Cyprus University of Technology (CUT) (Public University)	BSc in Civil Engineering (with Coastal Engineering electives) and BSc in Mechanical Engineering (with Energy/Offshore electives)	4 years (240 ECTS) each	High school graduates; admission via national entrance exams (for public universities).	While CUT does not offer a standalone "Marine/Coastal Engineering" degree, its accredited engineering programmes include relevant modules. For example, Civil Eng. students take CIV_446 Coastal Engineering and Water Resources Management, learning shoreline processes, coastal structure design and erosion control. Mechanical Eng. students may choose Introduction to Offshore Drilling and petroleum engineering topics as electives, covering drilling rigs, oil platforms, etc.	Civil Eng. graduates acquire fundamentals to address coastal infrastructure challenges (ports, breakwaters, coastal zone management) within a broad civil engineering skillset. Mechanical Eng. graduates gain insight into oil & gas operations alongside core mechanical skills, preparing them for roles in energy facilities.	Assessment via course exams, lab practicums and capstone design projects. Civil projects can include coastal structure design; Mechanical final projects may involve energy systems or offshore technology.	BSc degrees (Level 6); Accredited by CYQAA and ETEK. These programmes meet EU engineering education standards. (CUT's faculty includes specialists in offshore and coastal engineering, and students can pursue related MSc research or

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								PhDs in these fields.

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24	UCLan Cyprus – Institute of Professional Studies (IPS)	**Professional Diploma in Oil & Gas** (Energy Engineering Technicians) – *Pathways:* Drilling, Electrical, Mechanical, Welding/Pipeline, Health & Safety	In-person (UCLan Cyprus campus in Larnaca); combination of classroom learning, practical workshops, and field training. Duration: 2 years full-time (split into foundational Year 1 + specialization Year 2)	Aspiring offshore/onshore technicians and trade specialists for the oil & gas industry. Typically school leavers or individuals with vocational backgrounds seeking energy sector skills. Programme is designed to fast-track locals into Eastern Med hydrocarbon jobs. Prerequisites: High school (Science/Technical stream helpful); interview and basic English.	Year 1: Broad engineering fundamentals and industry overview – petroleum geology, drilling technology, welding basics, materials & corrosion, oil & gas upstream/midstream/downstream processes, and HSE practices. Year 2: Intensive hands-on training in chosen stream: e.g., Drilling Tech: rig equipment operation, well control; Electrical: industrial electrical systems, motors and drives; Mechanical: oilfield machinery maintenance; Welding/Pipeline: advanced welding techniques to industry standards; HSE: safety management, environmental protection. Training uses the "Norwegian model" with input from North Sea industry experts. Participants also prepare for international certification exams relevant to their specialization (see outcomes).	Produces job-ready technicians with specialized skills aligned to oil & gas operations. Graduates earn a "Professional Diploma in Oil & Gas" from UCLan IPS. In addition, each pathway yields globally recognized micro-credentials: - Drilling Technician: International Well Control certification (e.g. IWCF/IADC Driller Level); - Electrical Tech: Certification to EN ISO standards and Cyprus Electromechanical Services (EMS) licensing (for industrial electrical work); - Mechanical Tech: EN ISO mechanical maintenance certification; - Welding/Pipeline Tech: EN ISO Welder qualification (pipeline welding to oil/gas codes); - HSE: International HSE certification (NEBOSH or similar, aligned with ISO	Evaluation is heavily competency-based. It includes written exams in technical theory, practical skill assessments (e.g. welding tests to X-ray standards, electrical troubleshooting drills, simulated well-control scenarios), and project work. Industry professionals assess many practical modules. To earn external certificates, students sit for the respective certifying body's examinations (for example, an IWCF well control test). Successful completion of all components results in the diploma and	Accreditation: The programme is approved as a vocational training scheme; UCLan Cyprus IPS is an HRDA-certified training center (KEK), so companies can receive HRDA subsidies for employee participation. The included certifications are accredited by relevant international bodies (IWCF/IADC, ISO, etc.), ensuring worldwide recognition. The Professional Diploma itself is a proprietary qualification aligned with European Qualifications Framework (approx. EQF Level 5). This pioneering programme was developed in

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						standards). Graduates will possess the practical competencies to work on drilling rigs, production platforms, pipelines or processing plants as skilled technicians, and the credentials to meet industry hiring requirements	associated certifications.	Cyprus to capitalize on emerging offshore gas opportunities and is considered a model for energy technical training in the region.

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25	Frederick University	AEEE260 Introduction to Renewable Energy Systems BSc in Electrical Engineering with Specialization on Renewable Energy Sources and Sustainable Energy Systems	3 hours/week lectures, 1 hour/week tutorial (1 semester)	Students	1. Photovoltaics Generation: Introduction to Photovoltaic generation, The silicon p–n junction, Photon absorption at the junction, Solar radiation absorption, Maximising cell efficiency, Solar cell construction, Types and adaptations of photovoltaics, Photovoltaic circuit properties, Applications and systems, Social and environmental aspects. 2. Wind Power: Introduction to wind power, Turbine types and terms, Linear momentum and basic theory, Dynamic matching, Blade element theory, Characteristics of the wind, Power extraction by a turbine, Electricity generation, Mechanical power, Social and environmental considerations. 3. Biomass and Biofuels: Introduction to Biomass and Biofuels, Biofuel classification, Biomass production for energy farming, Direct combustion for heat, Pyrolysis (destructive distillation), Further thermochemical processes, Alcoholic fermentation, Anaerobic digestion for biogas, Wastes and residues, Vegetable oils and biodiesel, Social and environmental aspects	1. Explain the basic concepts behind fuel cells. 2. Define the principles of hydrogen production. 3. Explain wind power technology. 4. Describe biomass and biofuel processes. 5. Explain the principles and fundamentals of photovoltaic generation. 6. Examine the basic concepts of wave power generation. 7. Understand the basic concepts of geothermal energy.	Assignments, Homework, Midterm Written Exams, Project, Quizzes	

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26	Frederick University	AEEE361 Sustainable Energy I BSc in Electrical Engineering with Specialization on Renewable Energy Sources and Sustainable Energy Systems	3 hours/week lectures, 1 hour/week tutorial (1 semester)	Students	1. Conventional versus dispersed (distributed) generation: advantages and disadvantages, multi-generation (cogeneration, micro CHP, waste heat recovery, tri-generation, heat storage, heat networks), steady- state operation of distributed generation systems, full-system energy flows to/from supply and to/from loads, selection of technologies and configurations, system reliability and condition monitoring. 2. Smart grids and micro-grids: introduction, transmission and distribution perspectives, design, voltage and frequency control, distributed generation and active network management, present and future challenges. 3. Low carbon emissions and technologies: introduction, climate mitigation and adaptation, bio-renewables (bio-energy, bio-chemicals, bio-materials), production and conversion of biomass. 4. Energy storage technologies: introduction, battery principles-design and operation, hydrogen transmission and storage infrastructure, solar thermal storage, pumped-hydro storage, energy storage for cooling, energy storage in organic fuels. 5. Electric Vehicles: introduction and definitions, plug-in concept and relation to smart grids, electric vehicles with fuel cells, electric vehicles with batteries (lead acid based, nickel based, sodium based, lithium based, metal-air based), hybrid	1. Differentiate between conventional and distributed electrical energy generation. 2. Relate smart and micro-grids to sustainable energy. 3. Recognize the necessity for low carbon sectors and identify low carbon technologies. 4. Describe the importance of energy storage and identify energy storage technologies 5. Appreciate the role of electric vehicles for sustainable energy. 6. Familiarization with multi-generation methods and their relation to sustainable energy.	Assignments, Homework, Midterm Written Exams, Mini Design Project, Presentation	

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					vehicles, power management techniques of electric vehicles, efficiency of electric vehicles.			

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27	Frederick University	AEEE362 Wind Energy BSc in Electrical Engineering with Specialization on Renewable Energy Sources and Sustainable Energy Systems	3 hours/week lectures, 1 hour/week tutorial (1 semester)	Students	1. Wind energy technologies, history of wind power generation, Betz'Law, structural considerations, basic operation of wind turbine, and wind turbine economics. 2. Wind energy and power, wind kinetic energy, reflection of rotor radius and wind speed on output electrical power, basic energy conversion equations. 3. Wind properties and measurements, statistical distribution of wind speed, power density, Weibull distribution, air density affecting parameters, configurations to measure wind, error estimates and computed quantities. 4. Wind turbine generator components, the rotor system, various configurations and designs of turbines, normal and extreme wind model, wind turbine blade aerodynamics. 5. Wind energy systems, calculation of estimated output power for specific wind turbines at proposed locations, effect of height and direction of wind speed on output power, calculation of capacity factor, optimal turbine rotation speed. 6. Electricity generation, principles of electromagnetism, alternating current and electrical machines, energy conversion from mechanical to electrical using synchronous generators (variable speed permanent magnet and direct drive). 7. Deploying wind turbines in the power grid, dispatch of wind resources in transmission and distribution (effect on reactive power and power factor), power	1. Understand the main principles underlying the field of wind turbine operation and also having a critical awareness of the wider context of wind energy systems. Environmental and technological impact on surroundings is also covered. 2. Apply the concepts of energy contained in wind and potential power generation. Describe the properties of wind, dependence of air density on pressure, humidity and temperature, and dependence of energy on wind density. 3. Create a report with literature and statistical data, and learn how to obtain wind speed measurement values data in order to theoretically implement a utility project.	Midterm Written Exams, Mini Research Project	

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					quality issues (flicker, harmonics), protection for overvoltage and lightning.			

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28	Frederick University	AEEE360 Solar Energy BSc in Electrical Engineering with Specialization on Renewable Energy Sources and Sustainable Energy Systems	3 hours/week lectures, 1 hour/week tutorial (1 semester)	Students	1. Introduction to Solar Energy: solar energy, the greenhouse effect 2. Properties of sunlight: basics of light, photons, solar radiation in space and terrestrial solar radiation, motion of the sun, solar time, elevation angle, declination angle, azimuth angle, position of the sun 3. Solar radiation: solar radiation on a tilted surface, calculation of insolation (solar radiation energy on a surface), measurement and analysis of solar radiation 4. Photovoltaics: the PV phenomenon, semiconductor materials and structure, generation and recombination, diode equations for PV 5. Cells, modules and arrays: solar cell operation, IV characteristics and efficiency of cells, module design, interconnection effects, temperature effects, lifetime of PV modules 6. Solar collectors: description, flat plate, concentrating collectors, temperature effects, effects of dust and shading, performance, efficiency, characteristics, practical considerations 7. Solar thermal power systems: Parabolic troughs, Sterling engines, Solar towers, thermal storage	1. Identify and associate the properties of sunlight and solar geometry. 2. Describe the fundamental operating mechanisms by which PV cells generate electrical energy. 3. Assess and examine solar radiation data and measurements. 4. Describe and classify solar thermal technologies and systems.	Assignment, Homework, Midterm Written Exam, Mini Design Project, Presentation	

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29	Frederick University	AEEE460 Design of Photovoltaic Systems BSc in Electrical Engineering with Specialization on Renewable Energy Sources and Sustainable Energy Systems	1 semester	Students	1. Components associated with grid-connected photovoltaic systems: definitions, principles and applications of grid-connected PV systems, photovoltaic modules, grid inverters, solar cables, protective devices 2. Components associated with off-grid photovoltaic systems: principles and applications of off-grid PV systems, photovoltaic modules, off-grid inverters, batteries, solar charging regulators, protective devices, cabling, generators 3. Photovoltaic module technical characteristics: module design, module mismatch effects, by-pass diodes, temperature effects, ageing, shading, hotspots, I-V characteristics, module efficiency 4. Inverter technical characteristics: conformity with standards, islanding, efficiency, open circuit voltage and short circuit currents, protection, conditions for connection and disconnection from the grid, inverter selection criteria, control of active and reactive power 5. Grid-connected PV system design: small scale PV systems for buildings, large scale PV systems, site survey, environmental conditions, performance ratio, considerations for proper plan, electrical circuit design, feasibility study, installation considerations, inspection requirements 6. Off- Grid PV system design: applications, hybrid PV systems, load characteristics and maximum demand,	1. Identify the components and equipment associated with grid connected and off-grid photovoltaic systems 2. Assess the technical characteristics of grid-connected photovoltaic system components and integrate them for small and large photovoltaic system design 3. Assess the technical characteristics of off-grid photovoltaic system components and integrate them for the design of off-grid photovoltaic systems 4. Design of grid connected photovoltaic systems 5. Design of off-grid and hybrid photovoltaic systems	Assignment, Homework, Midterm Written Exam, Mini Design Project, Presentation	

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					inverter selection criteria, battery types/selection and sizing, types of solar charging regulators and selection, sizing of photovoltaic system in kWp, electrical circuit design, feasibility study, installation considerations, inspection requirements			

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30	Frederick University	AEEE461 Renewable Energy Sources Instrumentation and Measurements BSc in Electrical Engineering with Specialization on Renewable Energy Sources and Sustainable Energy Systems	1 semester	Students	1. Introduction to Instrumentation and Measurements: Principles of Instrumentation and Measurements, Errors in Measurements, Measurement Standards, Uncertainties. 2. Measuring Devices (Sensors and Transducers): Introduction to Sensors and Transducers used in for renewable energy parameter measurements such as solar radiation, wind , Basic Electrical Sensing Elements, Strain Measurement, Introduction to Calibration, Calibration Techniques. 3. Energy Fundamentals and Trainer Familiarization: identify sources of energy. Review definitions of power and work, measurement methods and units. Identify Trainer components. Highlight safety practices. Perform Lockout-Tagout procedure for proper shut down of machinery. 4. Investigation of solar module: Carry out experiments on a solar module and measure its efficiency and long-term performance. Design different configurations of solar collector systems and record their characteristics for variations on temperature, irradiance and angle of incidence. Effect of shading on solar panel operation. 5. Analysis of solar module parameters: determination of cell distribution on a solar panel. Produce experimentally the V-I and P-V curve. Investigate PV array ratings. Setup of an off-grid power system with rechargeable solar cells. Perform and compare series and parallel	1. Describe the basic mechanical and electrical measurement and instrumentation concepts 2. Apply independent judgment in performing instrument measurements, calibration and linearization 3. Analyze the working principles, operation and applications of various sensors and transducers in relation to renewable energy systems 4. Identify the components and operational parameters of a solar module 5. Identify the components and operational parameters of a wind turbine 6. Experiment with basic concepts of power measurements, calculations and transmission practices 7. Use of diagnosing and testing equipment	Assignment, Homework, Midterm Written Exam, Design Project, Quizzes	

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					configurations of circuits for solar cells. 6. Investigation of wind module: calculate and measure the performance of the wind turbine electrical systems. Operate the generator at varying wind force levels. Compare the efficiency for constant-speed and variable-speed configurations.	for performance assessment		

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31	Frederick University	AEEE464 Power Electronics for Renewable Energy Systems BSc in Electrical Engineering with Specialization on Renewable Energy Sources and Sustainable Energy Systems	1 semester	Students	1. Introduction to Power Electronics: Applications of Power Electronics, History of Power Electronics, Power Semiconductor Devices- Power Diodes, Thyristors, Power Transistors. 2. Control Characteristics of Power Devices: Characteristics and Specifications of Switches- Ideal Characteristics, Characteristics of Practical Devices, Switch Specifications, Types of Power Electronic Circuits. 3. Design of Power Electronics Equipment: Square Values of Waveforms, Peripheral Effects, Power Modules, Intelligent Modules. 4. Power Diodes: Diode characteristics and its models, Types of diodes, Series and parallel operation of diodes, Unidirectional device like a diode on RLC circuits, Freewheeling and stored-energy recovery. 5. AC/DC Rectifiers, DC/AC Inverters, AC/AC Changers and DC/DC Choppers: Principles of operation, General characteristics of these devices, Applications of the above circuits.	1. Explain the basic concepts of power electronics. 2. Be familiar with the different existing types of basic power electronic switches such as the power diodes, transistors and thyristors. 3. Understand power electronic control principles for renewable energy systems. 4. Be familiar with the general principles of AC/DC Rectifiers, DC/AC Inverters, AC/AC Changers and DC/DC Choppers. 5. Examine power electronic devices used in renewable energy sources applications. 6. Explain power electronic devices used in photovoltaic and wind applications.	Assignment, Homework, Midterm Written Exam, Design Project, Quizzes	

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32	Frederic University	AEEE466 Sustainable Energy II BSc in Electrical Engineering with Specialization on Renewable Energy Sources and Sustainable Energy Systems	1 semester	Students	Energy saving technologies, Definition of thermal energy efficiency parameters and Minimum demands, Energy data collection, Energy efficiency legislation for buildings, ISBEM software	1. Understand the main principles underlying the field of material Energy performance and also having a critical awareness of the wider context of energy efficient systems. 2. Apply the concepts of energy conservation technologies at distribution level. 3. Evaluate the legal structure surrounding building energy efficiency in Cyprus according to the latest directions of the ministry of commerce industry and tourism, energy service. 4. Evaluate all required parameters for energy efficiency simulations using ISBEM software and calculate the impact of proposed energy saving techniques on the total consumption of a case project.	Midterm Written Exams, Group Research Project	Theoretical Course with the use of ISBEM software. Good practice for energy consumption calculation.

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33	University of Cyprus	MME 516-Technologies of Renewable Energy Department of Mechanical and Manufacturing Engineering	1 semester	Students	The course content includes the energy problem and Renewable Energy Sources (RES) 1. Historical development of energy technologies & current status: energy sources and energy consumption (worldwide, Europe, Cyprus) 2. Towards a sustainable energy future - The development of renewable energy in Europe and the world - RES in Cyprus - Short and long term prospects of RES (world, Europe, Cyprus) 3. Methods of analysis and prolexis: Wind potential - Solar radiation - Biomass - Hydroelectric resources - Sea waves / ocean currents - Wind - Passive & Active solar systems - bioclimatic architecture - Photovoltaics - Small hydroelectric - Geothermal Energy - Hydrogen - fuel Cells	1. Identify different modes of energy conversion and explain the difference between conventional and renewable energy conversion mechanisms, 2. Identify, classify and estimate the potential of different renewable energy resources, 3. Analyse, and report and apply the curves of performance of solar, wind and hydroelectric systems and 4 Design, plan and inspect renewable and hybrid power systems to meet specific power needs	Written exams, Assignment & Presentation	
34	University of Cyprus	ECE 687-Building Integration of Photovoltaic (PV): Towards nearly zero energy buildings (NZEB) Department of Electrical and Computer Engineering	1 semester	Students	Introductory graduate-level course on building integration of photovoltaics (BIPV) in a Nearly Zero Energy Building (NZEB). 1. Available advanced components, technologies, tools, systems, techniques, and theories in modeling a building for achieving NZEB design and incorporating BIPV. 2. Calculation of the size and cost of a system to offset building energy use. 3. Study of smart systems for energy management and grid integration: monitoring consumption, RES generation, and environmental conditions are	1. Have a good understanding of what constitutes BIPV and NZEB and the other relevant concepts 2. Have a good understanding of the different components and types of BIPV systems and the most important parameters necessary for the implementation of such systems (either new or retrofitted)	Written exams, Final Report Assignment & Project	

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					included, as well as case studies of smart meter projects.	3. Use the necessary tools for the incorporation of BIPV in a NZEB context 4. Have a good understanding of the regulations relevant to NZEB 5. Have a good understanding of the relevant standards 6. Use the necessary tools for electrical, thermal and financial analysis 7. Develop a good understanding of the current situation in Cyprus and in Europe on different initiatives and policy implementation 8. Develop a good understanding regarding the offsetting of the net energy in a building through the incorporation of RES and in particular PV in the building stock. 9. Develop a good understanding of smart management, energy efficiency and energy saving issues 10. Understand the critical issues		

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						associated with PV and BIPV in particular and how these can be part of NZEB 11. Enhance their knowledge & skills on BIPV and NZEB issues.		
35	The Cyprus Institute	Modern Trends in Renewables and Energy Storage	12 hours total (divided into 4 modules: 4, 3, 3, and 2 hours)	Energy industry professionals (engineers, technicians, managers), policy makers, researchers, grid operators, energy consultants, renewable energy investors, municipal and local authority representatives; no specific prerequisites noted.	Module 1: Overview of renewable energy technologies (solar, offshore/onshore wind, hydropower, geothermal, bioenergy) and emerging trends. Module 2: Energy storage systems (batteries, pumped hydro, thermal, mechanical, hydrogen-based). Module 3: Challenges and strategies for renewable integration into modern grids. Module 4: Role of digital technologies (AI, IoT, digital twins) in grid management.	Participants gain a comprehensive understanding of current trends in renewables and energy storage; they learn to critically evaluate technical, economic, and operational challenges and integrate digital solutions for grid optimization.	Module-based assessments including examinations, case study analyses, and participation in discussions.	A certificate of completion is issued; the programme is not directly linked to formal professional qualification standards.

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36	AQS Cyprus LTD και Advanced Quality Services	Safety and health in the construction sector - Scientific and technical staff	6 hours total (delivered as a series of modules)	Scientific and technical personnel in the construction sector (architects, engineers, foremen, technicians) as well as job seekers aiming to work in construction; no specific prerequisites indicated.	Modules covering: – General principles of prevention and risk assessment (including accident statistics and hazard identification). – Legislative framework and employer/employee obligations. – Construction site safety (fencing, signage, use of protective equipment, work at height). – Ergonomics and machinery safety.	Enhances participants' knowledge and skills in occupational safety and health; equips them to recognize hazards, implement safety measures, and reduce workplace accidents and occupational illnesses.	Likely a combination of practical demonstrations, written examinations, and participant involvement (exact methods are not detailed).	A certificate of completion is issued; the programme is not directly linked to formal professional qualification standards.
37	PHAETHON CoE	Photovoltaic System Designer and Installer	40 hours total – 25 hours of theoretical instruction plus 15 hours of practical training	Public sector employees, local government representatives, staff from private organizations, self-employed individuals, and job seekers aiming for roles in PV system design and installation; prerequisites are not explicitly stated.	Theoretical Modules: – Solar energy theory (properties of light, nature of solar radiation, optimization of solar collection). – Introduction to PV technology (operation of PV cells, technical terminologies, factors affecting energy production). – Market trends and relevant European/national legislation. Practical Modules: – Design and technical-economic analysis of PV systems. – On-site evaluations, electrical connection methods, installation procedures, and maintenance practices.	Develops technical competence to design and install small-scale, grid-connected PV systems (<30 kW); prepares participants to apply for certification under the Professional Qualification Standard for PV installation and maintenance.	Assessed through theoretical examinations, practical laboratory assessments, on-site evaluations, and simulation exercises.	A certificate of completion is issued; the programme is not directly linked to formal professional qualification standards.

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38	PHAETHON CoE	Energy Storage: Diverse Role in the Modern Electricity Network	30 hours total	Designed for public sector employees, local government officials, staff of private organizations, self-employed individuals, and job seekers interested in roles related to energy storage integrated with renewable energy systems. No specific prerequisites indicated.	Theoretical Modules: • Introduction to energy storage: basic concepts, categorization, role in electricity storage, system characteristics, and recent statistics. • Basic battery principles: introduction, types, characteristics, lifespan, connection methods, and application for self-consumption. • Battery technologies: overview, lithium-ion battery types, comparisons, sustainability (including recycling), and future trends. • PV–energy storage systems: introduction to hybrid systems, technical characteristics of batteries and converters, and sample datasheets. • System dimensioning: guidelines for sizing hybrid PV–battery systems, including mechanical and electrical components, and commissioning. • Residential energy storage: introduction to home-use systems, integration of renewables for self-consumption, and pilot battery systems. • Failures and maintenance: common causes, troubleshooting, maintenance procedures, and safety measures (fire prevention/detection). Practical Labs: • Lab 1: Design of a hybrid PV–battery system using specialized software. • Lab 2: Techno-economic analysis of a PV–battery system including energy throughput evaluation. • Lab 3: On-site visit to PV systems, pilot energy storage installations, and	Participants will acquire a thorough theoretical and practical understanding of energy storage systems, particularly for residential applications. They will be able to design, install, operate, and maintain hybrid PV–battery systems to maximize self-consumption and potentially provide ancillary network services.	Evaluation is based on theoretical examinations and practical lab exercises, including on-site evaluations and system design analysis. Specific assessment tools are integrated throughout both the theoretical and practical components.	The programme is not linked to a specific professional qualification standard (indicated as Δ/E) and does not specify an external accreditation beyond its inclusion in the multi-enterprise training framework.

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					microgrid demonstration. • Lab 4: Installation of an autonomous PV and battery system (wiring and operational setup). • Lab 5: Installation of a residential hybrid PV and battery system (wiring and operational setup).			
39	INTERCOLLEGE	MTECH 230 - Renewable Energy Sources and the Environment (Solar Thermal, Geothermal) Diploma - Mechanical Installations Technician	1 semester	Students	1. Solar thermal systems: • Methods of analysis of solar radiation. • Solar panels, types, degree of efficiency, calculations. • Instant and long-term efficiency of a flat solar collector • Active and passive solar systems for heating and cooling. • Heat storage methods • Use of solar thermal systems in residential and industrial applications • Main engine room parts • Installation and operation methods. • Maintenance methods and fault detection 2. Geothermal Systems • Definition • Geothermal fields and their classification. • Types of geothermal systems • Geothermal fluids • Shallow or Normal Geothermal. • Applications: Heating, Cooling of	1. Understand the operation of various solar and geothermal energy recovery systems 2. To be able to install and maintain solar thermal and geothermal systems. 3. Know how to measure and calculate their performance. 4. Evaluate a system of renewable energy sources in relation to its operation and usefulness. 5. Assess situations and advise on the use of RES.	Written Exams, Assignment, Laboratories	

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					buildings • Horizontal and vertical heat exchanger systems • Installation and operation methods. • Maintenance methods and fault detection. 3. Wind systems • Fundamental of wind energy • Wind characteristics • Wind energy • Wind power generation systems. • Methods for estimating and evaluating wind potential. • Wind turbine location selection. • Wind generators. Types of operation and power • Wind turbine efficiency • Individual applications - Wind farm • Installation and operation methods. • Maintenance methods and fault detection			
40	INTERCOLLEGE	MTECH 270 - Principles and Installation of Photovoltaic Systems Diploma - Mechanical Installations Technician	1 semester	Students	1. Photovoltaic systems • The Photovoltaic phenomenon. • Electricity generation from • Main parts of photovoltaic systems • Inverter (sine / square wave) • Solar charger (Regulator) • Battery Bank • Wiring and accessories (DC / AC disconnecting, meters, etc) • Photovoltaic cell, panels, array. • Types and performance of Photovoltaic systems • Operating curve • PV performance in various inclinations and orientations.	1. To understand the operation of various systems for the utilization of solar and wind energy in the form of photovoltaics and wind turbines. 2. To be able to install and maintain photovoltaic and wind systems 3. To know how to measure and calculate of their efficiency. 4. Evaluate a system of	Written Exams, Assignment, Laboratories	

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					• Effect of temperature change • Interconnected and autonomous systems of photovoltaic (on-grid, off-grid and standalone). • Installation and operation methods for various applications. • Maintenance methods and fault detection	renewable energy sources in relation to its operation and usefulness 5. Assess situations and advise on the use of RES.		

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