



Maritime Alliance for fostering the European Blue Economy through a Marine Technology Skilling Strategy



Co-funded by the Erasmus+ Programme of the European Union

# Highlights of MATES Pilot Experiences

## Innovation Manager in Shipbuilding

### Layman Report

March 2022



# About this Report

This document was developed through the EC-funded Erasmus+ project **MATES: Maritime Alliance for fostering the European Blue Economy through a Marine Technology Skilling Strategy**.

The objective of the MATES project is to develop a skills strategy that addresses the main drivers of change in the maritime industries, in particular shipbuilding and offshore renewable energy. Both sectors are strongly linked and require new capacities to succeed in an increasingly digital, green and knowledge- driven economy.

Duration: January 2018 – April 2022 (52 months)

More information on the project is available at [projectmates.eu](http://projectmates.eu).

Document information	
Short description	Summary of the results of the Pilot Experience Innovation Manager in Shipbuilding, including the successful extension of its impact to other regional and national interested bodies. The main achievements and European added value are clearly outlined to promote further implementation among interested experts and stakeholders.
Next steps	These results present a solid foundation for the Maritime Technologies Skills Strategy and the long-term Action Plan and sustainability.
Work Package	WP4. Pilot Experiences
Task	4.5 Impact assessment
Deliverable	4.2 Layman report
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## Partners involved



## Additional Collaborators:



# 1. Context

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**MATES: Maritime Alliance for fostering the European Blue Economy through a Marine Technology Skilling Strategy** is an EC-funded, ERASMUS+ project whose objective is to develop a skills strategy that addresses the main drivers of change in the maritime industries, in particular shipbuilding and offshore renewable energy.

The MATES Pilot Experiences are vital components of the strategic design of the project. They consist of a series of activities that fall in line with the priority areas needed to support training and development of the shipbuilding and offshore renewable energy industries, closely linked sectors which require new capacities to succeed in an increasingly digital, green, and knowledge-driven economy. This report summarises the outcomes and learning elements from one of these Pilot Experiences: *Innovation Manager in Shipbuilding*.

Target beneficiaries include students, teachers, trainers, skilled workers and those who have recently joined the workforce. The outcomes of the Pilot Experiences provide indispensable knowhow for bridging the maritime skills gap and increasing both sectors' overall competitiveness and attractiveness. The insights gained from these activities feed directly into the long-term MATES Action Plan, which contains policy recommendations and best practices.

**Results from these Pilot Experiences are particularly relevant for the following stakeholder groups:**

- Local Government in charge of education
- Industry
- Research and Development Centres/Universities
- Vocational and Educational Training (VET) Centres

The new paradigm of the **technological base**, of which the shipbuilding industry forms part, involves the comprehensive evolution of the industrial capacity towards a new way of understanding its productive activity and relationships with all the agents in its value chain. Meanwhile, the new **Industry 4.0 model** enables the use of tools for hybridising the physical world (materials, products, machinery, and facilities) with the digital world (systems), seeking to advance towards a smart manufacturing concept through this connection.

The main objective of this PE is to introduce the shipbuilding sector and the opportunities it brings to add new technologies to the trainees. Graduates from engineering degrees might contribute to a successful development of the industry, developing a professional career in this transformative industry.

In order to attract talent to this traditional sector, it is necessary to improve young people's awareness about it. This PE offers a bridging course for recent graduates in order to encourage them to look for their first job in the naval sector.

## 2. Overview of the Innovation Manager Pilot Experience

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The “**Innovation Manager in Shipbuilding**” course, led by ASIME, the Galician Association of Metal Industries and Associated Technologies, identifies the following aspects as key for a successful development of the shipbuilding industry:

1. Professional training, upskilling, and qualifications.
2. Greater professionalism in company management.
3. Improved production processes for greater efficiency (in time and costs) to make companies more competitive.
4. Ensuring generational renewal: recruiting young talent to the sector and ensuring know-how is passed on by more experienced professionals.

Taking this context into account, and to check the suitability of training focused on developing and empowering the role of Innovation Manager, ASIME met with companies in the sector to find out their real concerns. As a result of these, it was confirmed that **the needs identified by ASIME match the ones conveyed by the industry, plus digitalisation and the introduction of new technologies** (Industry 4.0).

Thus, to respond to the most current needs of the sector, the “**Innovation Manager in Shipbuilding**” course was **undertaken with the aim of recruiting young talent, i.e. graduates (EQF6)<sup>1</sup> to work in the shipbuilding industry**, while attempting to close the gap between universities and industry’s real needs. The PE also seeks to improve participants’ skills in the use of **Key Enabling Technologies** (KETs), while developing essential **transversal skills** such as analytical capacity, creativity and innovation, social and communication skills, initiative, organisation, problem-solving, and teamwork, which are key in any role in the labour market.

The course had an innovative format too, since it combined the educational sessions with a period of **mentoring**, facilitating the interaction between participants and companies in the sector. Both for conducting the Webinars and for leading the mentoring process, the trainers were selected from among leading people in various industry bodies. All organizers (100%) agreed that research centres and private companies were key to its execution, while 33.3% of them found it was interesting to include universities and other education centres.

The main objective of this Pilot Experience was therefore to show participants the shipbuilding value chain operations and new technologies used in this industrial sector. It was envisaged as a win-win experience, because students get a closer look at the shipbuilding sector and at the same time can provide innovative solutions to the real problems brought by the industry experts.

### Specific objectives of Innovation Manager were:

- Evaluating whether this training and new methodology can attract talent from university and higher education to the shipbuilding industry, bridging the skills gap between training and industry demands to foster employment opportunities in the sector.
- Testing the viability of scaling this content and methodology to formal education.
- Exploring whether this methodology is replicable in other sectors
- Promote careers for women in STEAM (Science, Technology Engineering, Arts and Maths).

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<sup>1</sup><https://europa.eu/europass/en/description-eight-efl-levels>

The course was designed for Spanish speakers, recent graduates or those close to graduation in sciences, specifically in industrial engineering, computer engineering, shipbuilding, or telecommunications, who are interested in making a career in the shipbuilding industry. Figure 1 shows the Bachelor degrees of the participants in the training.

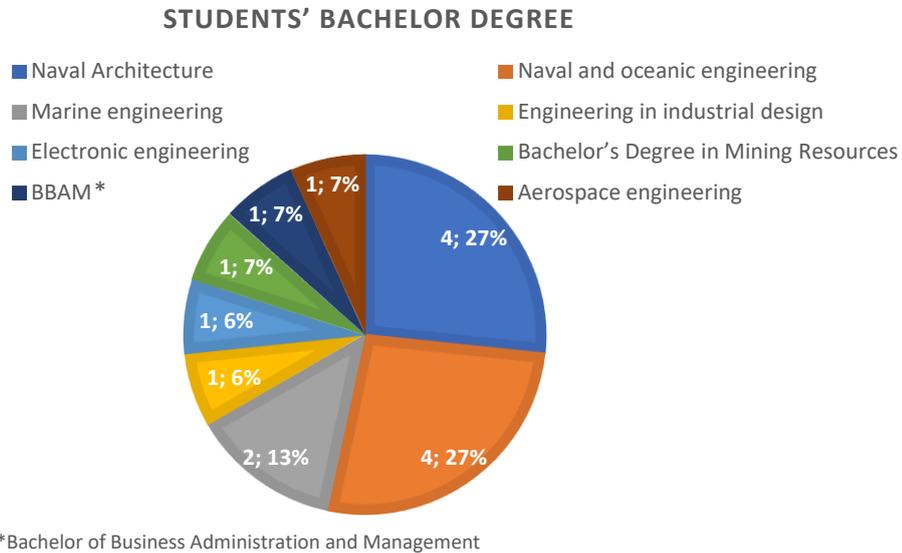


Figure 1: Background of the participants in the “Innovation Manager in Shipbuilding” course

To recruit students, the course was advertised on different social networks, especially LinkedIn<sup>2</sup>. The advertisement of the course included a questionnaire with practical questions which enabled a faster and more effective selection of participants. Just in the first week, 17 applications were received, from which the 15 trainees that formed the group for this course were selected, taking into consideration their career path. Figure 2 shows the main skills of the participants. Gender balance was taken into account during the selection of participants, since the number of female workers is low in this sector. As can be seen below, 40% of the participants were women.

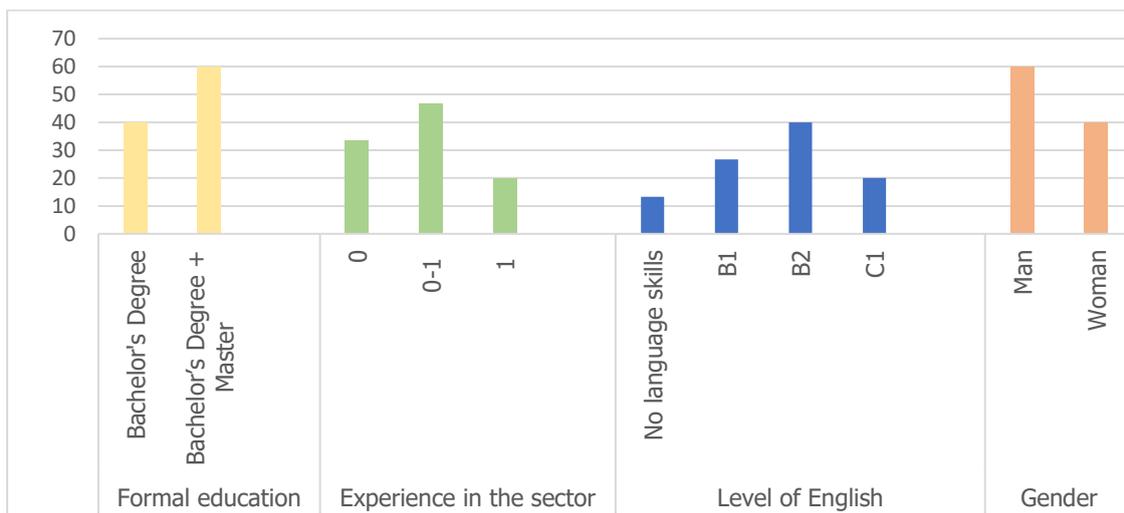


Figure 2: Statistics for the participants in the Innovation Manager in Shipbuilding course. (Note that experience in the sector unit is years and the vertical axis is percentage).

<sup>2</sup> [https://www.linkedin.com/posts/asime-galicia\\_formaci%C3%B3n-innovation-manager-en-sector-activity-6747110020120358912-pKzk/](https://www.linkedin.com/posts/asime-galicia_formaci%C3%B3n-innovation-manager-en-sector-activity-6747110020120358912-pKzk/)

### Summary of Participants engaged in the Innovation manager course

	<b>Location</b>	Galicia (Spain) – Online format
	<b>Hours of Training</b>	128
	<b>Participants</b>	24 (15 students, 6 teachers/mentors & 3 organizers)

## 3. Achievements

### 3.1. Results: Training Materials

A mixed methodology combining theory and practice was proposed for this course. The content of the course was provided by the company Lidera K<sup>3</sup> (80 hours) through a **virtual platform**. It was complemented with **webinars** (18 hours) developed by ASIME. The practical approach followed a **mentoring model** (30 hours). Although initially both parts were scheduled for in-person classes (including the possibility of placements with companies in the sector), **due to the COVID-19 pandemic this approach had to be modified to a full (100%) online format**.

Students had access to the training platform 24 hours daily, 7 days per week and could contact their tutor at any time to resolve doubts or queries. Since attendance at the six webinars (3 hours each) was mandatory, they were made available online to match students’ schedules, enabling them to be followed at their own pace.



Figure 3: Screenshot during training

<sup>3</sup> <https://liderak.com/>

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The Tables below show the full course syllabus and timeline.

Table 1: Syllabus of the "Innovation Manager in Shipbuilding" course Part I

MODULES	DATES		Nº. OF HOURS
	START	END	
Module I: Lean Management: From the first industrial revolution to Industry 4.0.	05/02/2021	19/02/2021	20
Module II: Digital KETs for industry.	22/02/2021	05/03/2021	20
Module III: KETs for Industry 4.0	08/03/2021	29/03/2021	20
Module IV: DIGITAL FACTORY: Manufacturing intelligence.	30/03/2021	15/04/2021	20

Table 2: Syllabus of the "Innovation Manager in Shipbuilding" course Part II

WEBINAR	DATE	Nº. OF HOURS
Lean Manufacturing	12/02/2021	3
Value chain in the sector	26/02/2021	3
Advanced Industrial Robotics	12/03/2021	3
Big Data and Cybersecurity	26/03/2021	3
Virtual reality and augmented reality in the shipbuilding industry	09/04/2021	3
Organisational coaching	21/04/2021	3

The Learning Outcomes of the course can be downloaded [here](#). The webinars (in Spanish) can be downloaded [here](#)<sup>4</sup>. The **Mentoring** period was **30 hours**, held between **16 April and 9 May 2021**.

The mentoring approach proved the best way to bring together a practical internship in the companies within the framework of the COVID-19 pandemic restrictions. Therefore, **the aim of the mentoring was that students would be able to propose solutions/improvements, applying the knowledge acquired throughout the course to a given challenge focusing on the shipbuilding value chain**; specifically, to solve problems or identify gaps and contribute innovative ideas to make the sector more competitive.

Therefore, students had to produce a final project, consisting of selecting one or more KETs to apply to the shipbuilding value chain (including planning, timeliness, the creation of work teams, etc.). The projects were evaluated by the mentor based on the following criteria:

- Viability.
- Innovation in proposed improvements
- Interaction with the mentor
- Timely delivery
- Around 7 to 10 pages in length.

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<sup>4</sup> <http://marinetraining.eu/node/3412>

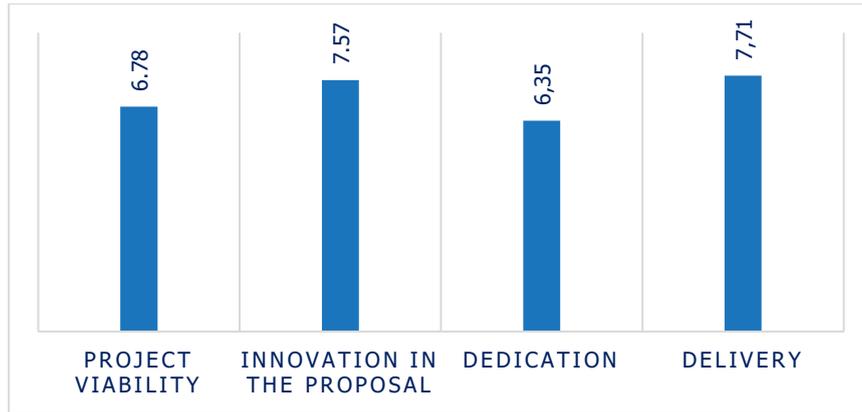


Figure 4: Students' average score for each element.

In order to be awarded a certificate of achievement students had to follow at least 75% of the classes available on the platform. In addition, they had to pass a test at the end of each module, answering correctly at least 50% of the questions and present a successful Final Project. Participation on the forums, exercises, and webinars was also considered as part of the students' assessment.

80% (12 out of 15) of the students completed the Mentoring successfully. Maximum score of the project was 10. Figure 5 shows that about 90% of the students produced a good project while just over half got a mark higher than 8, i.e. indicating a high student performance rate.

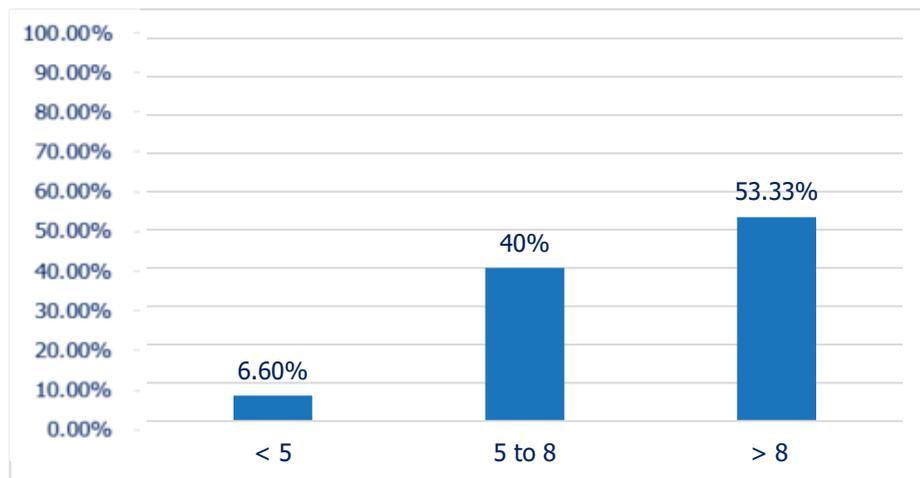


Figure 5: Percentage distribution of the Final Project marks

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Table 4 Projects presented by students during mentoring, and destination companies

PROJECT TITLE	COMPANY OR SCOPE OF APPLICATION	ENTITY OF THE PROJECT TUTOR
<b>“Data analysis for a company providing maintenance services”</b>	SOLUCIONES TÉCNICAS H&R S.A.C. <sup>5</sup>	GRADIANT <sup>6</sup>
<b>“Introduction of a data analysis system in an auxiliary company in the shipbuilding industry”</b>	Confidential. A company that produces custom-made or short to medium runs of cast iron and bronze parts.	GRADIANT
<b>“Introduction of drones with spectral camera for inspecting ship surfaces”</b>	Confidential. A leading company in inspection, quality control and technical assistance in the fields of Regulatory Inspection in Industrial, Environmental and Naval Safety, Industrial Inspection, Occupational Risk Prevention, Acoustic Engineering, Telecommunications, Waste, Technical Assistance in Civil Works, Construction, Management Systems Consultancy, and Energy Efficiency.	CTAG <sup>7</sup>
<b>“An offshore structure monitoring system for predictive maintenance”</b>	Project developed by Navantia <sup>8</sup> for the Saint Brieuc offshore wind farm.	CTAG
<b>“Lean system based on visual panels for organisation and communication in different areas of a shipyard”</b>	Nodosa shipyard <sup>9</sup>	CTAG
<b>“A historic crossroads for MECANAVAL S.A.”</b>	MECANAVAL S.A.	TRIVIUM <sup>10</sup>
<b>“Introduction of augmented reality technology in an auxiliary naval company”</b>	Confidential. Auxiliary company in the shipbuilding industry, dedicated to carpentry and refitting of different types of boat.	TRIVIUM
<b>“Proposal for improving a naval engine production plant”</b>	Confidential. A company in the shipbuilding sphere which dedicates 40% of its production to the manufacture of four types of engine, for which it holds the patents.	TRIVIUM
<b>“Introduction of a system to monitor the soldering process and traceability under offshore requirements, in a boiler workshop, using Industry 4.0 enabling technologies”</b>	GANAIN S.L. <sup>11</sup>	GANAIN

<sup>5</sup> [https://soluciones-tecnicas-hr-sac.negocio.site/?utm\\_source=gmb&utm\\_medium=referral#details](https://soluciones-tecnicas-hr-sac.negocio.site/?utm_source=gmb&utm_medium=referral#details)

<sup>6</sup> <https://www.gradient.org/en/>

<sup>7</sup> <https://ctag.com/en/>

<sup>8</sup> <https://www.navantia.es/en/>

<sup>9</sup> [https://www.nodosa.com/index\\_en.php](https://www.nodosa.com/index_en.php)

<sup>10</sup> <https://www.triviumpackaging.com/>

<sup>11</sup> <https://ganain.es/en/>

### 3.2. Impact

In order to assess the impact of the Pilot Experience, a six-month follow-up questionnaire was undertaken by phone to the trainees. So, 14 people was interviewed, 57,14% men & 42,86% women.

This PE made a real impact on the participants who undertook the training, as shown in **¡Error! No se encuentra el origen de la referencia.**, but also on the companies that provided a real case study for which students gave an innovative solution.

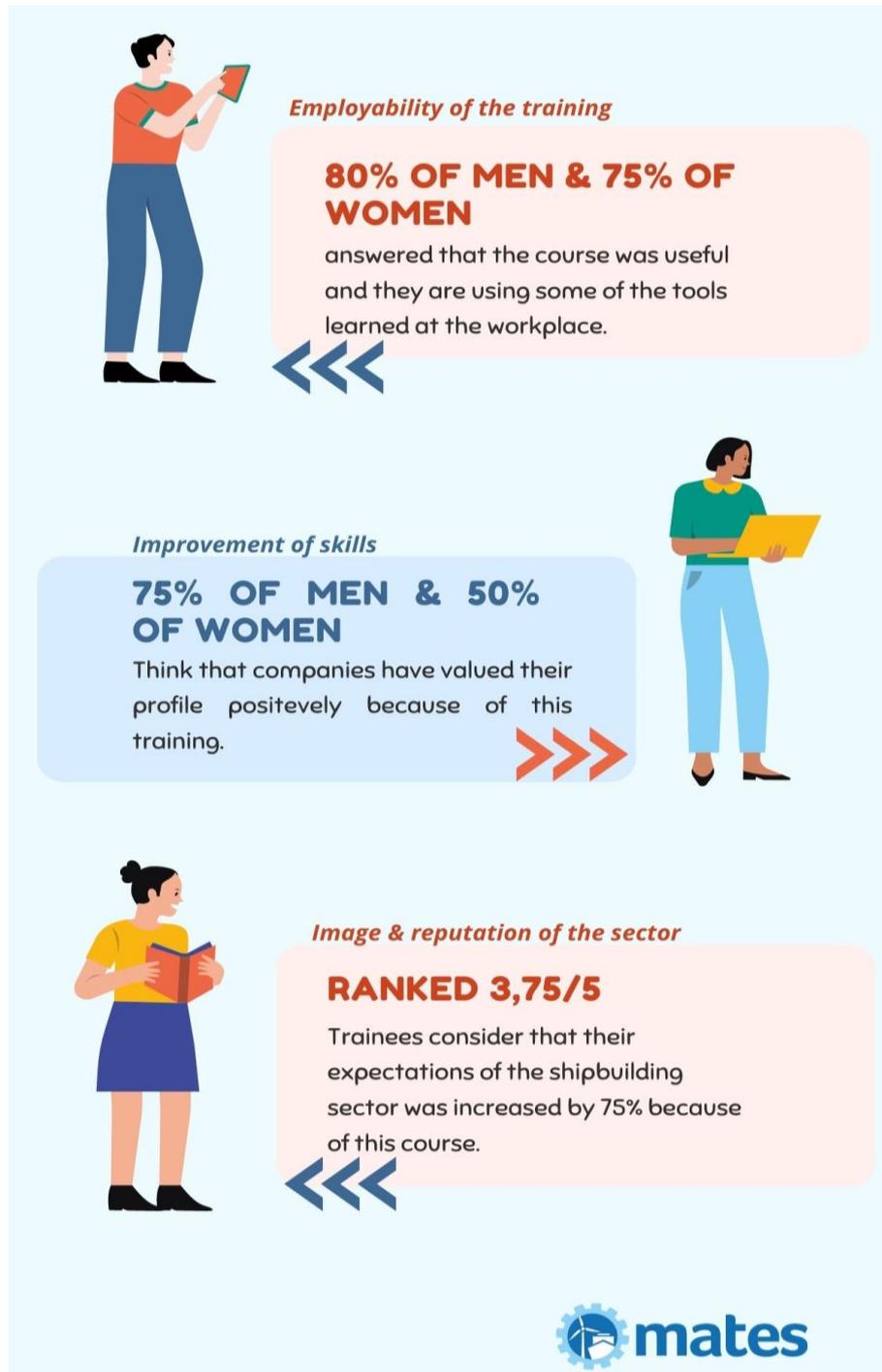


Figure 6: Summary of the answers that trainees gave during the 6-months follow-up questionnaire

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Table 5 shows how this Pilot Experience met the main objectives set for it.

*Table 5 Results obtained in relation to the Quality criteria and indicators proposed*

CRITERIA	MONITORING INDICATOR	RESULTS
EMPLOYABILITY	Number of unemployed people in this Pilot Experience.	60% of the participants were unemployed when they entered the course. The six-month follow-up survey showed that 13 of the 14 interviewed students were employed (92,86%) six months later. 100% of trainees agree that this Pilot Experience has improved their professional background. Therefore, we can conclude that this course helped to improve their employability.
RECOGNITION OF QUALIFICATIONS	Recognition and certification achieved in the activity itself.	80% of the students obtained a diploma of achievement, and 13.33% received a certificate of participation (having completed only the theory and not the mentoring section).
IMPROVED EXPERTISE AND SKILLS	<ul style="list-style-type: none"> <li>- Average score obtained by the students.</li> <li>- Number of students successfully passing the course.</li> </ul>	<ul style="list-style-type: none"> <li>- Average score for the theoretical part (modules + webinars): 85.85 out of 100.</li> <li>- Average score in mentoring: 7.10 out of 10.</li> <li>- 80% successfully passed the course.</li> </ul>
INTERACTION WITH SECTOR AGENTS	Number of participants in each stakeholder group in the sector.	<ul style="list-style-type: none"> <li>- 6 trainers from the industry (private companies and research centres) taught webinars, and 4 of them took part as mentors in the second phase of the programme.</li> </ul>
DEVELOPMENT OF ENTREPRENEURIAL SKILLS	Number of participants who create a company/business in the sector.	<ul style="list-style-type: none"> <li>- In the student survey, 16.7% of the students expressed an interest in entrepreneurship. The six-month follow-up survey showed that none of the students decided to start their own business. Therefore we can conclude that the course did not help to develop their entrepreneurial skills.</li> </ul>
INNOVATIVE APPROACH	<ul style="list-style-type: none"> <li>- Number of participants in mentoring.</li> <li>- Satisfaction level of companies/mentors in relation to the improvements proposed by students.</li> </ul>	<ul style="list-style-type: none"> <li>- 80% of the students took part in the mentoring process.</li> <li>- 75% of the mentors said that the contributions they received were of interest, although only 50% considered them applicable to their company in real life.</li> </ul>
REPUTATION AND IMAGE	Recognition of the course by the students before and after taking it.	<ul style="list-style-type: none"> <li>- 58.3% would recommend this course to other people.</li> </ul>
ATTRACTIVENESS	Number of students who would consider a career in the shipbuilding sector.	<ul style="list-style-type: none"> <li>- 83.4% would like to pursue a career in the sector. Of this total, 66.7% would opt for providing services as an employee, while 16.7% would prefer to start their own business. During the six</li> </ul>

CRITERIA	MONITORING INDICATOR	RESULTS
		<p>month follow-up survey of those looking for a job (10), 80% sought a job in the naval-maritime &amp; ORE sectors, while the other 20% sought in the automation, metal and transport sectors. It is noteworthy that 100% of women chose the naval sector and found a job in it.</p>
FLEXIBILITY	<ul style="list-style-type: none"> <li>- Nº of different engineering specialisations.</li> <li>- Nº of students per engineering specialisation.</li> <li>- % of national and international students.</li> <li>- Satisfaction level with the schedule and method used (online training).</li> </ul>	<ul style="list-style-type: none"> <li>- Background of participants was diverse, coming from 5 different engineering specialisations.                             <ul style="list-style-type: none"> <li>- Naval and oceanic engineering: 4 students.</li> <li>- Electronic engineering: 4 students.</li> <li>- Marine engineering: 2 students.</li> <li>- Engineering in industrial design: 1 student.</li> <li>- Aerospace engineering: 1 student.</li> </ul> </li> <li>- There were 2 international students in a total of 15, i.e. 13.33% of the students.</li> <li>- The satisfaction level with the length of the course was 3.9 points, and satisfaction with the platform used was 4.6 points (over 5).</li> </ul>

Following the Knowledge transfer plan, ASIME met with the University of Vigo in order to include the Innovation Manager course as part of its training offer. There is a need for this type of initiative, which includes innovative content and up-to-date technologies, to meet the demands of the sector, looking to the future in partnership with official educational bodies and institutions.

## 4. European added value

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This Pilot Experience highlights the Europe-wide need to get engineering graduates to engage with maritime industries and technologies. The results demonstrated the added value of enhancing relationships between industry and education. **Internships at shipyards, or at least mentoring programmes give students a first-hand experience that might enhance their interest in developing a professional career in the shipbuilding sector.**

The strategic framework for European cooperation in Education and Training (ET 2020<sup>12</sup>) highlights that more sectoral organizations should contribute to the design and delivery of educational programmes. Bringing real problems from industry to the classroom is a clear example of cooperation in educational programme design.

One transversal action line of this project is to work towards gender parity. Through this PE inclusive culture is being promoted following the Council Recommendations on promoting common values, inclusive education, and the European dimension of teaching<sup>13</sup>.

A shortage of suitably skilled workers has been identified as blocking growth in nearly all blue growth economic sectors<sup>14</sup>. The training undertaken contributed to strengthening the shipbuilding sector with a skilled labour force which responds to the labour market needs<sup>15</sup>.

For those interested in replicating this kind of training, it is recommended that the following key learning elements should be taken into consideration:

- 1. Identify trainers from industry:** For this training we looked for leaders/managers at shipbuilding companies and research and technology centres, with at least 5 years of experience in the subjects to be taught and with a good level of English.
- 2. Engage with industry collaborators:** The mentoring approach was key for the purpose of attracting young talent to the shipbuilding sector. Therefore, it is necessary to engage with industry collaborators to provide real case studies.
- 3. Take a flexible approach:** The delivery of the PE online showed advantages over face-to-face classes, the fact that students can learn at their own pace is a plus factor, therefore this kind of format could be implemented in formal education courses.

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<sup>12</sup> 2009/C 119/02 Council conclusions of 12 May 2009 on a strategic framework for European cooperation in education and training (ET 2020). [https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52009XG0528\(01\)](https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52009XG0528(01))

<sup>13</sup> 2018/C 195/01 Council Recommendations on promoting common values, inclusive education, and the European dimension of teaching. [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0607\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0607(01)&from=EN)

<sup>14</sup> COM(2012) 494 final “Blue Growth opportunities for marine and maritime sustainable growth” [https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/docs/body/com\\_2012\\_494\\_en.pdf](https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/docs/body/com_2012_494_en.pdf)

<sup>15</sup> Work-based learning in Europe: Practices and policy pointers. [https://www.skillsforemployment.org/KSP/en/Details/?dn=WCMSTEST4\\_057845](https://www.skillsforemployment.org/KSP/en/Details/?dn=WCMSTEST4_057845)

All layman reports and education and training materials from all the MATES Pilot Experiences are available on the MATES website and include:

<p><b>ED2MIT: Education and Training for Data Driven Maritime Industry</b>  <a href="http://projectmates.eu/pilotexperience/ed2mit">projectmates.eu/pilotexperience/ed2mit</a></p>
<p><b>MOOCs on Industry 4.0 and the naval sector</b>  <a href="http://projectmates.eu/pilotexperience/mooc-training-course">projectmates.eu/pilotexperience/mooc-training-course</a></p>
<p><b>Freeboard</b>  <a href="http://projectmates.eu/pilotexperience/freeboard">projectmates.eu/pilotexperience/freeboard</a></p>
<p><b>The Magnus Effect</b>  <a href="http://projectmates.eu/pilotexperience/the-magnus-effect">projectmates.eu/pilotexperience/the-magnus-effect</a></p>
<p><b>Innovation Manager in Shipbuilding Course</b>  <a href="http://projectmates.eu/pilotexperience/innovation-manager-course">projectmates.eu/pilotexperience/innovation-manager-course</a></p>
<p><b>Additive Manufacturing and Risk Management in the Shipbuilding and Ship Repairs Sectors</b>  <a href="http://projectmates.eu/pilotexperience/training-seminar">projectmates.eu/pilotexperience/training-seminar</a></p>
<p><b>MOL<sup>2</sup> Maritime on the Loop of Ocean Literacy</b>  <a href="http://projectmates.eu/pilotexperience/mol2">projectmates.eu/pilotexperience/mol2</a></p>
<p><b>Offshore Renewable Energy Courses</b>  <a href="http://projectmates.eu/pilotexperience/renewable-energies-crash-courses">projectmates.eu/pilotexperience/renewable-energies-crash-courses</a></p>
<p><b>Ocean Pro.Tec Lab</b>  <a href="http://projectmates.eu/pilotexperience/ocean-pro-tec-lab">projectmates.eu/pilotexperience/ocean-pro-tec-lab</a></p>
<p><b>Green Move</b>  <a href="http://projectmates.eu/pilotexperience/green-move">projectmates.eu/pilotexperience/green-move</a></p>
<p><b>Definition of New Occupational Profiles</b>  <a href="http://projectmates.eu/pilotexperience/dop-definition-of-new-occupational-profiles">projectmates.eu/pilotexperience/dop-definition-of-new-occupational-profiles</a></p>





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