



**Boulougouris, Evangelos and Chrysinas, Leonidas and Vavourakis, Georgios and Mizythras, Panagiotis (2018) Maritime education in EU : strengths and challenges. In: Transport Research Arena (TRA) 2018, 2018-04-16 - 2018-04-19, Reed Messe Wien. ,**

This version is available at <https://strathprints.strath.ac.uk/63735/>

**Strathprints** is designed to allow users to access the research output of the University of Strathclyde. Unless otherwise explicitly stated on the manuscript, Copyright © and Moral Rights for the papers on this site are retained by the individual authors and/or other copyright owners. Please check the manuscript for details of any other licences that may have been applied. You may not engage in further distribution of the material for any profitmaking activities or any commercial gain. You may freely distribute both the url (<https://strathprints.strath.ac.uk/>) and the content of this paper for research or private study, educational, or not-for-profit purposes without prior permission or charge.

Any correspondence concerning this service should be sent to the Strathprints administrator: [strathprints@strath.ac.uk](mailto:strathprints@strath.ac.uk)

Proceedings of 7th Transport Research Arena TRA 2018, April 16-19, 2018, Vienna, Austria

## Maritime Education in EU: Strengths and Challenges

Evangelos Boulougouris<sup>a\*</sup>, Leonidas Chrysinas<sup>a</sup>, Georgios Vavourakis<sup>a</sup>,  
Panagiotis Mizythrass<sup>a</sup>

<sup>a</sup>University of Strathclyde, Department Of Naval Architecture, Ocean & Marine Engineering, 100 Montrose St, Glasgow, G4 0LZ,  
United Kingdom

### Abstract

In a global competitive world, the education progress from school to University and the continuous professional training is the key to enhance productivity, employability and social stability. Continuous education is a key issue for the evolution of human being, not only in the professional sector of life but also in the personal life, enhancing important elements of the character and personality for each individual. Furthermore, new technologies, regulations and policies in maritime industry reveal the necessity for additional educational schemes that will cover the market needs. Considering the growing challenges of port, shipping and logistics, TrainMoS II and On The MoS Way Network (OTMW-N) European projects aimed to the development of students and professionals skills and laid the foundations for a cross-European maritime educational system. TrainMoS II was the evolution of the TrainMoS project, improving the tools developed during the first phase and covering a whole new range of technical and operational topics, including alternative fuels and technologies, logistic issues (including Single Window Directive 65/2010), damage control (incl. IMO 'Safe Return to Port' concept) and evacuation/crisis management operations. TrainMoS II focused on the provision of professional training and vocational education activities to undergraduates and professionals who belong to different sectors in the multimodal transport chain. Individual Modules were open to attendance from students to require a Continuous Professional Development (CPD) certification. At the same time, OTMW-N covered the training needs in the use of alternative fuels in marine industry, such as LNG. OTMW-N was also offering professional training and vocational education through a series of activities in which students obtain the opportunity to enhance their academic background and to implement it in simulation programmes. The present paper presents the results and the contribution of these projects to the maritime community. Stakeholder needs from different sectors of maritime industry are examined and the outcomes of the aforementioned projects are presented and discussed.

Keywords: vocational education; alternative fuels; maritime industry; training schemes; Motorways of the Seas.

---

\* Corresponding Author. Tel.: +44 (0)141 548 3875.  
E-mail address: evangelos.boulougouris@strath.ac.uk

## 1. Introduction

At the beginning of second millennium, Copenhagen Declaration (European Commission, 2002) was the first formal document revealing the need of cooperation between European countries for the further development of Vocational Education and Training (VET). VET programmes are considered as tools that promote employability and economic growth and enhance the cohesion within regional and European societies for a sustainable growth. Furthermore, the education is considered as the main pillar of the Blue Economy business model that motivates the green economy and productivity (Bruges Communiqué, 2010). However, OECD studies in European Union (EU) have found that there is limited vocational provision at post-secondary level in comparison with many other countries and relative to the potential demand (OECD, 2014). Moreover, surveys indicated that there are great discrepancies in VET programmes and policies among different European regions (IBCVET, 2017).

Simultaneously, maritime stakeholders from shipping industry to ports and logistics, require trained and skilled people in multimodal transport, capable to improve the quality of their final products and services, in order to comply with the latest policies. The development of an efficient multimodal transport needs integrated procedures and processes, carried out by specialized personnel with specific integrated skills and knowledge. Unluckily, though those issues are disseminated at European level, the current competences and expertise are most of the time regional.

The main post-secondary vocational programmes which are provided locally are the Modern Apprenticeships, which include industry designed programmes that support employees to acquire certificated competencies, required to deliver their job role through work-based learning and/or off-the-job training. Other programmes, provided mainly in colleges, are the Higher National Certificates (HNC) and Higher National Diplomas (HND) which offer a mix of practical skills and theoretical knowledge in their job-related courses, allowing progression onto a degree programme (OECD, 2013). In addition to these, a huge number of seminars and conferences related to maritime sector take place every year in the majority of European countries. Most of them aim to present the companies' work during the last period, advertising their achievements and communicating the forthcoming steps. As a result, the educational purposes have lower priority than the companies' reputation and network increase.

However, there is a wide range of employees who are occupied in the maritime sector with limited access to the industry evolution, the advances of technology and the alterations of legal framework. It is obvious that the only way to achieve their goal, to maintain their usefulness and to improve their skills is through training. Training can be theoretical or practical. According to Aristotle [384-322 BC]: Both theoretical and practical wisdom are essential for bringing people to eudemonia (i.e. happiness or flourishing or living well) (Ross and Brown, 1999). Apart from "eudemonia", both theoretical and practical training are important elements to successfully implement the state of the art in their own position and to significantly contribute to the maintenance of each company's competitiveness in the race of evolution.

Besides the importance of education in society, the limited time availability and knowledge resources at regional level are the commonest obstacles in training process. In the last decade, these challenges have been met with distance learning. Distance learning is a process of virtual training and it can be achieved by using a number of software that permit the clear transfer of sound and image between different places, facilitating professionals' eagerness on following training modules. Through distance learning, every individual has the opportunity to actively participate in classes in different areas, making questions, taking part in possible experiments or simulation processes. This fact is also concerned by European Commission which gives extra motivations and funding for training projects that support distance learning such as TrainMoS II and On The MoS Way Network (OTMW-N), which are presented below. As a result, any professional or student who meets the prerequisites of the training programme is capable to participate without regional boundaries.

## 2. Background

The creation of an effective network of combined transport by integrating land, sea and inland waterway, and air transport has been recognized as an important aspect of sustainable development for the transport sector in the European Union. Based on this idea, EU set as main objectives the creation of the Trans-European Transport Networks (TEN-T) (European Commission, 1992). TEN-T aimed to create interfaces, interoperability and

continuity of services especially for long distances, and finance assistance for the implementation of major transport infrastructure projects. The development of the TEN-T contributed to the smooth operation of the internal market and to strengthen the economic and social cohesion which has also been a key element in the renewed 'Lisbon strategy' (European Commission, 2010a) for competitiveness and employment in Europe to achieve the objectives of the new strategy 'Europe 2020' (European Commission, 2010b).

As part of the TEN-T program, the Commission proposed in its Transport White Paper the development of Motorways of the Sea (MoS) as a real competitive alternative to land transport (Commission of the European Communities, 2011). The concept of MoS aimed to extend existing network and to introduce new intermodal maritime supply chains in Europe. The main objective of the MoS was to transfer a significant part of freight transport from road to sea. To achieve this, maritime chains need to become more efficient than road transport, and with greater sustainability. The efficiency of the port links with the hinterland was considered as vital parameter for the establishment of the "Motorways". Successful implementation would help to achieve two main objectives of European transport policy, which are the reduction of road congestion and environmental impact of freight transport. Further, MoS are expected to become an asset for EU in the future, improving remarkably the access to the European markets. As a result, a more comprehensive development of not only maritime transport resources, but also of the available rail and inland waterways capabilities could be achieved as part of an integrated chain. The sea areas selected to be "Motorways", such as the Baltic, the seas of South-Western and South-eastern Europe and sea areas of Western Europe, are presented in Figure 1.

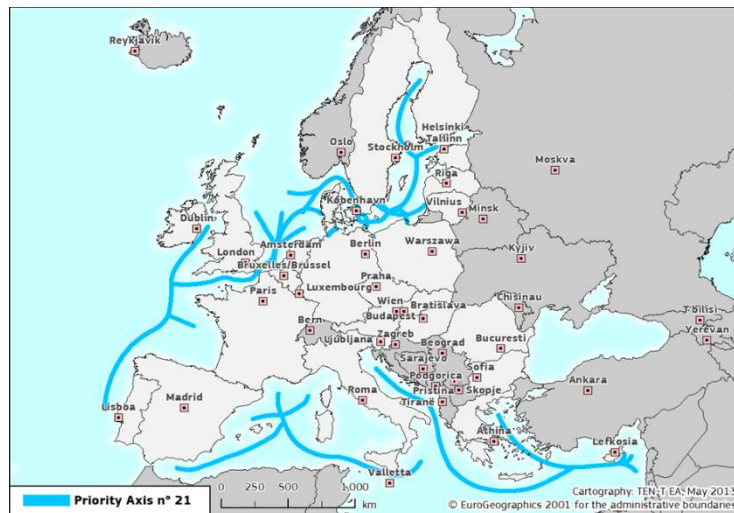


Fig. 1 Motorways of Sea Map (European Commission, 2017).

To meet the general objectives that are described above, the European Coordinator identified three key priorities for action (Simpson, 2015):

- Environment
- Integration of Maritime Transport in the Logistics Chain
- Maritime Safety, Traffic Management, Human Element/Training

In parallel, European Commission suggested the necessary actions which should return the market share of the modes of transport to 1998 level by 2010 (Commission of the European Communities, 2001). This was intended to pave the way for a shift of balance from 2010 onwards. Therefore, the Commission established the Marco Polo funding programme in June 2003 to minimize the road bottleneck and to improve the environmental performance of the whole transport system by shifting freight from road transport to greener modes, such as short sea, rail and inland waterway transport. Through this programme, the overcapacity of railways, shipping routes and inland waterways was exploited and the efficient management of transportation logistics was expected to be achieved, reducing the overall congestion and pollution in Europe. Based on the success of the first Marco Polo programme, further plans of EU included 50% shift of the medium distance intercity passenger and freight journeys from road to rail and waterborne transportation, with at least 40% cut in shipping emissions (European Commission, 2011). Marco Polo critically contributed in three actions:

- Modal shift action: start-up support for new non-road freight transport services, which should be viable in the mid-term.
- Catalyst actions: contribution to establishment of non-road freight services or facilities of strategic European interest.
- Common learning actions: stimulating co-operative behavior in the freight logistics market.

However, the sustainable economy requires further improvements in terms of skills, knowledge and qualifications. The only available way to face the upcoming challenges is through the further development of the maritime educational programmes. This general need for education and training in relation to the further MoS deployment is clearly expressed in the Motorways of the Sea coordinator report, “insisting on Education, Training and Lifelong-Learning: new training for the numerous professions linked to maritime transportation, logistics and operations in harbours must be implemented. This is fundamental for the provision of a good level of initial training rather than the on the job training currently used today” (De Oliveira, 2013).

Training is the keyword that European Commission uses in relation within these projects. In the latest years, basic alterations took place in the European Transport Policy, targeting in a change to a more sustainable society. This new growth of transport has to be characterized by smartness, sustainability and inclusiveness, main principals of Blue Economy. In this case, the word inclusive can be translated as manpower and jobs. However, it is more than obvious that setting as aim the job market, there is a precondition for highly qualified employees. Although the satisfaction of that requirement can constitute a strong motivation for the enhancement of employees’ productivity, it is still insufficient. Thus, a more suitable technique is necessary to be adopted in order to achieve higher performances. Moreover, the devolution from secondary education to professional domain, or further education, has been characterized as chaotic (National Institute on Post-Secondary Education, 2000). In this concept, the only way to obtain the respective proper technique is education and continuous training. The combination of training with research through universities leads to the University Specialization (i.e. university specialized courses, workshops, seminars, masters etc.) which is capable to meet the future challenges and market needs.

The higher employee technical qualification develops the individuals’ performance and through this, the company’s and market’s competitiveness increase. This healthy competition leads to a dynamic market growth and improves the individual and collective life quality. Consequently, the process of strengthening the human capital of the Motorways of the Sea is necessary for the efficient and effective implementation of multimodal corridors in the EU, and as a result there should be more attention to the significance of the training and the way that is successfully applied in European projects that target in sustainable development of the transport sector.

Employing well-educated and trained professionals is essential to promote the safe, efficient and environmental friendly services and products, especially in cases of new technologies, such as the application of liquefied natural gas (LNG) as a marine fuel. At present, there is a shortage in the availability of suitably qualified personnel, whilst the established regulatory framework is still under development. There are also few educational institutions with the necessary resources and relevant knowledge to provide such training. Therefore, the training programmes should focus in the continuous update of their material and sources, adopting new ideas, market trends and future policies in their courses, and enhancing the high level of maritime education.

### **3. Framework**

In this framework, a long-term Global Project aims to the establishment of a maritime and logistic platform of knowledge at all levels, contributing to the formation of the human element with complete and updated contents and tools in order to answer to the different stakeholders needs. The Global Project is divided into different actions-subprojects which can address specific needs. Depending on the international economy and society, the technology evolution, or the major changes in the regulatory frameworks, various programmes should be developed to face the challenges of maritime industry.

The first step for the development of an MoS knowledge base which will meet the market needs was the TrainMoS project. The TrainMoS action included seven universities from seven different EU Member States (Spain, Portugal, Sweden, Germany, United Kingdom, Italy, and Greece), which altogether constituted a full training programme on maritime and multimodal freight logistics. Participants of the project in combination with universities’ students created a critical mass which allowed for the development and testing of a European

academic module in seven MoS related subjects that should meet the needs of the freight transport industry actors (European Commission, 2013).

When the TrainMoS programme started at the beginning of 2012, there was a need for a training programme on the EU multimodal transport system, addressed as follows:

- Supporting the concept of MoS in the Multimodal Transport Networking by developing an initial MoS knowledge platform, and
- Introducing the human element in the Motorways of the Sea by defining the basis for a future EU virtual open MoS University Master Programme and by pulling together local MoS related competences and knowledge of different EU universities.

TrainMoS included a series of activities that completed until the end of 2013. The main target of those activities was the process of preparation and delivery of modules that would contribute on maritime education. Although all the developed modules and the Learning Management System (LMS) between the involved universities were operating properly, the project did not reach its full potential as the modules were followed mainly by students of each University locally, without simultaneous participation by the majority of the students during the pilot exercise. In addition, TrainMoS revealed the necessity to expand the training and vocational education programmes to professionals, to exploit the stakeholders' network that was established and to develop the knowledge platform that was launched and tested during that project. This paved the way for the successful application for the "TrainMoS II" and "OnTheMoSWay-network" (OTMW-N) projects.

### 3.1. TrainMoS II project

Following the principles and the ideas of its predecessor, TrainMoS II was built upon the already generated knowledge and tools in order to answer to the new demands, to deliver new contents (post degree courses, professional training and vocational education), to improve the existing IT tools and to bridge the demand and offer of training and jobs with a specific section in the OnTheMoSWay.eu portal. TrainMoS II consolidated consortium consisted of six prestigious EU Universities (University of Strathclyde, University of Genoa, Technical University of Madrid-UPM, National Technical University Athens, University of Piraeus and Faculdade de Ciências Sociais Humanas in Lisbon). The consortium was completed by two IT partners (Circle and CIMNE), plus public and private entities (Regione Liguria, Ocean Finance and Magellan) working in the stakeholders needs and best practices domain.

The main objective of TrainMoS II project was the establishment of a maritime and logistics knowledge platform, covering all main levels and contributing to the development of human element with up-to-date contents and tools in order to address the various stakeholders' needs. This platform aimed to match the maritime market needs with the training provision and to develop new or to enrich the already existing online tools with new material and knowledge for both professionals and students.

Based on the videoconference systems and portals which were developed in TrainMoS project, one of the first steps was the stakeholders' database update and expansion with new players of maritime industry who were interested in training modules. Through that, the dissemination of the training programmes was increased and more challenges of real market were identified. The development and extension of these online tools ensured the sustainability of the delivered courses and modules, and the availability of the material for future applications. An additional aim inspired from the Blue Economy principles was set during the TrainMoS II project. A specific section was created within the portal, dedicated to match between the job market demands and the training and provided services supply.

The TrainMoS II project, taking into consideration the stakeholders demands and students' interests, and focusing to the dissemination of its training programmes, set as a cornerstone the establishment of a strong linkage between industry and educational institutes. 'Focus Groups' were organised in each of the participating countries. By the end of 2014, the participants in the groups identified important issues to be addressed, bringing the industry closer to the project simultaneously. In these groups, the tasks of each activity were planned and the main topics of training modules were prepared. In detail, the concerns for the action were the following:

- To involve the TrainMoS Stakeholders Networks in the consultation, coordination and adaptation of the academic program to market demands.
- To detail the contents of the training courses according to the stakeholders needs as identified through the

previous activity, and prepare the corresponding training modules.

- To establish the content of a modular MSc/Post Graduate Diploma/Certificate/Continuing Professional Development (CPD) programme with a number of modules, and start the accreditation process following the European Credit Transfer and Accumulation System (ECTS) system and the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers of International Maritime Organization (IMO).
- To use the existing videoconference systems and to further develop the website [www.OnTheMoSWay.eu](http://www.OnTheMoSWay.eu) and to improve LMS Spontania and Fraktalis software tools further, with new functionalities and new assistance services for the platforms.
- To use, update and extend the material and mailing list that has already been set up in TrainMoS, taking into account the new topics that have been indicated from the stakeholders.

Taking into account the input from the maritime market stakeholders, the Project Coordinate Committee defined the courses setting as a main focus to maximize the students' and professionals' participation. The developed training modules were relevant to the following five main topics:

- Alternative fuels & Technologies
- Logistic issues
- Damage Control training
- Evacuation/Crisis Management Operations
- Maritime sustainability and energy savings

Based on the aforementioned topics, two different packages of courses were prepared for the professionals and postgraduate students respectively, taking into consideration each group skills and knowledge, as well as their availability. The post-graduate courses were:

- TM 2.1.1 Maritime sustainability and MoS
- TM 2.1.2 Port planning, infrastructure management and alternative fuel supply chain
- TM 2.1.3 Risk based methods for new fuel technologies
- TM 2.1.4 Port energy operations and clean power investment analysis
- TM 2.1.5 Safety and energy efficient marine operations
- TM 2.1.6 Alternative fuels in the common European transport space through intelligent investment, design and innovation

The professional courses were:

- TM 2.2.1 Maritime sustainability and energy savings
- TM 2.2.2 Modern logistics networks fuelled by alternative energy sources
- TM 2.2.3 Logistic issues and single window directive
- TM 2.2.4 Safe return to port
- TM 2.2.5 Evacuation and crisis management
- TM 2.2.6 Elements of maritime and intermodal transport management

The format of the postgraduate student modules was developed in respect of the ECTS accreditation scheme, structured by a series of lectures, visits, exercises and exams that were required for the successful completion of each module. The structure of the professional modules followed the postgraduate modules, with major differences to the included material due to the different orientation and time schedule. Each consortium partner was responsible for a specific module, depending on its expertise, delivering the training modules to students from five different countries.

Throughout the courses, distance learning platform was a valuable tool for the successful courses performance. The students from the country in which the module was delivered were following the lectures in the same class, simultaneously with the students from the rest participating countries, which were able to participate and involve through the online tools that have been used within the project. In addition, the provided lectures were recorded through these, enhancing the acquired knowledge for future applications through the OnTheMoSWay Portal and the Learning Management Systems (OnTheMoSWay portal, 2017; ClearOne, 2017).

Finally, the importance of a training module was reflected by the accreditation that was acquired at the successful completion and assessment. Considering that the TrainMoS II focused on two different groups of recipients, the efforts had been made to design a hypothesis of MSc programme for students and acquire a CPD

certificate at international/local level. In the first case, a multilateral cooperation agreement was signed among the participating universities on the credit recognition, whilst the policy and regulatory framework in national level was tracked. Additionally, universities from each country prepared documentations for the accreditation of Higher Educational Programmes for professional engineering competence.

### 3.2. OTMW-N project

The other offspring of TrainMoS was the OTMW-N. This project aimed to the provision of valuable skills and knowledge to professionals and students about the usage of LNG as marine fuel, focusing on the design of a specialized LNG-oriented VET programme. The respective consortium consisted of Higher Education Institutes (University of Strathclyde, City Glasgow College, University of Genoa, World Maritime University) and companies (Ocean Finance and Environmental Protection Engineering S.A.) with the active contribution of La Spezia port authority and the IT assistance of Circle.

LNG is considered as the fuel of the future due to its lower emissions, lower carbon content and lower price. Also, a great number of marine LNG engines are built by European manufacturers. Though its use is widespread in European continent, the poor understanding of the strengths and risks of the LNG as marine fuel prohibit the expansion of its use. Additionally, the limited number of ports with LNG bunkering facilities prohibits the consideration of LNG as a viable alternative.

In order to overcome these obstacles, both onshore and onboard personnel should be aware of the advantages and disadvantages of LNG's application as marine fuel. In addition to the IMO's requirements, the inter-modal characteristics of the LNG logistics have to be realized. Up to now, LNG was mainly used as fuel onboard LNG carriers and its transfer was made mainly at dedicated LNG terminals. Additionally, the use of LNG in ports requires a new culture to be developed and a deep understanding from all the engaged personnel has for their individual roles to the safe operation of LNG fuelled ships.

The OTMW-N project, clearly in line with the market needs, addressed training supporting safety issues and engaged a large number of stakeholders in several ways such as clustering events, networking activities, social media and the final conference. The major objectives of the project were the following:

- The understanding and the appreciation of the advantages and disadvantages of the usage of LNG as a marine fuel
- The development of a new culture in all the stakeholder and personnel, both onboard and offshore, to understand their role to the safe operation of LNG fuelled ships
- The linkage between the different perspectives of onboard and port crew, developing a mutual understanding.
- The gap bridging in the existing training procedures and the different perspectives on the use of LNG for bunkering

The significance of distance learning was taken into account during the planning of OTMW-N project and as a result, the modules were supported by state-of-the-art remote lessons, realised using the Spontania videoconference tool (ClearOne, 2017), a simple software that sufficiently supported the successful transfer of sound and image between different classrooms and offices, different countries and at the end of the day gave the opportunity to the students from different areas to take part in the most reputable educational programmes such as the OTMW-N project. Further, this tool gave the opportunity of gathering the best lecturers and specialists relative to the project's topic at the same "location", even if they were located in different countries. At the same time, an informal network was created for the follow up of training actions in the future. A wide number of important activities, which have been covered by OTMW-N project, were:

- A set of professional trainings and vocational education activities in four European countries, in cities, in ports or even on board.
- A number of cross fertilization on site dedicated visits related to LNG bunkering best practice.
- An enlarged LNG content of a professional portal including an application available on mobile phones and tablet.
- A set of activities in professional social media.
- A set of clustering activities engaging large number of stakeholders and liaising with a number of LNG projects.
- A conference on the introduction of LNG as a long terms strategy for supporting the greening of TEN-T



and of MoS as its maritime dimension.

- The creation of a formal association of stakeholders for the promotion of MoS in Europe.

The training modules were based on current demands in the industry. Subjects and content were defined and rechecked to meet the demands that were described by major stakeholders through an entire process that was carried out before the final delivery of the modules. The project partners, with their origins on education and industry, agreed to the necessities of the market and the current employees. These necessities with the academic background of the majority of the partners turned into motivations for the construction of a really competitive curriculum which combine the theoretical knowledge with the practical implementation through simulation activities. The modules that were generated from that process are the following:

- Module 1: LNG fuelled vessels design training
- Module 2: Safety of LNG handling on plant, bunkering station and on board vessels
- Module 3: LNG cargo and ballast management training on LCHS simulator
- Module 4: Manoeuvring of LNG driven vessel, special conditions and operations
- Module 5: Propulsion and power generation training of LNG driven vessel

#### 4. Outcome

Both projects, TrainMoS II and OTMW-N, delivered a whole series of lectures, site visits and seminars across Europe. The outcome of this effort is quite interesting. Regarding educational activities, a number of more than 70 students and 85 professionals attended successfully to the courses, either by physical presence or using the Spontania software, which allowed them to participate actively during the class.

Within the modules, students enhanced their operational skills concerning the understanding of logistics chain and operations efficiency related to maritime transport and intermodality. The courses assisted students to recognize the importance of a holistic approach to maritime transport sustainability and to identify and evaluate the critical factors related to environmental and social sustainability of maritime transport. Moreover, they gained a basic knowledge on transport systems, maritime transport and MoS, and on the environmental sustainability of maritime transport. Further, they developed an understanding on crisis management operations, including the controlling of passengers and other personnel during a crisis. The mix of the local and distance learning students is depicted in Fig. 2. Though the local students' percent is higher than the respective distance learning percent, the fact that almost one out of three students was using the online platform to follow the educational programmes proved the high resonance of the online tools to the educational programmes.

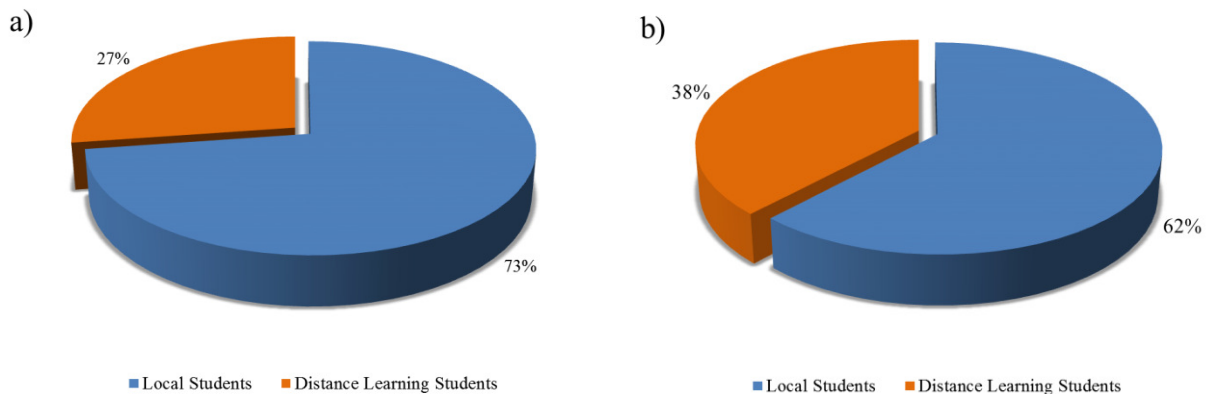


Fig. 2. Distribution of a) professional students in TrainMoS II project and b) students in OTMW-N project

The students' technical skills were evaluated by the implementation of methods to perform technical feasibility studies (existence of realistic technological solutions, quantification of requirements and specification of main dimensions, etc.), and to evaluate risk and accident analysis in the field of LNG and relevant new fuels issues, general operations, bunkering operations and other similar cases. Also, they were able to understand the basic principles of IMO's evacuation guidelines and to familiarize with an evacuation simulation software tool by the evacuation analysis study of a RoPax vessel. The size of post-graduate students and success percentage are presented in Fig. 3. At the successful assessment of the delivered modules, a certification of attendance,

recognized from IMarEST, which is an international marine organisation, was given to each participant as a qualification for the acquired knowledge. In terms of accreditation, the framework of a European MSc programme in maritime studies with the participation of many universities from different countries was defined, discussing the influence of industry within it and each university requirements to realise it.

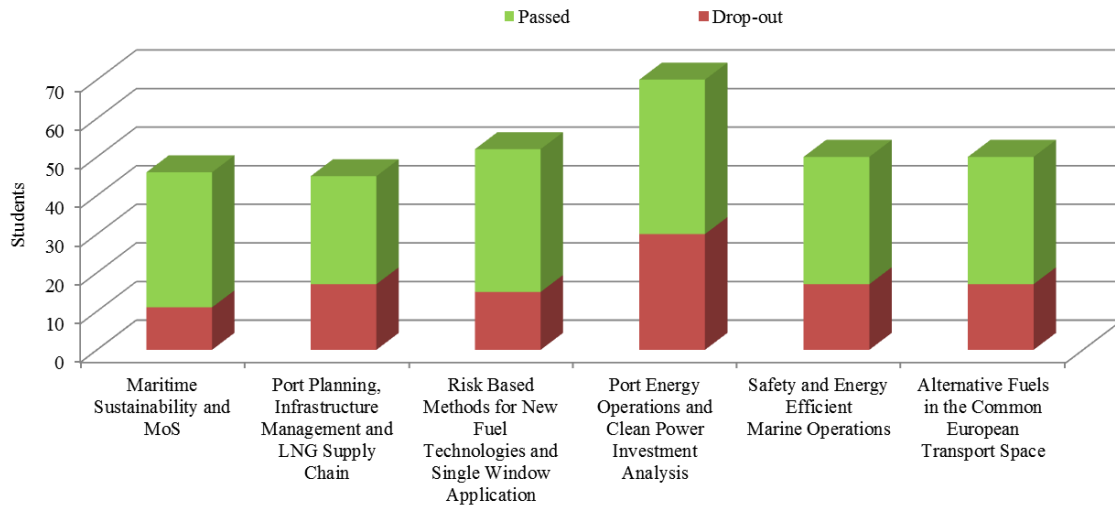


Fig. 3. Postgraduate students' participation in TrainMoS II project modules

Table 1. OnTheMoSWay.eu portal statistics data

Site Indices	
Visits	20,235
Unique visitors	13,185
Page views	53,342
Average time spent on the site	~3 minutes
Newsletter total subscribers	1,133
Geographical coverage with most visits	Italy, UK, Greece, Spain, USA, Portugal, Germany, Belgium, France, Netherlands

An important outcome of the OTMW-N project was the further development of the IT platform. The IT platform was developed based on an existing platform, whilst a network was created for the follow up of training actions in the future. The statistics of the platform during the project development (from May 2014 to December 2015) are presented in Table 1.

The material produced from the Universities in the TrainMos II project and collected from the conferences, lectures and visits in OTMW-N project is available through the online educational platform (OnTheMoSWay portal, 2017). In particular, the uploaded contents to the Learning Management System Platform are:

- Approximately 150 GB disk space
- More than 12.000 files uploaded
- More than 500 video recordings and more than 1000 hours of video lessons

The produced material included presentations of the lectures, lecture notes and additional useful material (e.g. regulations, case studies, examples, presentations etc.) and it was available online to open access for the registered students. Simultaneously with the established knowledge platform, an Android based application was developed under the title 'OnTheMoSWay Training Center'. Through this application the users were able to reach the delivered courses description, the contact information and the training materials produced within the courses, though the project's end. With over 100 downloads, the developed application still offers access to various maritime educational modules to the users through their mobile devices.

The feedback from the students was quite satisfactory, with the highest rating to come from the administrative staff of the course. The majority of the students found the courses quite helpful and more time was requested for the better assimilation of the content. Furthermore, more than 300 stakeholders from public and private entities

in more than 6 countries were involved, with valuable contribution to the module design and content selection. At the same time the stakeholders were introduced to the site dedicated sections for covering their future training needs and posting relevant job vacancies in case they may arise. TrainMoS II organized an event and presented its results to representatives of the European Parliament in December 2015 with very positive feedback.

## 5. Conclusions

VET programmes are considered as one of the most constructive ways to the Blue Economy. The balance between industry demands and society needs for a sustainable economy is achievable only through the knowledge exchange and sharing. In particular, maritime industry is a dynamic market with high turnover, many technological evolutions, continuous policy amendments and enormous size of information and knowledge. TrainMoS II and OTMW-N projects, presented within this paper, had as a main target to focus on the foundation of European maritime educational programmes, covering all the levels of a classical educational and training system, from students till lecturers and from professionals till trainers.

During these projects, educational material and video were produced and recorded, offering insight to maritime industry issues with limited availability in existing educational programmes. Through these programmes, a network of maritime stakeholders was traced and links between industry and educational institutes were established, with early signs for the future development of a European educational programme in shipping and maritime infrastructures were set. The dynamic participation of students, stakeholders and universities in these projects proved the interest of all actors to the deployment of additional educational programmes that will be directly connected with industry and society, improving the technology research and growth in fields of maritime industry with limited knowledge and competitiveness, and enhancing the safety within shipping operation and building. Although, the material and the IT platforms produced within these projects constituted the first steps to the success of this vision, further steps are required.

The main aspects of the future maritime educational programmes include the continuous update of the educational material, the stronger connection between education and job market, and the active communication among research, regulatory bodies and industrial partners. However, sufficient funding of such actions is required, inviting new players and maintaining the efficiency of educational programmes in society. Thus, a self-sustained economy is essential to be achieved, enhancing the competitiveness of the European maritime industry.

## Acknowledgements

The present work was conducted within the European Commission co-financed projects TrainMoS II (2014-2015), Decision no 2013-EU-21012-S and On the MOS Way Network (2014-2015), contract no MP/2013/035/ONTHEMOSWAY NETWORK in the framework of the MARCO POLO II Programme (2007 – 2013). The European Commission and the authors shall not in any way be liable or responsible for the use of any knowledge, information or data of the present paper, or of the consequences thereof. The views expressed in this paper are those of the authors and do not necessary reflect the views and policies of the European Commission.

## 6. References

- ClearOne, 2017. Spontania Cloud-Based Media Collaboration. [online] Available at: [http://www.clearone.com/products\\_spontania](http://www.clearone.com/products_spontania) [Accessed 21 Sep. 2017].
- Bruges Communiqué, 2010. The Bruges Communiqué on enhanced European Cooperation in Vocational Education and Training for the period 2011-2020, [online] Available at: [http://ec.europa.eu/dgs/education\\_culture/repository/education/policy/vocational-policy/doc/brugescom\\_en.pdf](http://ec.europa.eu/dgs/education_culture/repository/education/policy/vocational-policy/doc/brugescom_en.pdf)
- Commission of the European Communities, 2001. European transport policy for 2010: time to decide. White Paper from the Commission to the European Council, COM(2001) 370 final, Brussels.
- Commission of the European Communities, 2011. Roadmap to a Single European transport Area-Towards a competitive and resource efficient transport system. White Paper from the Commission to the European Council, COM(2011) 144 final, Brussels.
- De Oliveira, L., 2013. Priority Project 21 Motorways of the Sea: Annual Activity Report 2012-2013.Brussels.
- European Commission, 1992. Treaty on European Union (Maastricht text), July 29, 1992, 1992 O.J. C 191/1 [hereinafter Maastricht TEU].
- European Commission, 2002. Declaration of the European Ministers of Vocational Education and Training, and the European Commission, convened in Copenhagen on 29 and 30 November 2002, on enhanced European cooperation in vocational education and training. [hereinafter “The Copenhagen Declaration”].
- European Commission, 2010a. The Lisbon Strategy 2000-2010: An analysis and evaluation of the methods used and results achieved. [online] Available at: <http://www.europarl.europa.eu/document/activities/cont/201107/20110718ATT24270/20110718ATT24270EN.pdf> [Accessed 14 Dec. 2017].

- European Commission, 2010b. EUROPE 2020: A strategy for smart, sustainable and inclusive growth, COM(2010) 2020. [online] Available at: <http://ec.europa.eu/eu2020/pdf/COMPLETE%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf> [Accessed 14 Dec. 2017].
- European Commission, 2011. Transport 2050: Commission outlines ambitious plan to increase mobility and reduce emissions. [online] Available at: [http://europa.eu/rapid/press-release\\_IP-11-372\\_en.htm](http://europa.eu/rapid/press-release_IP-11-372_en.htm) [Accessed 13 Sep. 2015].
- European Commission, 2013. TrainMoS 2011-EU-21004-S Project Description. [online] Available at: [http://ec.europa.eu/inea/sites/inea/files/download/project\\_fiches/multi\\_country/fichew\\_2011eu21004s\\_final\\_2.pdf](http://ec.europa.eu/inea/sites/inea/files/download/project_fiches/multi_country/fichew_2011eu21004s_final_2.pdf) [Accessed 5 Oct. 2015].
- European Commission, 2017. TEN-T Priority Project 21: Motorways of the Sea - Project Description. [online] Available at: <https://ec.europa.eu/inea/en/ten-t/ten-t-projects/projects-by-priority-project/priority-project-21> [Accessed 13 Sep. 2017].
- IBCVET, 2017. International European Benchmarking on CVET for Blue jobs-skills-economy. [online] Available at: <http://www.ibcvet.eu/> [Accessed 13 Sep. 2017].
- National Institutes on Post-Secondary Education, 2000. Emerging Research Findings: Connections Between Education and Work.
- OECD, 2013. A Skills Beyond School Commentary on Scotland. OECD Reviews of Vocational Education and Training, OECD Publishing.
- OECD, 2014. Skills Beyond School: Synthesis Report, OECD Reviews of Vocational Education and Training, OECD Publishing.
- OnTheMoSWay portal, 2017. [online] Available at: <http://www.onthemosway.eu/> [Accessed 21 Sep. 2017].
- Ross, W. D., Brown, L., 2009. Aristotle-The Nicomachean ethics. Oxford: Oxford University Press.
- Simpson B., 2015. Motorways of the sea work plan of the European Coordinator.