

Maritime Education and Research to Face the XXI-st Century Challenges in Gdynia Maritime University's Experience

Part I – Maritime Universities Facing Today and Tomorrow's Challenges

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ABSTRACT: In the paper, divided into two parts, a problem of advancements in maritime education and research facing the 21st century challenges, based on the case study of the Gdynia Maritime University (GMU) experience is discussed. Part I is devoted to the main directions of advances in the maritime education and research towards the challenges in a global meaning. In this context, the education and research potential of the Gdynia Maritime University, as one of the world-leading maritime universities, is shortly presented. Part II is dedicated to the Gdynia Maritime University experiencing the 21st century challenges. The GMU's contribution and good practices concerning the participation in modification of the processes of the IMO STCW 78/2010 convention, adoption of programmes into the international and national qualification frameworks' standards and procedures, as well as the development of research addressed to a new technological and organizational solution are described and analyzed.

1 INTRODUCTION– THE MAIN CHALLENGES THAT MARITIME UNIVERSITIES FACE

1.1 *Preliminary remarks about a continuous development of maritime education, training and research*

Legal and technological aspects create a space and necessity for progress of maritime education and training (MET) in a wide meaning. This progress is stimulated and driven by the innovative research and implementation of new technologies. The highest values for the world community today [4], whether maritime or other, are "safety", "quality" and "environmental friendliness". These are basically the values of the users of the merchandise and of the general public. In shipping they are shippers and people in general. The highest value for the merchandise producer in "profitability". Maritime education, training and research appear as the basis

for the vertically integrated production system [4]. A wide perspective of the MET discussed in [1] covers such elements like the concepts of learning, learning resources and educational technology, the organization of MET, fundamentals of assessment and evaluation, and finally present approach towards specialization. MET is one of the form of vocational education and training (VET), which is characterized, among others, in [2]. Some experiences of competency-based training are presented in the wake of important observations.

Firstly, vocational education and training (VET) is driven by multiple factors, such as a global economy, industry, restructuring and policy governmental initiatives. And secondly, the world of work keeps on changing due to the progress in science and technology [2]. This leads to the changes in tastes and preferences, which necessitate a continual adaptation in VET teaching and learning. In this place it should

be added that VET (or more precisely MET) is developed also due to the changes within the international standards, like for example STCW'95 (2010) Convention [11] signed by the majority of the world governments. In this context the main goal of education is to prepare an individual for life which involves multiple roles in order to function effectively in one's community, e.g. seagoing service onboard of ships.

Maritime Education and Training (MET) evolves along with the fast development of maritime industry. It faces many new requirements [5] in the progress of such evolvement like the requirement of further enhancement of seafarers' practical skills and ability under the new STCW'95 (2010) convention, the requirement of the introduction of new training items, such as Electronic Chart Displaying Information Systems (ECDIS) and Bridge Resource Management (BRM), multifunctional VTS, and other requirements and demands from maritime industry.

The process of meeting those requirements can be seen as a new development of MET. Additionally, for the countries interested in crew-manning supply, the quality of their MET is one of the main factors affecting the competitiveness of their seafarers in crew-manning market.

The university case-study presented and discussed in [3] has an employability framework which includes six elements to be embedded in the courses to promote employability:

- 1 the progressive development of autonomy,
- 2 the development of skills,
- 3 personal development planning,
- 4 the inclusion of activities similar to those required in the external environment,
- 5 student reflection on skills and knowledge and how these can be transferred to different contexts,
- 6 the encouragement of career management.

It is very easy to note that the conditions and requirements formulated as general case, in point 2, 4 and 5 are very strictly adapted to the commonly accepted MET standards.

1.2 *Today and tomorrow's challenges in the domain of maritime education*

Maritime education advancement is forced upon and based on full implementation of the STCW 1978 as amended in 2010 Convention in the teaching and training programs of the Universities [6,7,8]. Introduction of some new simulators and several selectively dedicated laboratories is a must for modern training and this goes along with the adoption of the maritime specializations and programs to the International (European) and National Qualifications Framework. Flexible adoption of programs and creation of the new specializations is a response to the needs of global and local labour market. It is worth noting that a full implementation of the Manila amendments (STCW 2010) requires not only some changes and completions of the teaching and training programmes of the STCW convention signatories, but also a creation of a new and modernisation of the existing laboratories. In many cases a new academic staff like in the case of Electro-

technical, Electronic- and Information Systems areas [9] must be employed. Also, the simulator technology has rapidly developed and applied, but one should be careful in the use of these solutions. Authors of this paper are of the opinion that the simulator could be a valuable and useful completion tool in the education process, but cannot substitute the training in the real objects – in the laboratories equipped with real devices and installations as well as onboard on the training and commercial ships.

On the other hand, a new problem has appeared in front of maritime universities in the last years [6,7]: adoption of programmes into the National Qualifications Framework procedures. Adoption of programs to the National Qualifications Framework procedures. The National Framework of Qualifications for higher education is – generally speaking – an understandable in national and international meaning, description of qualifications gained in a higher education system in respective country. As a result of works on the National Framework of Qualifications /NFQ/ for higher education in a country under consideration, the conclusion was reached that: the effects of education are described in categories of knowledge, skills and social competences and that the students gain the qualifications at three tiers and two profiles (a general profile and a practical profile).

Three underlined tiers of qualifications correspond with [7]:

- obtaining – as a result of completing the tier one education – a title of Bachelor, Engineer or equivalent,
- obtaining – as a result of completing the tier two education – a title of Master of Science, Master of Science in Engineering or equivalent,
- obtaining a title Doctor of Philosophy.

In all the European countries participating in the Bologna Process, the implementation of National Framework of Qualifications for higher education and life-long learning have been designed to be adequate to the European frames' levels. Moreover, these levels of the National Framework of Qualifications for higher education correspond with three tiers (Bachelor, Master, Doctor) specified in European Framework of Qualifications for higher education, shaped as a result of the Bologna Process.

1.3 *Today and tomorrow's challenges in the domain of the research in maritime universities*

Research advances in maritime universities are mainly addressed to widely understood marine transport problems [4,6,7]. The main focus of the recently conducted and quickly developed research is concentrated on implementation of new advanced technologies, as well as effective and reliable technical and organizational solutions. The most important projects are dedicated to and implemented in the numerous areas, but their key points are related to the highest values for the world marine community today - safety, quality and environmental friendliness. The priorities of the scientific areas are resulting from the „hot topics“ in the international cooperation (e.g. 7th European Framework Programme) as well as the expectations and challenges formulated by the

industry. They cover, among others, such directions as: information and communication, technologies, energy, environment, transport, food, agriculture and fisheries, biotechnology. The general assumption is that the development of research addresses to new technological and organizational solutions should be friendly for users and environment.

But the key point of the research is oriented to the highest values of the world marine community today: safety, quality and environmental friendliness.

2 THE GDYNIA MARITIME UNIVERSITY – ONE OF THE WORLD-LEADING MARITIME UNIVERSITIES

Gdynia Maritime University (GMU), established in 1920, is a state technical higher education institution offering engineer and master's degrees for prospective merchant marine officers, highly qualified specialists in ship and port operators, transport management systems and other professionals for maritime industries – up to national, European and world standards of education [6, 7]. It is the largest state school of higher maritime education in Poland and one of the largest in Europe. The GMU, situated on the Baltic Sea East coast, is the biggest Polish maritime university. Besides of this university, the Polish maritime higher education system covers also Szczecin Maritime University (the Polish West coast of the Baltic Sea) and particularly the Polish Naval Academy deriving from the navy sector, and placed in Gdynia, too.

In Fig. 1. it is shown how the Polish maritime universities operate and how they are supervised.

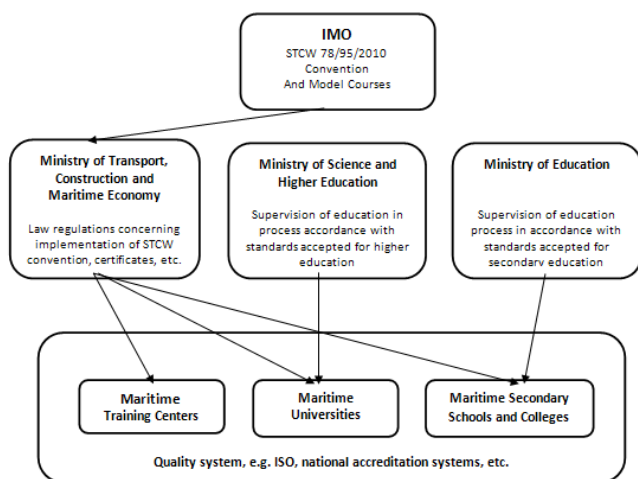


Figure 1. Polish Maritime Education System: its components and links

A main conclusion resulting from Fig. 1 is that the maritime universities in Poland are subordinated by two Ministries and must meet the requirements and accreditation conditions formulated by the Ministry of Transport, Construction and Maritime Economy (maritime standards) which is a legal representative of IMO in Poland, and by the Ministry of Science and Higher Education (academic standards), respectively.

This situation generates some difficulties concerning the academic and maritime standards for teaching staff and also causes some limitations in regard to IMO KUP (knowledge, understanding and proficiency) aspects corresponding to the functions under consideration, e.g. Navigation, Marine Engineering, or Electrical, Electronic and Control Engineering at the appropriate competency level, management or operation. For the effective and satisfactory maritime university operation, being in line with two kinds of the above mentioned standards, it is necessary to accept some compromises and choices between the good maritime education and training leading to professional skills on one side, and the academic mission of the university on the other. Taking into account those basing but sometimes opposing conditions, an appropriate structure and way of functioning of maritime university should be considered. In this context, at present, the academic programmes of GMU are organized into four faculties constituting the basic scientific-educational units: Faculty of Navigation, Faculty of Marine Engineering, Faculty of Marine Electrical Engineering and Faculty of Entrepreneurship and Quality Science. The faculties are composed of departments that conduct research and educational activities within their profiles of studies [7].

In 2012, Gdynia Maritime University had employed 793 persons, including 334 scientists and academic teachers (in which: 74 full and associate professors, 150 assistant professors, 110 lecturers and assistants) and 459 persons as technical, administration, service personnel and training ships' crews.

The total number of full-time and part-time students is over 6600 students in 35 specializations. Officer qualification and specialist training courses realized in Officer Training Centre of Gdynia Maritime University is provided for over 6000 ratings and officers (yearly) in 43 specializations. The post-graduate studies are delivered for over 300 students in 12 specializations.

The programs of studies offered by the Gdynia Maritime University satisfy both Polish educational standards provided by the Ministry Science and Higher of Education and also the requirements of the International Maritime Organization. The accreditation awarded by the IMO covers the field of training for shipboard deck, engineer and electrical-automation officers in compliance with the STCW Convention: Operational and Management levels.

The University is assessed and found to be in accordance with the Quality Management System - ISO 9001: 2008 in the scope of education, conducting research works according to Polish and international requirements.

The State Accreditation Committee has awarded Gdynia Maritime University with accreditation for the following fields of studies: navigation, transport, mechanical engineering, electrical engineering, electronics and telecommunication, management, commodity science.

The GMU is an active member of international organisations, e.g. European University Association

(EUA), International Association of Maritime Universities (IAMU), our researchers and lecturers are active experts of the International Maritime Organization (IMO). An active cooperation with a large number of foreign partners is the natural result of the University's character.

The traditional lecture halls are organized in modern multimedia auditoria. Educational facilities include several specialised laboratories, such as full mission bridge simulator, satellite navigation systems (GPS/GNSS), Colregs, electronic chart display and information systems (ECDIS), radio-communication systems (GMDSS), a Planetarium, a ship's power plant simulator (ER-SIM), a radar simulator (ARPA), fire-fighting training ground and instrumental analysis workshop.

The University is the owner of two training ships - the research training vessel „Horyzont II” equipped with the state-of-the-art facilities, and tall ship „Dar Młodzieży”, pride of Poland and our University. During her service she has brought the unusual popularity among sailors from all over the world.

The Ship Handling Research and Training Centre at Ilawa is owned by the Foundation for Safety of Navigation and Environment Protection, which is a joint venture between the Gdynia Maritime University, the Technical University of Gdansk and the City of Ilawa [10]. Many experimental and theoretical research programmes covering different problems of manoeuvrability (including human effect, harbour and waterway design) are successfully realised at the Centre.

Safe operation of ships in restricted areas depends on operator skill and experience. One way to influence operator skill and hence to increase safety against collisions and groundings is proper training of operators in realistic environment. Training could be accomplished on board ships, which takes, however, long time but also on simulators. There are two types of simulators: full mission bridge simulators working in real time and physical simulators using large manned models in purposeful prepared training areas (MMS). There are few MMS in the world, one of which is in Ilawa. In the centre models of several types of ships are available and training areas are developed representing different navigational situations. The main purpose of the training exercises is to show the trainees how to handle the ship in many close proximity scenarios, in the presence of current, in canals and waterways of restricted width and depth, etc [10].

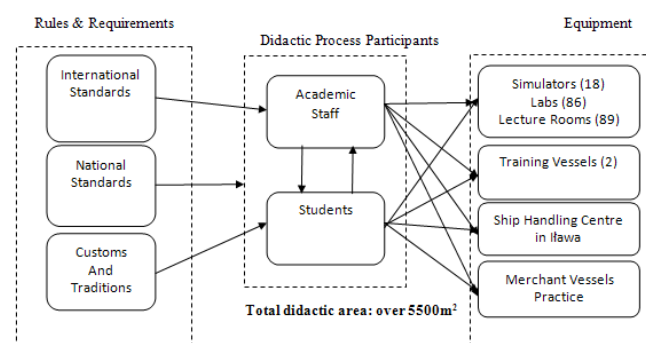


Figure 2. Components of educational and research activities of Gdynia Maritime University

Components of educational and research activities of Gdynia Maritime University are illustrated in Fig. 2.

3 FINAL REMARKS

Today and tomorrow challenges in front of the maritime universities concern two aspects - maritime education and research advances. The maritime education should comply with the requirements of IMO conventions. First of all the full implementation of the STCW 1978 as amended in a 2010 Convention reflected in teaching and training programs is necessary. The maritime Universities should be open for flexible adoption of programs and creation of the new specializations in the response to the needs of global or local labour market. Maritime education requires the compatibility with National and International Framework of Qualifications for easy recognition in case of continuation of education aboard or international job market activity.

The present and future research priorities in maritime universities are concentrated on, but not limited to, the well defined areas like information and communication technologies, energy (resources, safety and effectiveness), environment (influence on our life, changes, protection), transport (sea transport, marine technology), food, agriculture and fisheries, biotechnology (product quality aspect, new possibilities of implementation).

Taking into account the global trends concerning the 21st century challenges in the domain of maritime education and research, the Gdynia Maritime University, due to its educational and research potential based on the highly qualified staff and excellent training and research equipment, is considered as one of the world-leading maritime universities [12, 13]. A measure of the relevant meaning, good quality and high standards of maritime education in this University is a truly good reputation of its graduated on the international labour market of the seafarers.

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