Combining Vocational and Academic Requirements in the Maritime Education and Training

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Abstract

The main aim of the EU Vocational Education and Training (VET) is primarily to provide qualified people to support the economy. In order to achieve this aim the cooperation between business sector and VET institutions is necessary.

The operating methods and requirements of industry and VET providers are generally different as much as their modus operandi. The aim this paper is to report on the recent research that how the requirements of both sides can be met as pre-requisite for collaboration.

It is clear that we cannot undermine the education philosophy and practice or the requirements of the industry which are the backbone of the business life. There are ways that the requirements of both sides could be satisfied if the boundaries of each side could be drawn and overlaps of the requirements identified.

Industry relies on education sector to provide it with good quality craftsmen, technicians and graduates. For this reason, they should work with the education sector to make sure they get the right people for the jobs they have designed. They also need to send their employees to get additional education and training and update their knowledge and skills for meeting any new needs based on the emergence of new practices and/or technologies or for general or specific improvements to their business. The maritime education and training (MET) providers are obliged to make sure they understand the industry's needs and offer appropriate MET programmes in line with these identified needs.

The paper reports on the examples of good partnership between education and business and makes special references to the special education and training needs of the seafarers who work at sea under severe working conditions while being responsible for people's lives and ship owners' well-being. Considering the recent economic crisis funds for education and training is in short supply requiring the MET providers to become even more innovative.

KEY WORDS: Vocational Education and Training, Maritime Education and Training, Education-Industry partnership

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1. Introduction

A significant evolution happened in the vocational education system in early 1980s; higher vocational schools/community colleges/polytechnic schools in many countries either become universities or became a part of the universities and some colleges become faculties. Not only the organizations but also programme structures have drastically changed after this date. Academic courses became more dominant when the vocational courses reduced. To support these programme, the composition of the lecturing staff has changed in favour of academics while the number of the vocational lecturers reduced.

Industry has started to demand more specific manpower with additional qualifications and many new job descriptions rose in late 1980. Unfortunately education institutions could not fully support these new manpower requirements. To meet these requirements, many new institutions have been established to provide special courses to support the industry. Some companies established their own schools and training department to meet their specific manpower needs. Human resources departments became more sensitive to the specific courses rather than academic qualifications when assessing the details on the CVs of the candidates.

The countries which realized this problem have formed special platforms consisting of the representatives of the education institutions and industry to improve the situation with a view to meet mutual requirements. The role and the mission of such platforms became more significant after vocational qualification systems became an important area of concern in the Western World.

Unfortunately we still have many problems in vocational education and training to meet the manpower requirements of the industry. The people working in the industry in particular lower management level are not so happy with the education background of the newcomers and trainees.

2. The Elements of the Vocational Qualification Systems

The contemporary vocational qualification system has five essential elements;

- The definition of competencies for each vocational qualification
- The definition of physical conditions, background, additional education and training requirements including on the job training for each competency
- The structured education and training programmes and institutions to apply these programmes with suitable lecturing staff and teaching equipment
- The accreditation of both academic and vocational education and training
- The certification of competency

As it is evident all these functions need different types of organizations and inclusion of many different institutions in the system. We cannot leave the overall responsibility of the

vocational education and training system to education institutions, and to create a system with the participation of all respective authorities. In order to create such a system we should establish open forums in which every element can easily introduce their positions.

The regulatory authority, the government, is the key element of the system with its respective bodies such as Standardization, Vocational Qualification, Education, and different Industry Departments. Industry may be represented by chambers, bars and/or even by worker unions. The education and training institutions may be included in the system by institutional organization such as federations of schools, lecturer associations, etc. The active involvement of large number of participants will ensure the effectiveness of the system. Effectiveness, meaning the 'doing the right thing', as requirements of various bodies will taken into consideration due to their involvement and such as an inclusive approach would prevent developing an arrangement which could be negated by one of the key stakeholder later in the process.

In many countries bilateral links between industry and government have been established to improve the vocational education and training system, but it could not worked as expected because of missing elements for providing inputs for feeding the system better. We cannot neglect the importance of the non-governmental organizations in particular vocational associations.

There are very clear areas of joint collaborations in some countries. One interesting arrangement is the Merchant Navy Training Board of the UK often referred to as MNTB. The MNTB has developed a set of occupation standards for different types and ranks of seafarers. MNTB works very closely with representatives of the maritime bodies such as BTEC/Edexcel, universities/institutions with maritime provisions, IMarEST (Institute of Marine, Science and Technology), Nautical Institute, MCA (Maritime Coastguard Agency) and representatives of industry including the Chamber of shipping. It is interesting to note the bodies such as IMarEST ensure the maritime programmes are accredited and industries requirements for the profession are met. The UK model is inclusive and very comprehensive. The fact that all state-holders are involved ensures the overlap areas are kept to minimum but the resultant does not often resemble what is offered in comparison to similar provisions in other countries. In a major EU funded project, known as UniMET (www.unimet.pro) the programmes and practices are been studied and interesting to note that one version of the Dutch model is very different to the practices elsewhere. The project has yet to report on its findings but nevertheless, the outcome would be useful for cross -fertilisation and -referencing helping to identify good practices and models for adaptation.

3. Balancing Academic and Vocational Requirements

The academic studies need specific requirements and methodology as the vocational studies needs are different. We cannot underestimate or neglect one of them. Both requirements should be carefully investigated and creative solutions should be found to balance them. It is pertinent to alarm a bell here as while a university, for instance, can decide all academic requirements, for the programme to have the backing of industry, the industrial requirements have to be met. In the UK, the requirements of industry are met through three major external bodies, IMarEST, MCA, MNTB, each with their own set of requirements. There are also companies that set additional requirements, which re often met through short course provisions. If the programmes relate to METs then there are other requirements that while may have been included in say IMarEST accredit METs, or Edexcel programmes, will have to

clearly show that for instance, IMO STCW requirements, are met. This is absolutely essential if an inspection by the national Administration or EMSA (European Maritime Safety Agency) is expected.

There is also another set of constraints that are not apparent. The constraints often present themselves when the view of academics is somehow different to those from profession or industry. We met with opposite positions of the academics and professions/industry during a a project study when developing a questionnaire for another EU funded project, called, SAIL AHEAD (www.sailahead.pro). Sail Ahead Project is based on education and training requirements for seafaring officers who would work at sea related positions at shore with the option working onshore after a period at sea.

The academics seem to be very keen on extensive content for mathematics and science courses with some depth while the profession/industry were of the view that more time spent on academic units leaves less time for vocational courses and practical work. The Bologna Process reduces the number of the semesters and limits weekly class hours. So how will we find a place for the increased class hours for both vocational and science units?

The academics propose post graduate (not postgraduate) courses to counter the new constraints. Since the profession/industry prefer short courses and on-line type distance learning considering that there time and increasing opportunities to access Internet at sea, multi-unit clusters or comprehensive and structured 2-3 years post graduate studies are unlikely to be norm in the future.

So, what is the solution?

The under-graduate 'engineering' programmes generally require at least 4 semester 4 hours Math, 2 semester 4 hours Physics, 4 hours Chemistry, 3 hours Technical Drawing, 4 hours Statics, Dynamics, Computer Science, Strength of Materials, Fluid Mechanics, Thermodynamics, Electricity and Electronics units which covers approximately freshman and sophomore years. After 1980s some Navigation or Nautical Science courses were re-named Navigation Engineering and these programmes were been adapted to meet engineering requirements at national level and sometime seeking international recognition/accreditation. Today general trend is to reduce the undergraduate programmes to 3 years. The question is 'how we will arrange our navigation engineering programmes in three years to meet both 'engineering' and STCW based vocational education requirements?' We believe that we should make a compromise and try to find a practical solution.

We need basic math and science units for Marine Engineering officer cadet programmes but also to deliver Navigation, Stability, Ship Construction and Cargo Operations units which are the key elements of MET programmes for Deck officer cadets. But to what extent abd how deep do we have to teach these units? This is the question we must answer.

Firstly, vocational lecturers should define their requirements for math and science knowledge to facilitate delivery of these key units, then math and science lecturers should decide on how they can design their units to support this requirements. So we can easily incorporate these new designed units in our programme. We should be open minded and be able to ask this question to ourselves 'Do we really need Laplace Transforms or Matrix Theory in support of our, for instance Deck programmes?' Admittedly, one complication is when we also need to satisfy the requirements of accrediting or licensing bodies, which often require additional units or specific content for math and/or science.

Secondly, existing core engineering units are designed approximately 80 years ago when there were only civil, mechanical and electrical engineering. Today we have approximately 40 types of engineering field covering a very large spectrum of sciences. It is strongly believed that core engineering units also should be reviewed to meet specific requirements for each profession. The conditions of the 21st century force us to revise our minds in an unorthodox manner.

We cannot underestimate the academic education because it is highly important to create a foundation for most of the vocational units based on the math and science such as Navigation, Ship Construction, Stability and Cargo Work units and also postgraduate studies for the seafaring officers as a preparation for other related jobs at shore.

European Qualification Framework (EQF)

The application of European Qualification Framework (EQF) is still under development for almost all academic and vocational fields as well as maritime business. European Maritime Safety Agency (EMSA) spends substantial effort to achieve common standards for MET to ensure mutual recognition of the certificates of competencies throughout the EU. It is understood that EU needs a commonly accepted accreditation system for MET for both academic and vocational programmes. The EU projects related to MET such as UniMET is considered a very suitable tool to support establishment of an accreditation system providing a commonly agreed reliable, compatible and comprehensive MET standards.

Requirement for Seafarers by Employers Onshore

The nature of the seamen's life does not allow them to permanently work at sea for life. Most of the seafarers look for a job onshore after working at sea for some time. The maritime industry also needs employees with seafaring background to deploy at onshore facilities working in such organisations as shipping companies, shipyards, training institutions, port facilities because they often have most of competences for various jobs in these organisations particularly does related to ship related/oriented duties. This has been substantiated by a report on the progress of an ongoing EU funded project known as Sail Ahead (www.sailahead.pro). This project aims to introduce education and training programmes to make the Captains and Deck officers find jobs onshore after a period of service at sea. The deployment of seafarers is assumed a factor to increase the demand for the seafaring officers (BIMCO/ISF Manpower Update, 2005). This was also confirmed in BIMCO/ISF 2010 report.

This issue was a matter of long discussions and studies in the EU's METNET (Thematic Network on Maritime Education, Training and Mobility of Seafarers) project. One of the workshops was under the title of "Making MET and seafaring more attractive for more qualified young people by developing and offering new MET programmes which provide for better employment opportunities in the maritime sector, help ensure the sustainability and strengthen the quality of the maritime skills base". The need to design programmes with NEW CAREER PATHS offering MET for navigation and technical knowledge and management enabling up-take of posts by seafarers onshore in the maritime and industrial sectors. It was also proposed to increase the level of education up to postgraduate level with MBA/BSc and even with to higher levels at doctorate and PhD levels.

The programmes to prepare seafarers for jobs at sea will also encourage young people to join maritime industry who refrains working at sea for long duration and, supporting the intention of programmes such as 'Go to Sea'(IMO, 2008).

Flexible Semesters for MET

One year long sea training extends the duration of academic programmes to five years. Effective sea training can be achieved on board specific types of vessels. Nowadays the voyage periods of the ships are about 5 to 6 months without returning to their port of registry. As a result the companies often do not accept cadets for sea training for less than 6 months. Because of that most cadets are not able to start subsequent semester on time even sometimes 1 or 2 months late.

The Scandinavian MET institutions make 3 semesters a year and provide flexible applications to start the subsequent semester. This method may be adopted by the other MET institutions as it will facilitate matching academic programmes and sea training periods.

MET Lecturers

Most of the academic programmes and courses for shore-based jobs are management, maritime economics and cargo operations. All these subjects need a good academic depth and background. To this end, the importance of the academic vigour is essential not only for seafaring operation and management but also for officers when seeking employment onshore.

The higher education institutions have specific qualification requirements for their academic staff members. This also applies to maritime lecturers who in addition need an appropriate sea experience as well as sufficient knowledge of related subject(s). The academics follow a continuous path to fulfil their academic requirements. It is not possible for academic maritime staff members to continuously update their seafaring skills and competence as opportunities of going to sea is not feasible. This is the dilemma; to be experienced seafarer or an academic lecturer. This specific situation creates a difficulty to find qualified seafarer background academics to teach in the MET institutions.

The faculties of applied science universities have more flexible conditions for employing maritime lecturers rather than regular faculties which have very orthodox rules. This is the reason why many countries prefer maritime faculties of applied science and maritime collages. The authorities who are governing the higher education systems in different countries should try to improve a solution solving this serious problem. The lack of sufficient number of qualified lecturers is still a significant problem for MET institutions.

4. Use of improved teaching technologies

According to Laurillard (2002) teachers in higher education are slowly accepting the fact that they have to become more professional in their approach to teaching, matching their professionalism in research. The notions of quality audit and teacher appraisal are new, and in their existing forms ill-founded, but they represent a challenge that teachers will have to face. There is also a growing recognition that the technological media have the potential to improve student learning, or at least teach efficiently, the university teachers are looking for ways of increasing their understanding of what can be done with the new media, and how to do it (ibid).

Laurillard draws our attention on building toward a practical methodology for the design, development and implementation of educational technologies. The lecturers, in particular those teaching vocational subjects, wish to think constructively and critically, and as to how they can improve students' learning using educational technology. They should also be keen on individual teaching methods and media, including non-interactive media (lectures, print, audio, etc.), hypermedia (CD-ROM, etc.), and interactive media (simulations, modelling programs etc.). Unfortunately there are not many maritime teaching materials. To overcome this deficiency the lecturers should have sufficient knowledge of developing learning material taking into consideration subjects such as design methodology, designing learning activities, developing content based on learning context, applying appropriate assessment strategies, methods and maintaining quality.

Most of the MET experts agree that Computer Based Training (CBT) is necessary not only for facilitating delivery of courses but also establishing a link between book-based information and existing maritime practices and systems which the students meet during sea training and their working life.

As far as concerning assurance of quality at MET, the experts concur that Computer Assisted Training and Assessment (CBTA) is one of the best tools to be assure the quality of the training and the quality of the qualifications of graduates.

Both CBT and CBTA needs provision of specific courses on teaching technology for lecturers in particular teaching maritime subjects. Existing course programmes can not cover these subjects sufficiently. So, maritime lecturers need special teaching technology courses rather than existing classical approaches.

5. Importance of Sea Training

Sea training is an important element of the MET and covers at least 12 months sea time. It is a structured programme of training and can be carried out in phases or as a continuous period at sea. If an academic semester is of 14/15 week duration, sea training covers at least three and often four semesters of the academic year.

Sea training is subject to accreditation and cadets should prove that they have completed all required work to the satisfaction of the institution and in line with requirements of any external body such as an accrediting body or licensing authority if subject to such external regimes. Most of the countries follow ISF Sea Training Portfolio based on STCW requirements and the portfolio covers a huge spectrum of works to be carried out and recorded at sea and verified during and/or after the training programme has been concluded.

Can we transfer some parts of IMO requirement (Model course for each type of officer) into Sea Training period? The response surely would be yes, but this is only possible if we can establish a reliable and effective control system over what happens during the sea training. Unfortunately it is not so easy to create such a system. Firstly we are not able to send the academic staff to assess the work on board all ships. Secondly the ship crew are generally not so eager to assign the required time and pay the attention required for cadet training if do not sense the need, even most DSTOs (Designated Shipboard Training Officers) are not all keen to provide sufficient care for ensuring the quality of sea training.

Some shipping companies who are well aware of the importance of sea training are eager to provide the necessary supervision for cadet training. Some progressive companies have even produced their own sea training portfolios and created inspection systems to secure the quality of training provided on board their vessels. If the MET institutions establish mutual beneficial arrangements with these kinds of companies, some part of the vocational training may be transferred to the sea training. In this case MET would free some time to improve the quality of education for their cadets. These will also reduce the class hours for vocational units and provide more time for other academic units.

Our institution, TUDEV, uses Sea Training portfolios prepared by MNTB (Merchant Navy Training Board) and has been accredited by a major awarding and accrediting including on a pilot basis by United Kingdom NVQ and Scottish SVQ authorities for some six years. We have realized that both systems are well designed and very effective systems to ensure quality of cadets' sea training. It is believed that enhancement of use of such reliable systems will help safety at sea.

6. Training Ships

Deployment of training ship for MET is still subject on-going discussions. A training ship is a high cost asset to be deployed only for training purposes and there are many queries on the effectiveness of training on these types of vessels which often cannot simulate a real merchant ship and certainly not a range of vessels needed to successful completion of the tasks included in ISF or MNTB sea training portfolios.

Some professionals claim that even small training ships may provide better training opportunities than the shore based bridge or engine-room simulators in particular for the elementary navigation, watch, cargo and efficient deck hand training. This opinion should be carefully examined and considered as an alternative for the elementary parts of the sea training on board of regular merchant ships. Such applications may reduce the sea training time on board the merchant vessels.

The small or medium size training ships, shared by three or more MET institutions may be a cost effective solution. Both government and maritime industry should support the provision of such costly assets.

7. Existing MET Programmes

A comprehensive study has been made of the MET practices in several European institutions as part of the EU funded UniMET (Unified Maritime Training and Education) (www.unimet.pro) and SAILAHEAD (www.sailahead.pro) projects. A cross referencing table based on Deck and Marine Engineering Officers IMO Model Courses 7.03 and 7.04 has been prepared for eight different MET set of programmes. Although big differences exist all parties have ensured they fully met the STCW requirements.

UniMET research teams gathered information on the maritime education and training systems at the institutions of the partner countries which included tours the facilities and discussions with respective staff members at these institutions. All information gained are combined, evaluated, compiled and disseminated to support the following steps of the project and future

studies. A resume of the findings of this study is introduced in the UniMET paper which is will be presented also at IMLA 20 (2012).

8. Cooperation between different sectors and training institutions

European Commission has adopted a strategic objective for strengthening links with the world of work, research and society as a whole (European Commission, 2003). The following key issues have been defined to achieve this strategic objective:

- Promoting close cooperation between education and training systems and society generally;
- Establishing partnerships between all types of education and training institutions, businesses and research centres, for their mutual benefit;
- Promoting the role of stakeholders in the development of training, including initial training, and learning at the workplace.

Coherent policies are needed in order to support cooperation between the different sectors involved at all levels of decision-making and administration. The Enterprise Education Pathfinders project in the UK (England) promotes cooperation between schools and local companies especially in the disadvantaged areas by offering opportunities for young people to experience and understand enterprise, business and the economy and financial literacy, thus motivating them and helping them to optimise the benefits of schooling (European Commission, 2003).

The studies show that the cooperation between business sectors is still an area which needs more studies. As an example, a study made by World Bank proved that business sector was generally not happy with the quality of university education (55%) and universities were not eager too cooperate with business sector (48%). The cooperation between business sector for research and development is less than 10 percent (World Bank, 2007)

This situation underlines that although policies and objectives have been improved to encourage cooperation between universities and business sector for better vocational education and training, it is still could not been achieved.

Education and training of qualified manpower is a high priority objective for the European Union. Many EU projects have been initiated to achieve this objective in particular EU funded Leonardo Projects. This kind of projects, focusing on transfer or development of innovation have created and opportunity to strengthen cooperation between business world and education institutions.

EU encourages development of innovation and transfer of innovation throughout the union including perspective members. The DOI (Development of Innovation) and TOI (Transfer of Innovation) projects are supported to achieve these stated goals. It has been observed that many European countries created very important good/best practices on MET field which may be introduced as innovations. These practices may lead to new innovations by multi-lateral studies and mutual efforts using existing Leonardo projects. Also these innovations may be transferred to the other parties. One of the important objectives of UniMET, for

instance, is to establish a common on-line platform for MET studies. So the UniMET may be used as a suitable platform for DOI and TOI projects in the field of MET.

9. Conclusion

Time, cost and requirements are the major issues and challenges for achieving an effective MET practice. MET institutions are trying to overcome these problem areas independently. All above mentioned issues have been and will be part of the discussions at MET conferences and forums.

This study presented in the paper is a summary of the existing issues and problems faced by MET institutions worldwide. The study was carried out to initiate discussions with a view to find better solutions to problems encountered of offering highly regulated and complex set of programmes.

There are needs for creative and challenging solutions. To solve problems in MET, which directly effects safety at sea and productivity of maritime industry, more radical approaches may become necessary.

A bunch of the sticks is stronger than a single stick. This paper was prepared as a proposal to ail concerning parties to combine their efforts and create an effective MET practice for the benefit of themselves and the maritime community through multinational cooperation.

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