

# ENCOURAGING RESEARCH IN TRAINING INSTITUTIONS

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## Abstract

Education and training are vital to the development and success of today's knowledge society and economy. The EU's strategy emphasizes countries working together and learning from each other while the EU education and training policy underlines that knowledge, and the innovation it sparks, are the EU's most valuable assets, particularly as global competition becomes more intense in all sectors under the hardships of the global economic crisis.

EU's Education and Training 2010 work programme integrates previous actions in the fields of education and training at the European level, including vocational education and training under the Copenhagen Process, and links up to the Bologna Process, which is crucial in the development of the European Higher Education Area.

Leonardo da Vinci Programme which is part of the European Commission's Lifelong Learning Programme (LLP), funds a wide range of actions, notably cross-border mobility initiatives; co-operation projects to develop and spread innovation; and thematic networks. Innovation projects have always been at the core of the Leonardo da Vinci programme. They aim to improve the quality of training systems through the development and transfer of innovative policies, contents, methods and procedures within vocational education and training.

TUDEV, being the leading MET provider of Turkey which is fully complying with the EU accession programme, has been developing innovative MET solutions since 2005 under the EU LLP.

This paper intends to inform participants about TUDEV's past, present and future innovative projects under EU LLP and other research programmes to encourage future research collaboration which might be of interest to any IMLA member MET Institution.

**Key Words: MET Programmes, innovation, research projects**

## 1. Introduction

Shipping is perhaps the most international of the entire world's great industries and some of the most dangerous. Safety of life at sea, the marine environment and over 80% of the

world's trade depends on the professionalism and competence of seafarers. It has been reported that the over 80% of accident and incidents are due to human error IMO (2005).

Recently, IMO's priority has been to revise the most important international treaty dealing with crew standards – the International Convention of Standards of Training, Certification and Watch-keeping for Seafarers (STCW). But IMO cannot work alone. According to Ziarati (2003), governments and related industry should show the same determination to implement these standards. A close investigation of casualty analyses considered approved by IMO (sub-committee minutes, 12th session, 2004) particularly focusing on the causes of accidents clearly indicates that standards are not applied correctly and when human factor issues are studied carefully there are omissions in the education and training programmes received by the seafarers involved in accidents.

IMO has passed the responsibility for delivery and assessment of these programmes to member countries and does not take part, in any shape or form, in the inspection, evaluation or delivery of these programmes (Ziarati, *ibid*). It is a welcoming development that EMSA has been involved in visiting MET providers in many EU and candidate countries audit the education and training practice against STCW requirements (EMSA, 2009)

To identify the main problems and their causes and more importantly where these failures occur, it has been vital to look at some relevant and recent papers and reports. One interesting and informative paper is a recent study by Torkel (2004). He reports that 25% of the world fleet was responsible for more than 50% of shipping accidents around the world. The study notes that the top 25% of the safest ships were involved in just 7% of all accidents. The outcome of the a study by NYNU (2005) published by the University of Technology and Science (NTNU) in Norway, reports that by improving the quality of the world fleet to the same level as those in the safest 25% category, there might be an overall reduction of 72% in shipping accidents. The paper states human error rather than technical matters are the most common cause of accidents. The study also reports that smaller ship owners have a poorer safety culture.

There are also severe shortages of well qualified seafarers at different levels of seniority (Urkmez, 2005; Pourzanjani et al, 2002; Schroder et al, 2004 and IMO, *ibid*) and yet there are many young people unemployed in Europe (Ziarait, *ibid*). Urkmez (2005) report the need for substantial increase in the number of non-EU seafarers of different ranks in the European flag countries. The European Commission has indicated its concern (METHAR - 4th Framework) and METNET - 5th Framework) projects over the issue of Human Resources in Shipping through funding of various research and development programmes. These include METHAR (4th framework) and METNET (5th framework) projects.

## **2. European strategies for vocational training**

European integration and the creation of a united economic area has resulted in convergence of legislation of EU countries as well as the candidate countries as a first

step towards the harmonization of different national conditions and standards that now have to be incorporated into a single environment. Safety at work constitutes one of the EU's most important social policies. The Lisbon European council stressed that Europe was going through a transition to a knowledge based economy, marked by profound changes effecting society, employment and safety at work. European Commission's recent adaptation of "investment in people" and Commission's "investment in quality" are two policies that the proposed programmes are supporting. The EU strategy relating to both policies is based on consolidating a culture of risk prevention, and 'on right first time' philosophy, as well as on combining a variety of tools, with training and awareness, being the most important ones.

The recent decisions made by the European Council, for example, Official Journal (EU/L145/40EN, 2003) requiring EU membership countries to complete alignment with EU maritime legislation in safety and non-safety areas and to improve maritime safety, in particular improve the performance of maritime safety administrative institutions, firstly as a flag state, and then as a port state, and guarantee their independence. EU also expects EU membership countries to implement a programme of adaptation of the transport fleet particular in maritime transport to Community technical norms. The candidate countries have to ensure effective implementation and enforcement of transport legislation, particularly as regards to maritime safety.

The achievement of harmonising the education and training programmes with specific emphasis on improvement of training relating to safety topics as well as accredited and internationally accepted programmes for assessors and verifiers (the teacher/trainers and those who verify compliance, both internal and external) and finally the provision of transnational multilayer pathways for transfer of students/cadets as well as teacher/trainers are the main innovative aspects of the all new projects. The provision of integrated diplomas and degrees incorporating vocational and ancillary skills which are recognised worldwide are also considered innovative.

### **3. The need for change**

#### **3.1. What are the problems?**

A recent paper (Ziarati, 2006), identified several education and training problem areas for analysis:

- Knowledge of English
- Correct application of maritime terms and terminologies
- Ability to use navigation tools
- Conformance with standards or rules and conventions
- Application of current standards or conventions by third parties
- Inadequate standards
- Other reasons.

It is clear from the literature search that human failures are the dominant causes of accidents and if the offending countries are targeted and supported to improve their

safety record then measurable and visible improvements are expected. It is well established that human failures are a major cause of accidents and incidents at sea and ports (Ziarati et al, 2009). It is reported that mistakes are often made not because of faulty, deficient or inadequate regulations, but because the regulations and standards, that do exist, have been ignored (Ziarati, 2006). The IMO accident analysis reports (IMO, 2005) clearly indicate the causes of many of the accidents at sea are due to deficiencies in education and training of seafarers or disregard for current standards and regulations. In a recent report (SURPASS, 2008), it is also noted that new technology such as automation on board of modern vessels is causing havoc at sea and in ports (Savannah express, 2005, Glorious, 2006).

Review of some 50 papers and some 300 accidents has shown that IMO Model courses need to be revised and new Model courses based on STCW-2003 version and in line with good practice such as BRM and SH together with a provision cater for the language competence requirements should be developed. Maritime communications needs are a review. To ensure compliance a means of monitoring STCW implementation such the one devised by EMSA needs to be seriously considered.

### **3.2. How can problems be solved?**

The study by Torkel concluded that the top 25% of the safest ships were involved in just 7% of all accidents and the University of Technology and Science (NTNU) in Norway, present a clear argument that by improving the quality of the world fleet to the same level as those in the safest 25% category, there might be an overall reduction of 72% in shipping accidents.

What is now required is to seek funds and develop a new, unified and integrated programme for education and training of merchant navy officer cadets and officers. We need to cross reference the good practices particularly from the safer flag ships and transfer these to flag ships with a poorer record of safety.

Furthermore, one of main causes of accidents and incidents are due to poor standards of maritime English. The language of the sea is Maritime English and many ships, and to a lesser extent, ports, are manned by multinational crews. Hence, good communication in Maritime English is essential for creation and maintenance of effective working environments and safety of the crew, and generally safety at sea and at ports (Loginovsky, 2002). There are many reports and papers (MCA –MSC 82/15/02 and MSC 82/15/03, Ziarati, 2006) identifying poor communication as one of the most significant factors in accidents at sea and at ports.

## **4. Development of TUDEV's Major EU Projects**

Safety at sea is an international issue and safety is as strong as its weakest link. Many countries often due to lack of resources have not been able to improve their safety records. The quality of the education and training programmes of seafarers from these countries should be on the national agenda of all the flag countries and those operating

ports world-wide. The weakness in one flag state could have, and often does, an adverse impact in another geographical location.

To resolve the identified deficiencies in education and training of merchant navy personnel a partnership was established between TUDEV and C4FF ([www.c4ff.co.uk](http://www.c4ff.co.uk)), called as MarEdu ([www.maredu.co.uk](http://www.maredu.co.uk)). The partnership now almost includes at least one representative in every EU member country.

#### **4.1. MarEdu initiatives**

To understand the problems in greater detail a pilot project (Safety On Sea, 2005-07), funded by the EU Leonardo programme, a partnership consisting initially of Turkey, Scotland, England and Norway was formed to identify major problems and good practices in the partner countries. The partnership developed integrated and world-class programmes of education and training for both navigation engineering as well as marine engineering cadets, wishing to acquire internationally recognised qualifications as officer of watch. The Project also developed pathways to progress onto higher qualifications viz., chief mates and chief engineers as well as becoming a master and captain of ocean going vessels. Several other EU projects were also instigated in parallel to SOS. A summary SOS and other related project are presented in the following paragraphs.

#### **4.2. SOS (Safety On Sea) Project**

The first task of SOS Project was to review existing programmes in the partner countries to identify the differences and discover a methodology for harmonising educating and training systems and practices in collaboration with the relevant authorities in each of the member countries.

The review of the programmes led to many productive discussions and adaptation of cross-referencing methods developed as part of an earlier EU programme, EUROTECNET. The cross-referencing tables provided a means of comparing programmes in different countries in the partnership. In doing so, with no disrespect to organisations involved with validation and accreditation of these programmes, it was realised that there are serious differences in standards being applied, and even in the pathways chosen to satisfy the requirements of the same awarding body or even the same licensing authority. The content and standard of the sea service record books were also very different.

The unifying factor was the IMO syllabuses which are the basis of all MET programmes in the world. The partner countries' programmes have integrated these syllabuses to varying degree of complexities into their own national programmes. To harmonise and at the same time to improve the standard, for instance, the Turkish project team using the syllabuses developed by northern European countries, which in turn are based on IMO's, revised programmes and at the same time, applying cross-referencing techniques also satisfied the requirements of the national authorities as well as those of a major

international awarding body (BTEC/Edexcel) for the award of a higher national diploma (HND). HNDs are internationally recognised technician qualifications and HND graduates can continue their studies for two more semesters to obtain a degree in relevant subjects in many universities worldwide. HND graduates who also carry out their sea training according to recognised standards, for instance, Merchant Navy Training Board (MNTB) as part of the National/Scottish Vocational Qualification (N/SVQ) programme provided they successfully conclude the required ancillary courses are exempt from any written examination when applying for their certificate of competency. The MNTB and N/SVQ requirements are based on Occupational Standards (100-500 series).

All partners in the project have been running programmes of education and training programmes for Deck Officers and Engineer Officers based on the IMO syllabuses for many years. One of the partners became the national examination centre for seafarers' competency qualifications. The partners have therefore many years of experience and are in possession of many case studies.

### **4.3. Project MarTEL**

This project makes an attempt to overcome the problem of not having international or European standards for Maritime English ([www.martel-tests.org](http://www.martel-tests.org)). The project intends to establish a set of standards by transfer of innovation from existing English language standards and maritime English model courses such as International Maritime Organisation's (IMO) SMCP (Standard Maritime Communication Phrases, 2001). Review of the arguments from the recent IMO meetings (IMO MSC, 2006) considering MSC 82/15/2 and MSC 82/15/3 had identified that 'there is a compelling need to promote a high level of working maritime English language skills'. Several EU member states have invited STW sub-committee to consider how the requirements in the STCW-Code can be strengthened in this connection. It was noted that deficiencies in maritime English causes accidents and therefore needs to be seriously taught in the basic and the main training of all Chapters of the STCW Code of practice. It is interesting to note that both of the above issues were also the findings of an IMarEST paper and report (Ziarati, 2006; Ziarati, 2007). This Project therefore is a maritime language competency assessment project for the language certification with the main aim of developing a series of maritime English language standards incorporating also the IMO's SMCP, at three different levels: i) Foundation – Elementary, Intermediate/ Advanced, ii) Officer – Deck and Engineering, and iii) Senior Officers – Deck and Engineering, also senior officers at port and pilots. The tests will be piloted in at least two partner countries (Turkey and the UK). The other partner countries with experience in developing and testing of maritime English will be encouraged to pilot the tests in their own institutions.

### **4.4. GMDSS I and II Projects**

The GMDSS I Project ([www.e-gmdss.com](http://www.e-gmdss.com)) focused on provision of vocational education and continuing vocational training for Short Range Certificate (SRC) which is mandatory for seafarers operating vessels of up to 300 GRT within 30 Nm from coast. To obtain the

SRC award a candidate must be able to competently operate four different GMDSS communication devices (VHF DSC, Navtex, EPIRB and SART). These devices are only used for emergencies at sea which occur rarely. Therefore, the knowledge of operation of these devices tends to fade over time and should be regularly refreshed to ensure safety of crew, passengers and freight (even though this is not a legal requirement). After the successful conclusion of GMDSS I, GMDSS II Project was launched for the LRC Certification. Intention is to cover all aspects of GMDSS Communications for the GOC in the future projects.

#### **4.5. TRAIN 4Cs I and II Mobility Projects**

To try and test the pathways developed in the SOS project a Leonardo Mobility programme was developed in conjunction with MarEdu. The project aimed to improve safety at sea through a mobility programme (TRAIN 4Cs I) involving the transfer of cadets from TUDEV in Turkey to Glasgow College of Nautical Studies (GCNS) in Scotland, on a pilot basis. The period of placement is for 14 weeks. A new follow-up project (TRAIN 4Cs II) has already been accepted by EU and TUDEV is looking for other partners to exchange cadets. Three of TUDEV Cadets were also transferred onto the final year of the Plymouth University's BSc (Hons) Degree in Nautical Science and all three were successful and received their degrees.

#### **4.6. SOS (Safety On Sea) - II**

SOS-II proposal was developed as a follow-up to the former SOS Project in coordination with several partner countries in Europe. This project proposal concerns transfer of innovation from existing reports concerning accidents and incidents for creation of a range of scenarios for applications in simulators relating to emergency situation. It is acknowledged that emergency situations and use of simulators have not been fully taken into consideration and that industry would immensely benefit from a user-friendly and accessible training tool and programme for its sea-going personnel focusing on emergency situations; the causes for this situation to arise and how they are handled.

An existing software and internet platform will be used to transport these simulation trainings for greater access throughout the partnership as well as outside of it. The platforms have got facilities for e-learning as well as e-assessment for self assessment.

#### **4.6 Project SURPASS**

The main aim of this project is to fill the gap created as the result of emergence and application of the automated systems in the education and training of seafarers by provision of a training course enabling them to have a full understanding of automated systems, and these systems' weaknesses and limitations. This aim will only be achieved if a well-planned literature review of, on the one hand, the automated system and components, and on the other hand, the accidents and incidents, such as that by Savannah Express (2005) or the very recent sinking of Glorious (2007) in the Bosphorous, are

Carefully and meticulously carried out. The former accident was due to engine failure and the latter due to navigation (steering, rudder) failure.

#### **4.7. MarEng Plus**

In the MarEng Plus (2008-10) project, the partner organisations from several different European countries produce new sections into an earlier developed web based Maritime English Learning Tool MarEng. Project aims creation of new material in the Maritime English learning (the environment and transport security). The partner group consists of a wide variety of maritime institutions, and involved in the project are education and maritime experts such as English teachers, researchers, training managers, seafaring professionals and representatives of the maritime industry. MarEng Plus is partially financed by the Leonardo daVinci programme of the European Union.

The above projects are underpinned by several research and development project with several universities in the EU.

#### **4.8. Research Projects**

**1. Activity Based Costing for Small and Medium sized Maritime Enterprises in Turkey** - The MPhil Project aims to investigate the needs for costing systems for SMEs in the maritime sector in Turkey and to design, develop and test a generic costing system which is capable of associating costs and margins with products, processes and customers. Partners are TUDEV and De Montfort University and several companies in the UK and Turkey.

**2. Sustaining competitive advantage through co-operative decision making** - The project is designed to study competitive advantage and how it can be sustained through co-operative decision making processes/case studies of several businesses as a part of MPhil/PhD Research. Partners are TUDEV and De Montfort University and several companies in the UK and Turkey.

**3. Design, manufacturing and management processes considering modern lean and total quality principles to improve demand and capacity forecasting for merchant navy vessels** - The aim of the MPhil investigation was how maritime small and medium manufacturing enterprises manage the design and manufacturing processes using lean and total quality principles. Partners are TUDEV and De Montfort University and several companies in the UK and Turkey.

**4. Application of Neural and Expert Systems in Capacity Requirement and Ship Building** - This MPhil project concerns the development of novel neural and expert systems tools for building new ships at a minimised cost. Partners are TUDEV and De Montfort University and several companies in the UK and Turkey.

**5. Improving estimating and forecasting model development processes** - This a Pre-Framework project is funded by TSB intends to automate data collection for



pull systems to predict demand for a given type of ship in the future. Partners are C4FF, De Montfort University, TUDEV and several companies in Turkey and the UK.

**6. Cleaner Environment with Cleaner Diesels** - This MPhil/PhD project is a continuation of an earlier research project known as Clean Diesel. This earlier project led to the design of several hybrid vehicles, a novel engine management system and variable geometry turbochargers and application of a novel fuel injection system as well as a water injection system. The project is expected to lead to cleaner diesels and cleaner environment at sea and in ports. Partners are TUDEV and Coventry University.

**7. European Boat Design Innovation Group** - This project aims to transfer existing innovation in the automotive industry to yacht design and manufacture industry. Partners are Coventry University, TUDEV and nine other organisations from leading companies

**8. Marine Engineer Conversion Course** - This project aims the conversion of Mechanical Engineering graduates (BSc) to Marine Engineers by providing them with necessary marine Engineering and STCW courses for seafarers. The project document was sent to EU CFCU (Central Finance and Contracts Unit) and waiting for grant approval under the "Active Labour Market Measures Grant Scheme".

## **5. Conclusion**

The development of the integrated and unified programme for the education and training of merchant navy personnel under the SOS programme using of Pareto analysis and cross-referencing techniques has led to a set of programmes which include the latest STCW and includes all good practices at two level and for both Deck and Marine Engineering. The programmes were developed with support from major awarding bodies such as BTEC and several universities, accrediting bodies such as IMarEST and licensing authorities including the UK's MCA. The programmes have now been reviewed by EMSA and are now completely in compliance with EMSA requirements.

All projects summarised above are in line with EU's strategy which emphasizes countries working together and learning from each other and the EU's education and training policy which underlines that knowledge and the innovation it sparks as the EU's most valuable assets. An attempt was made to ensure that there is an e-learning and assessment platform for projects such as SOS, GMDSS and MarTEL.

The development of newly revised programmes is addressing the overall problems concerning safety at the source viz., education and training of cadets and the existing officers working in industry. The success of the MarEdu initiative has led to other projects being instigated and thus helping industry to update its skills and hence maintain the current efforts in improving safety at sea and in ports.

Developments are on-going and it is expected that many other organisations involved with education and training of merchant navy officer including awarding, accrediting and licensing bodies would join the partnership. There are now over 30 major centres

working with TUDEV supporting various European Projects. Full details of these are given on the partnership website [www.maredu.co.uk](http://www.maredu.co.uk).

In recent month MarEng Plus has agreed to closely work with TUDEV. This has provided a great opportunity for MarTEL and MarEgn Plus to establish close coordination and co-operation between two projects for joint valorization and dissemination. Considering the number of partners in both projects (32 in total), this will be an historical event if the two project groups come together. TUDEV will be looking forward to any co-operation and/or partnership invitation on any innovative MET related research and permission already granted to those who would like to come onboard for present and future research projects. All that is needed is a short message to the Partnership site and more detailed information on the projects would be forwarded to the interested parties.

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