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# Cadet's Perspective on Maritime Education And Training

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**Abstract:** The existing standards and quality of Maritime Education and Training (MET) are always under discussion worldwide and all concerned parties are trying to define the problem areas and deficiencies. Every year, the topic of MET is discussed at national and international forum, and many scientific articles are published on this topic. These publications are usually made by educational specialists and educators. There are two aspects of education: lecturer and. To order to better assess the current state of education, the opinions of students should also be taken. One of the parties which were directly affected by training is the learners (cadets) themselves. To pinpoint the gaps to be filled in the MET, the students' perspective on such matters needs to be investigated and considered.

This study aims to define the student (cadets) position in the sphere of maritime education and training, in particular, the quality and efficiency of education in METs institutions as well as on sea training which is an integral part of the overall training process.

Keywords: Maritime Education and Training (MET), Quality of Education, Efficiency of Education, Sea Training, STCW MET

## 1. Introduction

STCW (International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers) is the main reference to regulate the international standards of maritime education and training. Maritime education programs are to be planned and conducted by STCW worldwide. Maritime Education and Training (MET) Institutes should be organized and operated in such a way as to meet the requirements defined in the STCW.

The main function of the IMO (International Maritime Organization) is to ensure safety at sea. Despite many innovations in the technical specifications and improved training methods to provide safe seas, the number of accidents at sea still could not be reduced. Many research studies proved that the human factor is the major and leading element of marine accidents, directly related to education and training. The cadets who are the prospective seafaring officers and shipmasters who will command high-value vessels in the future their opinion should be taken into consideration to fully realize the problem areas.

## 2. Research Method:

This study aims to define the student's (cadets) position in maritime education and training, particularly the quality and efficiency of education in METs institutions and on sea training, which is an integral part of the overall training process.

It is intended to start this research with a literature study covering different opinions of the researchers on the essential elements of METs. Meta-synthesis is applied for this study. The reciprocal Translation method of meta-synthesis, "Concepts in one study can incorporate those of another" is applied. Different approaches, considerations, and predictions from versified sources are reviewed, evaluated,

and discussed to interpret the future of maritime management This will assist to define major deficiencies and weaknesses of the system. This will also provide a configuration of questionnaires to comprehend cadets' opinions on MET.

The research includes both qualitative and quantitative factors affecting MET. The quantitative information will be gathered with a questionnaire supported by the quantitative data obtained from the previous studies. Qualitative data will be extracted from the results of questionnaires with reliable information provided in the previous MET studies.

The senior cadets from the maritime faculties who have had sea experience and have sufficient knowledge of MET were selected as the target group for this survey. The survey is applied to the participants from different MET institutions, both from this country and abroad. A forthcoming study covering young Officer of the Watch (OOW) may assist us to provide more fruitful data on this subject.

The triangulation method is used to verify the literature study results; data provided from both a previous survey and the newly created questionnaires are used in the discussion section of this study. The results and proposals achieved during this research will be introduced in the final section.

### **3. Research**

#### *3.1. Basis of Maritime Education and Training*

The STCW establishes international standards for the education, training, and certification of seafarers in different grades. The convention aims to improve the quality of seafarers to ensure safety at sea.

The International Standard for Training, Certification, and Watch-keeping (STCW) is a unified international standard that provides a minimum standard for the training and certification of seafarers [1] [2]. The standard set by the convention applies to seafarers of all ranks serving on sea-going merchant ships. These minimum standards that should be applied by the Maritime Administrations and nations have an opportunity to extend them however they generally do not. Even the minimum standards mentioned in the STCW Code have not been applied by some countries. Due to a lack of sufficient seafarer supply, the developed countries suffer from manpower supply 80% of the vessels around the world belong to the developed countries while the seafarers who worked on them are mostly from the developing countries.

IMO, as a UN advisory organization, has no direct impact on applying the rules, regulations, and standards. The nations have the responsibility to ensure the quality of standards as being Flag State and Port State. Unfortunately MET in developing countries is not compatible with the equivalents in developed countries as well as inspection systems.

STCW [3] establishes a set of mandatory standards to ensure the importance of competence in the shipping sector. The main aim of the convention may be resumed as follows.

- Provision of proper education and training for seafarers
- Ensuring competency of seafarers defining required skills and knowledge
- To prepare seafarers with sufficient experience for sea duties to ensure safety at sea

To achieve these standards cadets should have the following knowledge:

- The contents of the shipboard management process
- The principal tasks of the safe navigation
- The general functions of the cargo operation

- The fundamentals of crew management
- The communication procedures including verbal and written English sufficient to support ship functions
- Actions in emergencies including fire, accidents, health and safety, security

In addition to submission of MET standards, IMO organized a system in support of these standards providing model courses as guidance for maritime administration and education institutes. These modal courses provide structured programs, teaching, and delivery methods for each standard and competency. No major deficiency is reported in the efficiency of modal courses. However, all the studies proved that there are many problem areas in the application of these courses by the different maritime administrations related to the quality of MET related to the syllabuses, delivery methods, standards for lecturers, provision of supporting material, facilities, etc.

No matter how far IMO sets the rules out and arranges the minimum standards, leaves the inspection and application of this model course to the administrations. Administrations re-arrange the syllabus and learning outcomes' working hours according to their country. Regarding this fact, again teaching standards significantly vary from country to country, even from school to school in this matter.

Sea Training is an integral part of MET which allows learners to apply their theoretical knowledge to practice on board the ships. STCW clearly defines which learning outcomes and subjects should be covered in the sea training phase to strengthen academic programs. There are three required functions in the STCW and subsequently, in the modal courses to ensure safe ship operation which is mainly subject to sea training:

- Navigation
- Cargo handling and stowage
- Controlling the operation of the ship and caring for the persons on board

The simulator training under STCW became mandatory including training and assessment, delivery methods, and equipment standards to demonstrate competence. The simulator training is enhanced in the STCW (2000) covering electronic navigation devices, cargo handling, communications, propulsion systems, auxiliary machinery, fire, and medical aids. Simulators need to comply with prescribed standards in particular functions mentioned above.

English language requirements under the STCW Convention, all officers in charge of a watch (navigational or engineering) must have a good command of spoken and written English. Senior officers with functions at a managerial level must also speak and write. Nowadays many ships are equipped with multi-national and multi-lingual crews and there is a strong need to share a common language which is also required not only for officers but also for ratings. All crew members are required to be able to communicate with passengers to assist in case of emergencies. Most of the accidents that happen during the loading and discharging are closely related to the communication problems between the ship and the terminal. All of the crew and terminal should be able to communicate safety-related issues in English.

A paper aimed to look at the perceptions of teachers and students about the teaching and learning of Maritime English in the Philippines [4]. This report states, "The student-respondents generally showed a positive attitude towards learning Maritime English. The students, in general, believe that English is important because it would make them more educated. Moreover, they strongly consider Maritime English functional in helping them get new information and link their previous knowledge. Most of them also agree that knowing Maritime English is an important goal that could help them in the future since their job would require communicating with people of different nationalities and English is a language that they can understand. As future seafarers, the students strongly agree that it is a mark of respect to foreign crewmen and passengers to learn their language, particularly English as a universal language.

MET standards are established by STCW, but it has been applied and inspected by the nations (Maritime Administration). Maritime Administration organizes MET programs at all levels and provides accreditation for courses in terms of the overall as well as national policy on MET. Seafaring officer education and training are generally a part of tertiary education and subject to rules established by national higher education authorities.

### *3.2. Previous Studies on MET*

#### *Requirements*

The function of MET institutes is not only to prepare the students for today's requirements but also for the future as well as to prepare cadets to participate in scientific studies on the marine industry. The STCW is mainly based on existing requirements. Considering rapid development in technology MET providers should also consider the future requirements to well prepare their students to facilitate their adaptation to roles and skills.

#### *Job Opportunities*

Life at sea differs from life at the shore and has difficulties that could not be met in normal working life at the shore. This different lifestyle creates several negative effects on the working condition of seafarers. A distant relationship with family and social environment, loss of awareness, unchanging society, multicultural life, health and well-being, miscommunications, various nutritional habits, long working hours, inadequate rest periods, and lack of social security may create negative effects on human physiology and subsequently work life. So, the cadets are looking for other job opportunities at the shore which are compatible with sea duties.

A study on "career development and career awareness of cadets, is being theorized and empirically investigated from a psychological perspective in South Africa [5]. One of the significant results was that "the curriculum can be structured in such a way that graduates can work both on and offshore so that the career paths are versatile for the people in the sector to allow flexibility and retain the experienced individuals who for any reasons may not be in positions to work on vessels".

A study [6] specifically examined the STCW-78 convention given identifying the 2010 Manila amendments and assessing the level of awareness of the Manila amendments by the students, cadets, and staff of the Maritime Academy of Nigeria showed that "it is important that all academic staff of Maritime Training Institutions is encouraged to have a good knowledge of it for effective training, compliance, and implementation of the convention and codes.

### *3.3. Technologic Development*

In recent years, there has been an intense focus on transforming maritime transport based on increased automation and digitalization. The initiatives focus primarily on the development of technical systems that aim to support safety and efficiency in maritime transport where the outcome is often described as autonomous and unmanned vessels (e.g., MUNIN project [7]; [8]; [9]. Related projects have also addressed the interaction between operators and advanced technologies onboard and ashore (e.g.,). What has been missing recently are analytical attempts to forecast the organizational development and the role of the human operator in the future of maritime transport [10].

Making predictions is indeed epistemologically difficult and very risky. It can, however, be concluded that digitalization and automation will continue to increase intertwined with changes to how work is conducted and perceived on board and by maritime stakeholders ashore. We do believe that despite the recent attention from industry and research communities, seafarers will remain a crucial part of the maritime transport system. It is thus unfortunate that the concept 'autonomous ships' has accidentally

become an indicator that seafarers soon will become obsolete, which may have negative consequences for the supply of maritime competence in coming years [11].

The content of the occupation will of course change due to the phase of implementation of the degree of digitalization, but there will always be a need for maritime knowledge and understanding. This calls for careful updates of curriculums in maritime academies concerning specific competence requirements related to different concepts and combinations of types of ship and traffic areas. However, the proper understanding of the real conditions at sea will remain a fundament for maritime education [11].

It is worth mentioning in this context two extensive studies on autonomous/unmanned vehicles perception [12]; [13]. The first study provides up-to-date information about the advantages, disadvantages; limits, and ideal applications of specific sensors. The second one deals with putting men back in the headlines despite the rise of auto immunization in the marine and shipping industry. Namely, according to this study “85% of those surveyed agreed that seafarer skills will remain an essential component in the long-term future of the shipping sector” [13]. In other words, the findings of the study suggest that humans will remain an essential component in the long-term future of shipping, even if that future is autonomous.

The resume of the “Future Expectations for the World Economy” is as follows [14].).

- Change is now not gradually but suddenly.
- The change will be exponential and interdependent,
- Collaboration between different sectors will increase highly,
- Digitalization will be the most significant factor for the changes.

The QT Flagship program should be structured in five domains, each of which should be reflected in a call for proposals. Four vertical domains (not necessarily of the same size in terms of allocated resources) address vital application areas of a future knowledge-driven industry (See Figure 1) [15]

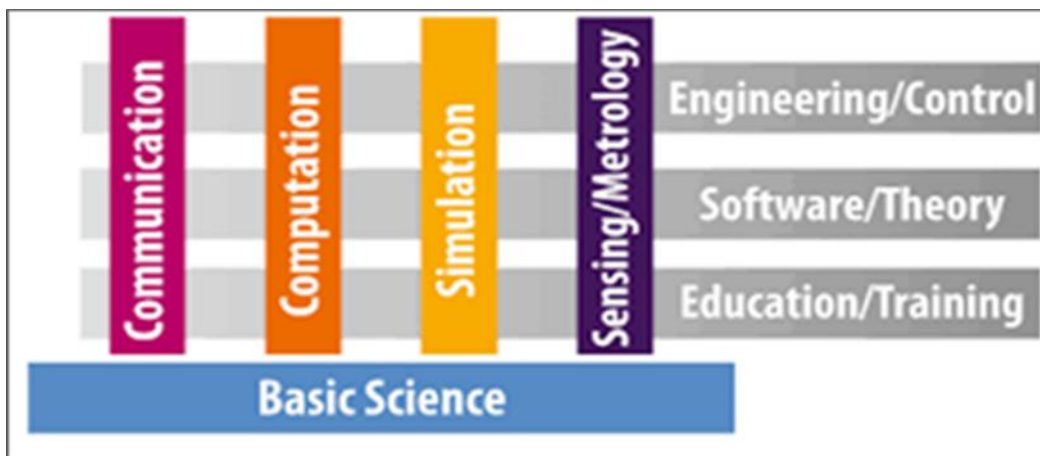


Figure 1: Structure of the Strategic Research Agenda (Source: European Commission, 2017 [15])

### *Continuing Professional Development (CPD)*

Continuing Professional Development (CPD) is a combination of approaches, ideas, and techniques that will help you manage your learning and growth. The focus of CPD is firmly on results – the benefits that professional development can bring you in the real world. Perhaps the most important message is that one size does not fit all [16]. CPD will help you develop your skillset in several different areas including self-development, social awareness, and employability. This employability course will introduce you to many sought-after skills in the world of employment including managing

social behaviors, understanding stress and anxiety, personal identity, and developing employability skills.

The outcome of well-planned continuing professional development is that it safeguards the public, the employer, the professional, and the professional's career. Well-crafted and delivered continuing professional development is important because it delivers benefits to the individual, their profession, and the public [17] Wherever you are in your career now and whatever you want to achieve, your CPD should be exactly that: yours.

Education can give them a goal to aspire to and in return, their aspirations will have an impact on what skills they want to nurture to be ready for the future. Mentoring, training courses, and work placements are all opportunities where seafarers can have a taste of a potential career in maritime. This way not only does the industry retain valuable manpower, but it can also contribute to businesses' sustainability [18].

#### *The quality assurance*

The Total Quality Management (TQM) system is a common tool to ensure quality. TQM provides essential feedback to improve the quality of procedures and processes applied. Quality Assurance is the fundamental element of TQM and should be provided by recognized external authorities which are based on commonly accepted standards. External verification provides feedback to ensure the quality of the MET system. This will provide reliable support to continue the improvement of the system.

#### *Improvement of teaching methods*

The teaching methods may include class participation, demonstration, recitation, memorization, or combinations of these. The choice of teaching method or methods to be used depends largely on the information or skill that is being taught, and it may also be influenced by the aptitude and enthusiasm of the students. The creation of new teaching methods will facilitate the delivery of knowledge using all available assets. The MET education may be improved by establishing an effective link through classroom teaching, use of stand-alone computers, simulators, and distance learning tools as well as distance learning.

#### *Importance of English*

A study on Teachers' Perceptions and Students' Needs and Attitudes Towards the Teaching and Learning of Maritime English highlighted the following issues as student perspectives on this subject [4]. The students, in general, believe that English is important because it would make them more educated. Most of them also agree that knowing Maritime English is an important goal that could help them in the future since their job would require communicating with people of different nationalities.

Interculturality and its impact on the maritime profession is a major concern for the shipping industry: the transport of goods by sea is a global business which reaches almost any part of the world and employs professionals from many language and cultural backgrounds. As such, it is known to be a multinational, multi-ethnic, multilingual, and multicultural industry that is largely dependent upon successful intercultural communication [19].

#### *New Skills and Qualifications*

As in other work areas, shipping is influenced by technological development, and this changed the job functions at sea and shore. Some new jobs have been created and new work functions are added to descriptions, and some transformed into other professions. For shipping, the increased security and safety work, computerization, and increased administrative work have caused much additional work for seafarers, especially for officers

As the workload onboard increases the number of the crew has been reduced due to economic considerations. A reduced crew needs highly skilled and qualified competent people. Although many improvements in the MET were recorded, the competence development, within both the technical and non-technical fields is unlikely sufficient. Additionally, soft skills become more important for officers in the changing world order.

### *Distance learning*

Distance learning becomes of utmost importance during the COVID 19 pandemic due to the closure of schools. Many lessons learned were excerpted from the crisis based on the recommendations from several organizations and these results may also be used after the pandemic.

A new digital education agenda is needed. The pandemic has accelerated the digitalization of societies and economies. In education, the health crisis has shown the importance of digital resources and tools but also highlighted the potential of digital education in the post-pandemic world. Education is a social endeavor requiring human interactions. They could be shaped differently thanks to technology. In many countries, the digital learning infrastructure was inadequate and will need to be revisited after the pandemic. This will require public investments and smart decisions. International collaboration would allow countries and education systems to harness more quickly the potential of digital education [20]

The OECD developed joint principles for an effective and equitable recovery with Education International. Some significant principles for effective and equitable educational recovery are as follows [21]).

- Provide a remote learning infrastructure that is designed to reach all students.
- Support teachers in their professional lives.
- Enable teachers and parents to support learners.
- Empower teachers to exercise their professionalism and benefit from professional learning opportunities.
- Provide targeted support to meet students' learning and social and emotional needs.
- Co-design a robust digital learning infrastructure with teachers and stakeholders.
- Learn from national and international evidence.

Futurist Gert Leonhard [22] explains “disruptive technology” which has a significant impact on the five essential elements of digitalization as follows:

- Automation of knowledge work
- Advance Robotics
- Autonomous vehicles
- The internet of Things
- Mobile internet

### *3.4. Towards the Future*

The shipping business becomes more technical, and it demands a highly-skilled, well-qualified, and specialized crew ready to embrace continuously evolving technology. The failures of complex automated systems may cause very high costs even fatal accidents. We should be ensuring that the man-machine interface is fully achieved, and the crew is well trained on these highly improved systems.

The function of MET institutes is not only to prepare the students for today's requirements but also for the future as well as to prepare cadets to participate in scientific studies on the marine industry. The STCW is mainly based on existing requirements. Considering rapid development in technology MET providers should also consider the future requirements to well prepare their students to facilitate their adaptation to roles and skills. Close collaboration among the maritime authorities and all other



stakeholders ensures the development of MET programs meeting the requirement of the maritime sector.

Automation failures may cause high costs and fatal accidents. Now many ships are equipped with highly complicated automation systems and the use of automation onboard is expected to be emanated. A course on the 'Concept, Capabilities and Limitation of Automation System is deemed necessary to mitigate automation failures as well as facilitate the passage of remote-controlled and autonomous ships

Basic Science courses are 'sine qua non' for engineering education. The technology requires delicate measurement to reach the correct decision. In many developed countries a course, namely Metrology is added to engineering programs to teach precise measurements. Such a course is advised to be included in the deck and marine engineering programs to meet future requirements.

The MET institutes for educating seafarers should increase the number of cadets to meet the needs of the industry as well as develop the quality to provide high-quality officers for the future. Additionally, they should also consider the new requirements for officers to handle automated and semi-automated ships, and the related courses should be added to curriculums.

Maritime higher education institutions (MHEI) build their activities on basis of two different bodies of knowledge: professional knowledge, as outlined in the STCW Convention and related sources, and academic body of knowledge. Although not identified, MHEIs have implemented all the important knowledge management procedures: knowledge accumulation and knowledge transfer. Following that, it may be concluded that MHEIs can significantly improve their processes by applying a more structured implementation of the knowledge management principles

Data management using information technology became rather important in the digital era. Nowadays although it is not a requirement in STCW, 'Introduction to Computers and Programming' courses are delivered at all maritime schools. But this course is not sufficient to understand the use of data management. It is strongly believed that a course covering Data Management which covers the collection, control, and use of data should be added to the programs.

Integrated bridge management systems are now improving as decision support systems to assist the watch officers with quick decisions in case of an emergency. The watch officers need to understand the concept and usage of the decision support system. A course on Decision Support Systems is required to make mariners understand the specifications and capabilities of such systems.

The distance learning systems were used extensively during the Coronavirus pandemic and is believed that there could be a significant increase in the use of distance learning after the end of the pandemic. The broad use of distance learning will facilitate the application of CPD as an essential tool for delivery shortly.

Education and training for the European maritime infrastructure: Virtually no resources are allocated to the training of seafarers for second careers in the European maritime infrastructure, surveyors, pilots, harbourmasters, ship repairers, maritime teachers, administrators, or any of the other posts normally filled by former seafarers; maritime-related college courses provide an academic base, but without seafaring experience, the graduates lack the essential practical knowledge required for many of maritime shore-based "second" careers (KNOWME, 2014).

KNOWME is a project started as a part of the EU 7th Framework Programme. The Technical Paper 4.2.1 [23] [24] is related to "Areas for Common Measures among European Countries for Improving the Conditions for Training, Education and Knowledge Development<sup>1</sup>. Some important findings are as follows:

- Sound EU shipowners' interest in a more commonly defined MET education

- Sound the political will to a transboundary action on how MET education should be carried out. It would be a unique intergovernmental action.
- A general interest among the EU MET institutions to:
  - Need for a few highly sophisticated MET simulator centers within the EU.
  - Mobility and transferability/exchange for teachers
  - MET education carried out in the English language
  - Stimulation of QA (Quality Assurance) activities in MET
  - Development of common simulator programs
  - Having an EU common education program for MET teachers according to STCW

### *3.4. The Survey Viewing Students' Perspective on MET.*

#### *3.4.1. Aim of the survey*

The research aims to define seafaring cadets' perspectives on existing maritime education and training to provide inputs for MET improvement studies.

#### *3.4.2. Objectives of the survey*

- To define the deficiencies concerning existing curricula, quality and quantity of teaching staff, course materials, and simulators/laboratories in the light of STCW requirements.
- To define deficiencies concerning sea training

#### *3.4.3. Preparation for survey*

To prepare questionnaires for the survey, a study group was established composed of 5 maritime lecturers having 10-20 years of sea and academic experience. The group has been introduced the updated information about MET based on the literature study. The study group has defined the hypotheses, and subsequently content of the survey questions is settled. Then most suitable focus group is defined. The initial questionnaires are submitted for testing in December 2021. Making some changes in the questionnaires final form is defined and University Ethics Board approval is obtained. After testing the initial questionnaires some changes have been made. University Ethics Board approval was obtained. Questionnaires have been distributed 5 selected maritime faculty in Turkey

#### *3.4.4. Hypothesis*

The following hypothesis is selected.

*H1: Maritime Education & Training Institutes (METs) are not fully capable of providing education to meet STCW standards.*

- H1.1: Course materials are not sufficient to support the program
- H1.2: Curricula cannot fully meet STCW requirements
- H1.3: Use of simulators in training is inadequate

*H2. Maritime lecturers are not sufficient both in quantity and quality to support such a program.*

- H2.1: The quantity of lecturers is not sufficient
- H2.1: The academic staff are not adequately equipped to train the students due to a lack of experience

*H3. Sea training is not being carried out sufficiently well enough to cater to students' needs.*

- H3.1: The maritime industry does not give enough support to cadets for Sea Training

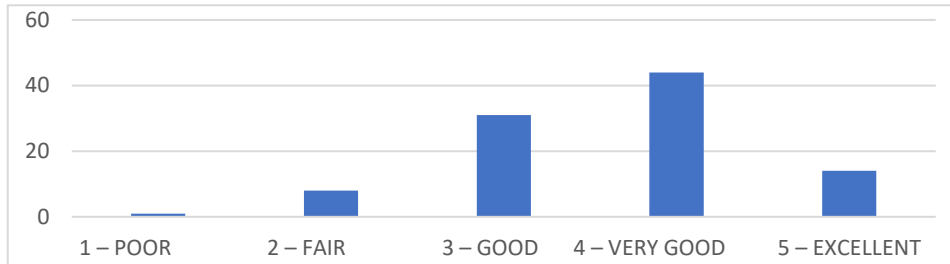
### H3.2: Most ship crews do not volunteer to support the cadets during a training

#### 3.4.5. Survey participants

The participants were selected from senior cadets, nearly graduated cadets from different nationalities. 98 cadets of various nationalities and from different schools have participated in this survey.

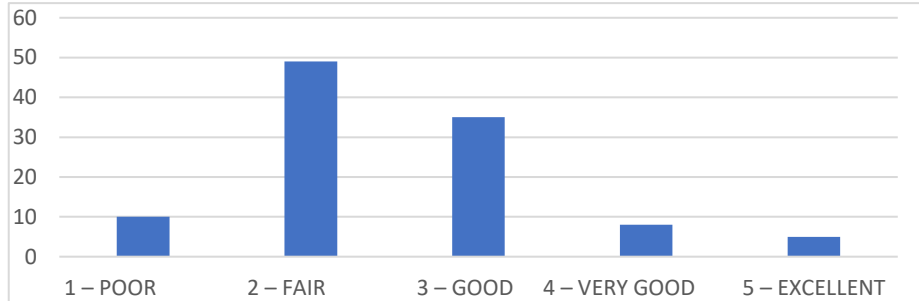
#### 3.5. Questionnaires & Analysis of Survey Results

##### 1. What will be the level of success of your training at sea duties?



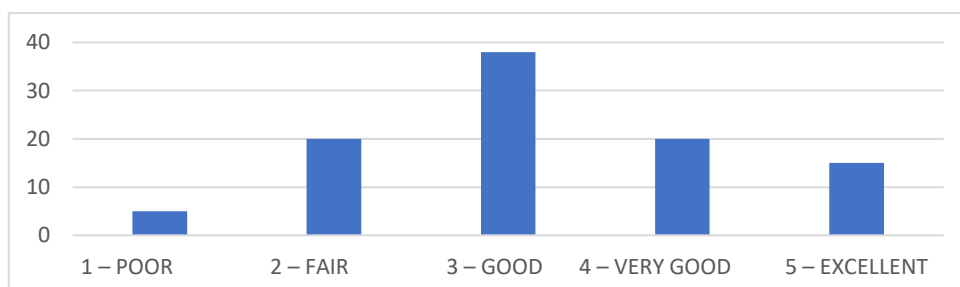
Approximately 95 percent of the cadets believe that education and training delivered in their schools are sufficient to prepare them for sea duties. That means existing programs, teaching staff, teaching material, and delivery methods are almost suitable to prepare them for their profession. But still, we should consider reaching golden standards.

##### 2. What is the level of training you receive to prepare you for future deployment depending on technological development?



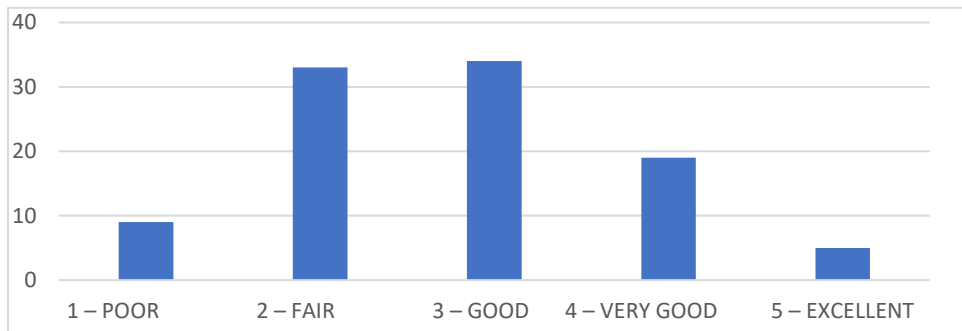
The cadets have some queries on the effects of the rapid development of technology. They are aware of technological development will affect their profession. That means cadets think about definite changes in their programs that need to be done to prepare them for future developments.

##### 3. What is the quality and quantity of the lecturers giving vocational courses?



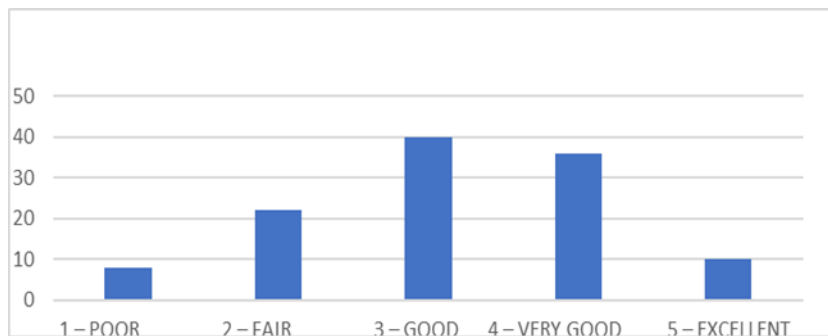
75 percent of cadets believe the quality and quantity of the lecturers giving vocational courses are sufficient. The vocational lecturers are generally having sea experiments and effectively deliver their courses based on their practice at sea. That means more emphasis needs to be given to recruiting and retaining qualified maritime lecturers with both vocational and academic qualifications.

*4. What is the effectiveness level of the current laboratory and simulator training?*



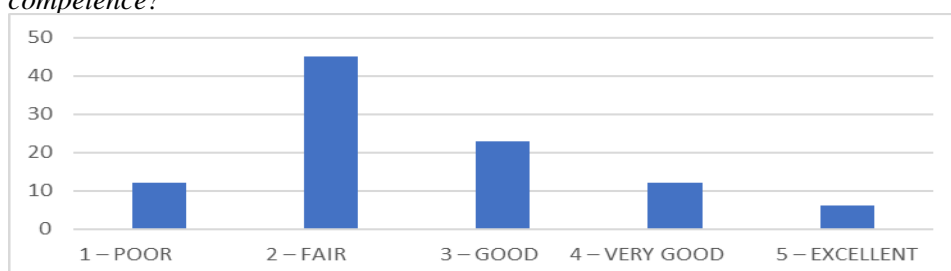
Half of the cadets stated that they are happy with the effect of the training conducted at laboratories and simulators. It is understood that the students realized the importance of class hours spent in the laboratories and simulators. So, the effective use of these supporting facilities should be reconsidered.

*5. What is the contribution level of Social Electives to your general culture?*



70 percent of the cadets stated that they believe the social electives contribute to their social and cultural developments. The students realized the importance of social electives is necessary for personal development. 30 percent of the students have different opinions and the reasons for that should be considered.

*6. What is the contribution level of vocational elective courses to your professional competence?*



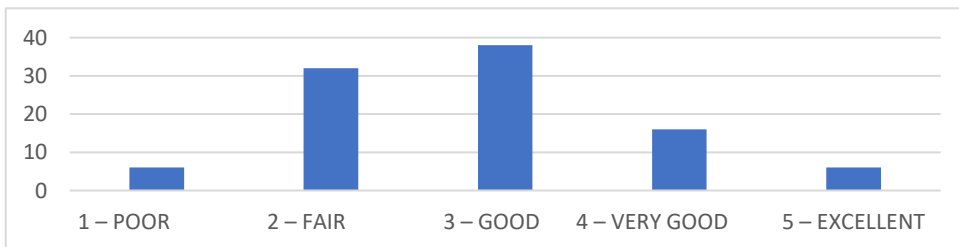
55 percent of the cadets stated that they are not so happy with vocational elective courses. The students are looking for different vocational electives which meet their future requirements. reasons for that should be considered. It is believed that the content and coverage of the vocational electives need to be reviewed.

7. *What is the level of contribution of English Preparatory Education to your language knowledge?*



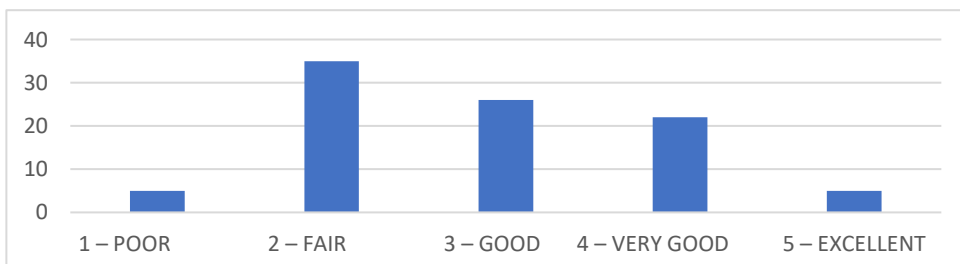
55 percent of the students are happy with Language education at the Prep school and 45 percent are not satisfied. The cadets realized that the English language is of utmost importance in sea life. The problem areas concerning English language education should be reviewed by the education planners by and large and reconstruction of the content, program, and delivery methods should be considered.

8. *What is the contribution of education in English to your professional language knowledge during your academic education?*



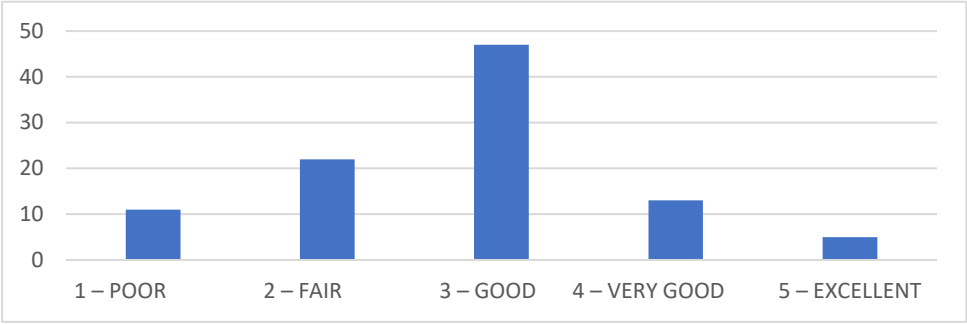
Unfortunately, 35 percent of the students are not aware of the importance of the English language in the maritime industry. The lecturers should be very keen to stress the importance of the English language in their profession. Delivery of vocational courses throughout the academic in English will facilitate the improvement of both spoken and written communication in English and better use of maritime phraseology.

9. *What is the effect of the Sea Training on the school ship on your professional knowledge?*



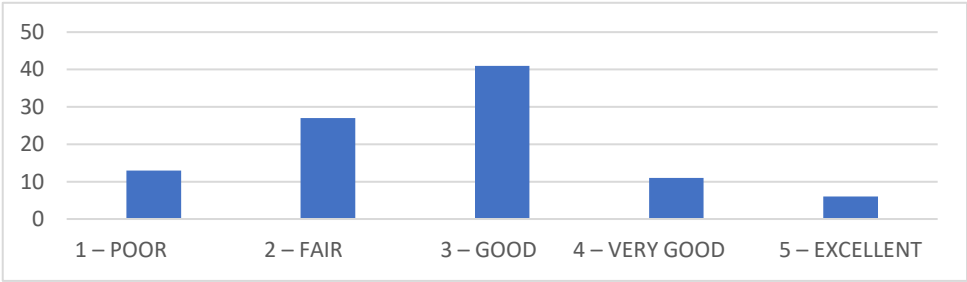
40 percent of the students found the effectiveness of sea training not so satisfactory. Previous studies proved that the objectives of the sea training program could not be achieved thoroughly due to many reasons which may be derived from students and ship crew attitude. Many professionals stated that the flag states should clearly define the foundation and application of sea training as well as control the conduct of application of sea training. IMO being responsible to ensure Safety at Sea, should establish stringent rules for sea training and enforce all respective maritime authorities.

*10. What is the ability of the Sea Training on commercial ships to support the education you receive at school?*



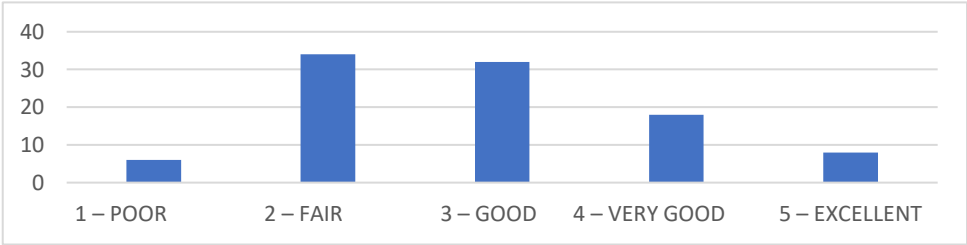
30 percent of the students stated that sea training on commercial ships could not support the education they have received at school. Many MET institutions have already established standards to define which parts of academic programs should be conducted at the sea training phase, but it is not clear in the STCW. It is proposed that this subject should be included in the forthcoming STCW development studies having a priority by all maritime authorities.

*11. What is the effectiveness of the internship conducted in the coastal facilities and counted as sea training in support of academic education?*



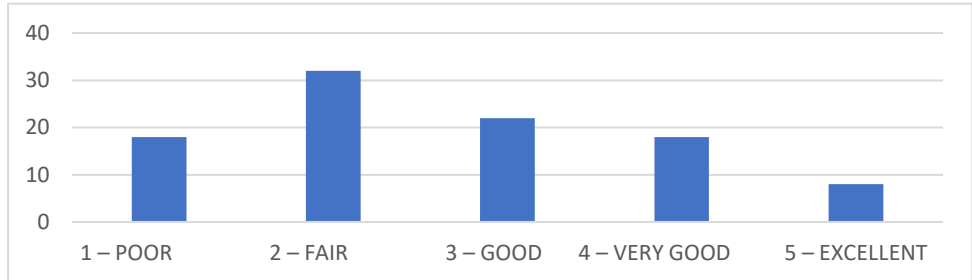
35 percent of the students stated that sea training on commercial ships could not support the education they have received at school. Many MET institutions have already established standards to define which parts of academic programs should be conducted at the sea training phase, but it is not clear in the STCW. It is proposed that new approaches to the development of effectiveness of sea training should be included in the forthcoming STCW development studies having a priority.

*12. What is the contribution of social activities at the university to your social and cultural skills?*



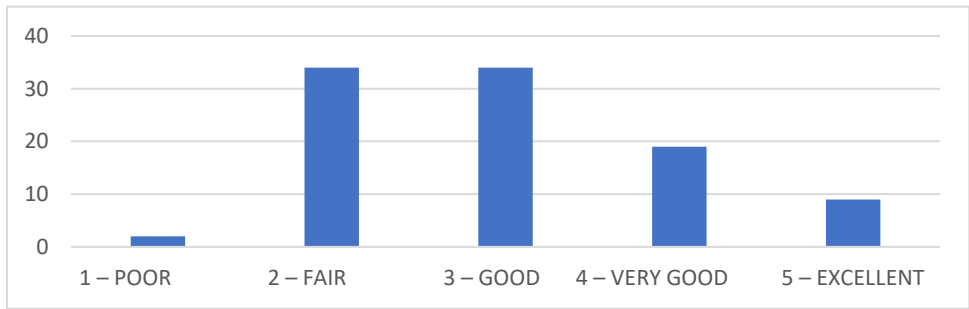
40 percent of the cadets stated that the contribution of social activities at the university to your social and cultural skills is not so sufficient. One of the missions of university y is to assist the development of social activities of the student. Additional measures should be taken for developing the social interactions of the students.

13. To what extent does the library contribute to your academic studies?



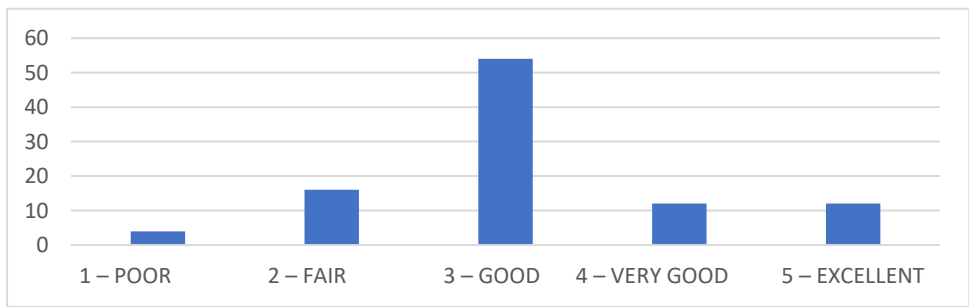
to their academic studies is not so sufficient. A university library should be fully capable to support students' academic studies. There is a strong need to enhance the capability of the university library to provide better research support.

14. What is the contribution of the thesis and other research studies to gain research skills?



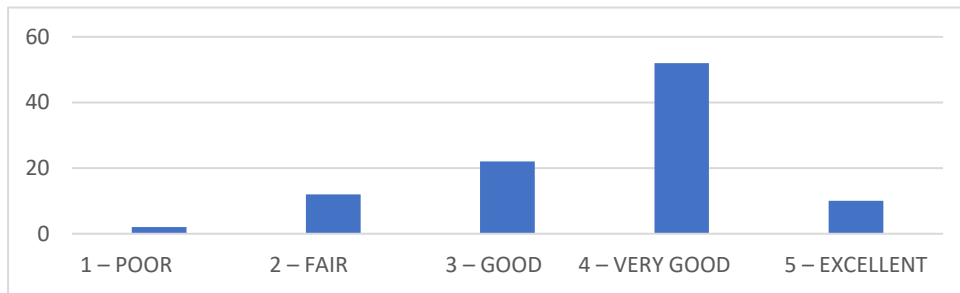
35 percent of the students assessed that there is not a sufficient contribution of graduate thesis and other research studies to gain research skills. One of the missions of the university is to develop the research skills of the student. Additional measures need to be taken to research activities in the university and more contributions of students in the research activities.

15. To what extent does the level of life at the university contribute to your adaptation to sea life?



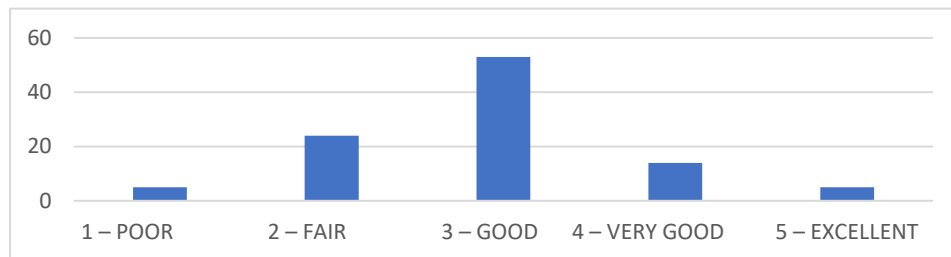
80 percent of the cadets are happy with life at the university contribute to life for adaptation to sea life?

16. When you compare the educational and social conditions at your university with similar institutions in your country, how do you evaluate your level?



Over 80 percent of the cadet's content with having an education in their school. This is an incredibly positive approach that affects the success of education.

17. When you compare the educational and social conditions at your university with similar institutions in your country and abroad, how do you evaluate your level?



Over 75 percent of the cadet's content with having an education in their school comparing other schools in their country and abroad. This is also an incredibly positive approach that affects the success of education.

## 4. Discussion

### 4.1. General Expectations from Cadet's Education and Training

The skills, knowledge, and competencies of cadets are defined in the STCW. The main aim of the STCW is to ensure the competency of seafarers define required skills and knowledge and, finally prepare seafarers with sufficient experience for sea duties to ensure safety at sea. The principal tasks of the seafaring officers are:

- The application of the governing principles and regularities of the maritime officers' management activity
- The fulfillment of professional duties and awareness of common mistakes which create negative effects on safety, feasibility, and productivity
- The formation of the skill of the adequate assessment of conflict situations and finding the way of their fair solution.

Beyond that, there are some additional expectations from the cadets to increase their effectiveness at work which also meets future expectations. The resume of the general expectations may be introduced in the following paragraphs.



*The general skills:*

- Analytical thinking
- Performing the analysis of a critical situation and finding solutions
- Gathering, analyzing, interpreting, and use of information to make an assessment
- The decision-making
- Assuming the professional responsibility.

*Common Skills:*

- Managing and developing self
- Working with and relating to others
- Communicating
- Managing tasks and solving problems
- Applying numeracy
- Applying technology
- Applying design and creativity

*The soft skills to increase efficiency at work:*

- Realizing the situation and predicting the development of the events
- Define the safety and security strategy
- Creating practical solutions in case of difficulties
- Being precise
- Work promptly
- Stabilization in changing situation
- Showing firm intention, endurance, and decisiveness

#### *4.2. Technologic developments*

The function of MET institutes is not only to prepare the students for today's requirements but also for the future as well as to prepare cadets to participate in scientific studies on the marine industry. Technological developments will continue to appear as new systems and procedures in the maritime sector. To respond to these developments, there is an obligation to make changes in our current programs. In this regard, it is considered beneficial to add the following topics to the programs.

- The concept, capabilities, and limitation of the Automation System is deemed necessary to mitigate automation failures as well as facilitate the passage of remote-controlled and autonomous ships
- Metrology is added to engineering programs to teach precise measurements
- Knowledge management principals and procedures: Knowledge accumulation and knowledge transfer.
- Decision Support Systems are required to make mariners understand the specifications and capabilities of such systems.

#### *4.3. Education Technologies*

CPD (Continuing Professional Development) courses are required to prepare seafaring officers for shore-based (second) careers which need additional skills and knowledge.

The broad use of distance learning will facilitate the application of some courses online as well as an essential tool for the delivery of CPD courses.

The wide use of simulators facilitates the delivery of the vocational courses and ensures a better understanding of trainees. The development of common simulator programs and the creation of

simulators course material should be considered. The establishment of sophisticated simulator centers in the selected MET institutes will provide support for other institutes.

Enhancement of the capabilities of the university library (information center) is necessary to provide better knowledge support. This will also increase the research activities.

It is very hard to find vocational lecturers with both professional and academic backgrounds. More emphasis needs to be given to recruiting and retaining qualified maritime lecturers with both vocational and academic qualifications.

#### *4.4. Communication Problems*

English is the unique language used in the maritime industry and it became mandatory for deck officers and masters to be able to speak, write, listen and understand English fluently.

All the operations during berth, approaching the harbors, and communication between ships or between ships and shore radio stations are being carried out in English. Also, onboard vessels where the multi-national crew is employed, all have to understand the importance of the language and they have to be able to speak, write, listen and understand English fluently, especially in all basic safety and security subjects so as not to endanger the safe operation of the ship and safety of the humans.

The use of English should be emphasized in the education and training at MET institutes. Especially in vocational courses, the education in English will make it easier for students to adapt to maritime terminology.

#### *4.5. Sea Training*

It is a fact that the expected targets in the sea training performed onboard the commercial ships are not fully achieved. The most important reason underlying this is considered that the shipmasters and the DSTO (Designated Ship Training Officer) s responsible for overseeing the training do not show sufficient sensitivity in this regard. It is a fact that not all ships have a suitable DSTO on board. Chief Mates cannot assume responsibility due to their highly overloaded duties. This situation causes cadets to not be able to provide the expected benefit from sea training. The maritime company also has a responsibility to make maritime training more effective. The company DSTO is also a part of the sea training and assumes an active role in the supervision of planning and implementation of the training onboard.

The Shipboard Training Officer should review the cadet's progress regularly. It is suggested that a set time is agreed upon each week when the cadet prepares and hands in the Portfolio for inspection. Establishing a routine will save time and ensure an efficient process. DSTO should enter comments in the 'monthly review of progress' before passing the Portfolio on to the Master or Chief Engineer Officer as appropriate for comment.

#### *4.6. The Assessment of the Results of the Survey*

The great majority of the cadets assess that education and training delivered in their schools are sufficient to prepare them for sea duties. It is proof that the existing programs, teaching staff, teaching material, and delivery methods are almost suitable to prepare them for their profession.

The cadets are well aware of technological development will affect their profession. It is understood that means cadets think that some definite changes in their programs are needed for preparing them for future developments in their profession.

Most of the cadets believe the quality and quantity of the lecturers giving vocational courses are sufficient. This is an important subject that directly affects the success of education. To maintain the

quality of the education more emphasis needs to be given to recruiting and retaining qualified maritime lecturers with both vocational and academic qualifications.

The cadets realized the importance of class hours spent in the laboratories and simulators. So, the better use of educational support facilities should be evaluated.

Most of the students realized the importance of social elective courses necessary for their personal development. 30 percent of the students have different opinions and the reasons for that should be examined.

Nearly half of the cadets are not so happy with vocational elective courses. The students are looking for different vocational electives which meet their future requirements. It is believed that the content and coverage of the vocational electives need to be reviewed.

The problem areas concerning English language education should be reviewed by the education planners by and large and reconstruction of the content, program, and delivery methods should be reconsidered. Delivery of vocational courses throughout the academic in English will facilitate the improvement of both spoken and written communication in English and better use of maritime phraseology.

Previous studies proved that the objectives of the sea training program could not be achieved thoroughly due to many reasons which may be derived from students and ship crew attitude. Many professionals stated that the flag states should clearly define the principles and application of sea training as well as control the conduct of application of sea training. IMO being responsible to ensure Safety at Sea, should establish stringent rules for sea training and enforce all respective maritime authorities. Many MET institutions have already established standards to define which parts of academic programs should be conducted at the sea training phase, but it is not clear in the STCW. It is proposed that this subject should be included in the forthcoming STCW development studies having a priority by all maritime authorities.

Nearly half of the cadets found the contribution of social activities at the university is not so sufficient to develop social and cultural skills. One of the missions of university is to assist the development of social activities of the student and this subject needs to be taken seriously to develop social interactions of the students.

Most of the cadets find existing libraries (knowledge canters) are not capable to support their academic studies. There is a strong need to enhance the capability of the university library to provide better support.

One-third of the students stated that their graduate project is not sufficient to contribute to the development of research skills. The university's responsibility for developing the research skills of the student should be considered seriously. Additional measures need to be taken to research activities in the university and more contributions of students in the research activities.

80 percent of the cadets are happy with life at the university and contribute to life for adaptation to sea life. Close cooperation for improving better solutions, among MET institutes, maritime administrations, and shipping organizations such as IMO, ICAS, ISF, ICS, BIMCO, and shipping companies is necessary to easily facilitate the adaptation of cadets for their future duties

Over 80 percent of the cadet's content with having an education in their school. This is an incredibly positive approach that affects the success of education. Over 75 percent of the cadet's content with having an education in their school comparing other schools in their country and abroad. This is also an incredibly positive approach that affects the success of education.

## **5. Conclusion**

### **5.1. General**

The MET for seafaring officers should cover the following basis:

- Principles and regularities of the maritime officers' management activity to fulfill the professional duties
- Safety, feasibility, and productivity awareness
- Assessment of conflict situations and decision making

The function of MET institutes is not only to prepare the students for today's requirements but also for the future as well as to prepare cadets to participate in scientific studies on the marine industry. Automation, Metrology, Knowledge Management, Decision Support System subjects should be added to seafaring officer's MET programs

As far as concerning delivery of courses:

- To facilitate the delivery of vocational courses simulator classes should be enhanced.
- The broad use of distance learning will facilitate the application of some courses online as well as an essential tool for the delivery of CPD (Continuing Professional Development) courses.
- There is a strong need for maritime lecturers with both professional and academic backgrounds.
- To provide better support for learning and research the activities, the capability of the university library (information center) should be enhanced.

Three issues need to be addressed to make BAT more perfect. These are as follows.

- Bringing English education to the standards specified in STCW
- Improving the quality of Sea Training to prepare students for sea duties
- Increasing the aptitudes of seafaring cadets in soft skills, especially in communication

### **5.2. Survey results**

When the results of the survey applied to the students are evaluated, it is considered that it would be appropriate to conduct studies on the following issues.

- MET programs need to be overviewed and developed are needed for prepare the seafaring cadets for their profession in the light of the rapid developments in the technology
- To maintain the quality of the education more emphasis needs to be given to recruiting and retaining qualified maritime lecturers with both vocational and academic qualifications.
- Additional measures are needed to provide a better contribution of simulators and laboratories in support of education.
- The social elective courses are necessary for cadets' personal development. Also, vocational electives should be rearranged to meet future requirements of the profession.
- Delivery of vocational courses throughout the academic program in English will facilitate the improvement of both spoken and written communication in English and better use of maritime phraseology.
- The sea training conducted under the flag states supervision is a complementary part of the academic program. IMO being responsible to ensure Safety at Sea, should establish stringent rules for sea training

and enforce all respective maritime authorities. Inclusion of these rules It should be included in the forthcoming STCW development studies having priority.

- One of the missions of the university is The social activities in the university assist the development of the students' social interactions as well improvement of their soft skills which become rather important in the time being.

- Enhancement of the capabilities of the university library (information center) is necessary to provide better knowledge support.

- The university's responsibility for developing the research skills of the student should be considered seriously as well as enhanced contributions of students in the research activities.

80 percent of the cadets are happy with life at the university contribute to life for The perfected cooperation among MET institutes, maritime administrations, and shipping organizations will facilitate the students' adaptation to sea life. The cadets are mostly contented with having education in their MET institutes. school. This is an incredibly positive approach that affects the success of education.

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