

# **PBL IN MET: ONE STEP FURTHER IN QUALITY ASSESSMENT**

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## **ABSTRACT**

Officers are the core element of the shipping industry and demand for competent and well educated officers has been growing. Due to the global nature of the shipping industry, structured, standardized, internationally accepted, monitored and assessed education and training are vital elements to meet the expectations of the shipping industry. The STCW convention, adopted by IMO in 1978 and revised in 1995, defines standards for training, certification and watchkeeping for seafarers. According to the STCW 95 convention, all MET shall be monitored by the administration through a quality management system. Turkey has established the evaluation system in 2003 and the maritime education institutes have been subject to the Independent Evaluation Committee (IEC)'s quality assessment procedures. Dokuz Eylül University School of Maritime Business and Management (SMBM) has been implementing ISO 9000:2000 quality management system for four years. In order to meet the requirements of STCW Code A-I/8, SMBM is under the guidance of the Turkish Republic's IEC. With regard to that fact, detailed processes have been applied to all stages of the education and training to comply with the requirements of both the ISO 9000:2000 system and the IEC. In addition to that, School has started to apply Problem Based Learning (PBL) system in 2003. PBL is a learning method based on the principle of using problems as a starting point for the acquisition and integration of new knowledge. PBL is built TQM compatible and requires utmost attention in system evaluation.

This paper attempts to introduce the quality assessment system and its application within the PBL system concerning both the ISO 9000:2000 and the STCW Code A-I/8 requirements in SMBM.

## **1. Introduction: STCW and Quality Requirements**

Seafarers are the core elements of shipping industry and it is widely quoted that 80 per cent of maritime transport accidents are due to human error. For nearly two decades, the international maritime community has shifted from the approach, which seeks only technical solutions to safety-related problems, to focusing on the role of human factors in maritime safety. On the other hand the demand for competent and well-educated seafarers is growing day by day. To meet the above-mentioned demand and expectations of the shipping industry and the international feature of the shipping industry, structured, standardized, internationally accepted, monitored and assessed maritime education and training has gained importance.

The STCW convention, adopted by IMO in 1978, defines standards for training, certification and watchkeeping for seafarers. In 1995, Convention was completely revised and updated to clarify the standards of competence required, introduce qualification requirements for trainers

and assessors, provide effective mechanisms for enforcement of its provisions and allow greater flexibility in the assignment of functions on board ship.

This convention reinforces the criteria for eligibility of seafarers and requires proof of the effectiveness of measures introduced to satisfy the intentions of the convention. It seeks to establish a baseline standard for the training and education of seafarers throughout the world and, by placing an emphasis on quality control and competence-based training,

The STCW seeks to ensure the highest standards for functions and processes relating to a mariner's competence. To do this, all training, assessments of competence, certification, endorsement and revalidation activities regarding STCW certificates must be monitored by a quality standards system (QSS).

Under the section A- I/8 "Quality Standards" of STCW Code; Parties are required to ensure that all training, assessment of competence, and certification activities are continuously monitored through a quality standards system to ensure achievement of defined objectives. An "independent evaluation" of the knowledge, understanding, skills and competence acquisition and assessment activities, as well as of the administration of the certification system, is to be conducted at intervals of not more than five years. The evaluation must be conducted by persons who are not themselves involved in the activities concerned to verify that (IMO, 1996).

### **1.1. The Quality Standards Model of STCW for Assessment of Knowledge, Understanding, Skills and Competence**

As per STCW Code Section B-I/7, (4) the quality standards model for assessment of knowledge, understanding, skills and competence should incorporate (IMO, 1996):

A quality policy, Quality management functions, quality system coverage, the quality control functions and the internal quality assurance.

### **1.2. IEC Standards**

Turkey has established the evaluation system in 2003 and the maritime education institutes have been subject to the Independent Evaluation Committee (IEC)'s quality assessment procedures.

IEC is founded to evaluate the quality standards of maritime institutes due to the directive prepared by the administration. The items to be inspected by the IEC surveyors are as below:

- 1- Competency of quality management system to the directive.
- 2- Educational tools and equipments
- 3- Competence and quantity of educational staff.
- 4- Application of quality management system.
- 5- Efficiency of quality management system and services provided.
- 6- Competency of quality management system to body of national and international law.

(Directive of Quality Management 2003)

The requirements of the committee covers both STCW and ISO based international quality standards, and it is compulsory for all maritime institutes of Turkey related to education and certification, such as universities, high schools, exam centers and governmental institutes.

In year 2004 all the maritime institutes of Turkey have been inspected by IEC and reports have been presented to the correspondent parties. The corrective actions and incompatibilities have been declared and the institutes are requested to amend their quality management systems accordingly.

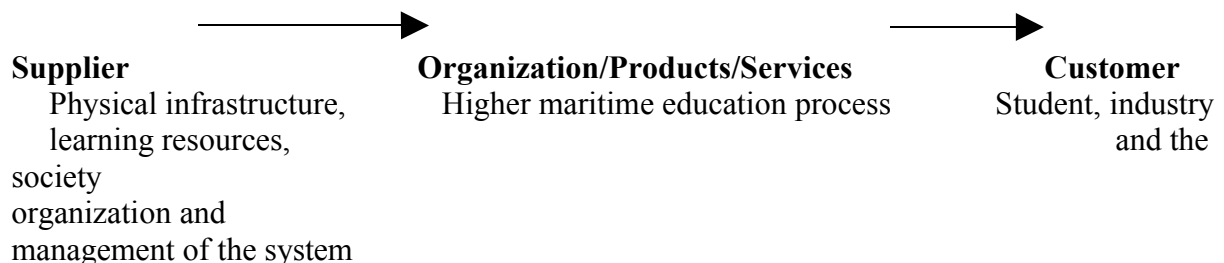
DEU SMBM and its problem based learning curriculum has been inspected thoroughly by IEC surveyors and it has been reported that the quality system greatly comply with the IEC requirements. As a system itself, PBL has properties such as feedbacks, evaluations, dynamic structure and flexibility are compatible with TQM, ISO standards and Turkish IEC requirements.

## 2. Quality Management Systems and International Requirements

International Standard ISO 9000:2000(E) states the following requirements for quality management systems of organizations (ISO, 2000): (1) Quality management system (2) Management Responsibility (3) Resource Management (4) Product Realization.

### 2.1 Quality Management in Maritime Education

Regarding the main approach of the ISO 9000 standard, the “organization” receives supplies from the “supplier” and provides “products/services” to the “customer” (ISO,2000:1,2). When the standard is applied to higher maritime education process, the term “organization/products/services” will stand for “higher maritime education process which is provided by the “university/faculty/school”. The term “customer” will stand for the “student, industry, society”. The term “supplier” will remind “the physical infrastructure, the learning resources, organization and management of the system” that serve the higher maritime education process (Asyali et al 2003).



### 2.3 PBL and its Contributions to the Implementation of Quality Management Systems at Maritime Universities

#### 2.3.1 Background: Studies on the Improvements in the Quality of MET and PBL Approaches in Maritime Universities

Starting with the dynamic atmosphere of MET brought by STCW-95, maritime universities initiated working on improvements in the quality of MET and studies have been conducted internationally. The studies have concentrated on the improvements in;

- learning resources of the educational institute
- learning styles of the students
- necessary changes in the course system,
- qualification of the instructors

- measurements and assessments regarding the outcomes of the MET system.

**Table 1: Comparison between STCW Convention and ISO 9002 Standards**

	STCW CONVENTION	IEC STANDARDS	ISO 9002 STANDARDS
Field of application	Maritime Training, certification and watchkeeping	National and International regulations	Quality assurance of services
Applicable to	Administration of the certification system; All training courses, and programs; Examination and assessments carried out; Qualification and experience of instructors and assessors	Maritime institutes of Turkey	Contractual relationship between customer and supplier
Purpose: Demonstrate compliance with	The training, certification and watchkeeping requirements	Training, certification and quality management	The customer quality requirements
Means: Implementation of	A Quality Standards System (QSS)	Maritime educational quality system	A company quality management system
Scheme of certification:	The independent evaluation report	Administration's accreditation	Company audit, Quality system approval
Validity	5 years subject to audit	Annual subject to audit	5 years subject to audit
<b>Compliance:</b>	Mandatory	Mandatory	Voluntary

Source: Adapted from Asyali et al 2003

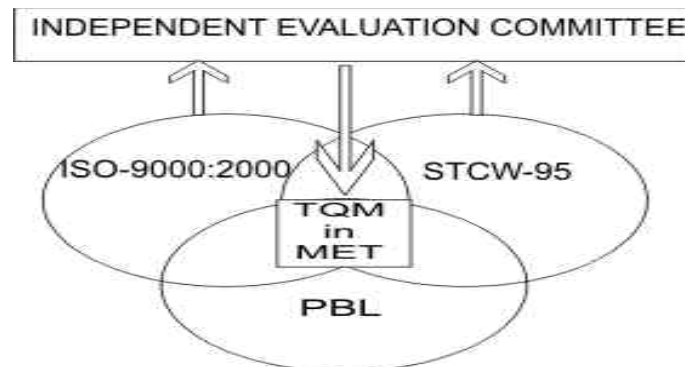
Requirements of maritime education and the need for the improvements of the system have been increasingly searched in the end of the 1990s. Teel had introduced the concept of “active learning” to the notice of the maritime community (Teel 1998, Teel 1999). In maritime education literature, modelling of the quality management cycle has been discussed in terms of “problem solving and decision making skills” (Er 1999:173). Improving the “cadets’ self learning abilities” has been recommended by a study where “a reform is recommended for the cultivation pattern and the course system for MET of the 21<sup>st</sup> century” (Zhaolin et al 1999:220). The role of the instructors on education has also been a subject to the studies. Kay examined the role of instructors in improvement of the long-term education process (Kay 1989).

In 2002 DEU SMBM has adopted **Active Learning** and the student centered **Problem Based Learning-PBL** system. The system has been introduced to the maritime universities and lecturers in international meetings (Tuna et al 2002, Nas and Paker 2002, Paker and Kalkan 2002, Asyali 2003, Paker and Zorba 2003, Kalkan and Yilmazel 2003, Kalkan 2003, Nas 2003, Zorba 2003, Acar 2003, Atilla 2003, Asyali et al 2003, Cerit et al 2003). In the scope of such an international workshop Rotgans, Furusho and Moore have also mentioned their approaches about the applications of PBL in MET (Rotgans 2003, Furusho 2003, Moore 2003).

### 3. PBL Application in Assessing Quality of MET in a Higher Maritime Education Institute

#### 3.1 Methodology

The evaluation of the system and the tutors has been done by internal and external elements of the described system. This study aims to highlight one of the many tools of evaluation; evaluation of the tutors by the students of SMBM Deck Department.



**Figure 1: Conceptual Model**  
Source: Authors

### 3.2 Evaluation / Assessment Applications Aiming Quality of PBL in MET

It is possible to mention a great variety of assessments; the common goal, however, is to evaluate whatever the system in question has provided the students with. This evaluation cannot be confined to evaluating the achievement level of the students. It is to cover the system as well. In compliance with this belief, the assessment work in practice at DEU SMBM Deck Department, where PBL has been adopted for the recent academic year, considers both types of assessments (Zorba 2003).

#### 3.2.1. Assessment of the Students

The main target of assessment is to cover cognitive, psychomotor and attitude-behaviour issues. In compliance with the overall rule “right tool for the right content”, different tools are needed to assess these three issues. In assessing the cognitive targets, written and multiple choice types of questions are preferred. The assessment of the others, motor skills and attitudes – behaviors, requires certain tools of observation (Semin 2002). Considering these points, the tools used to measure the achievement of the deck students can be highlighted as follows:

**Assessment following each module (Post-module assessment)** : The extent of acquisition regarding the learning objectives, covering a 2-3 week period of studying, extracted from a three-session scenario is assessed by an exam given at the end of each module.

**Scenario discussion session** : During these sessions, also called “tutorial group sessions”, students are graded by the tutor in terms of their ability to use the knowledge, questioning, integrating, communication and self regulation.

**First and second student evaluation** : An academic year comprises two terms, and at the end of each term the students take a term exam.

**First and second term practice** : Student’s performance is tested through the practices carried out through the modules.

#### 3.2.2. Evaluation of the System

Evaluation of the system is at least as important as that of the students achievement/ performance. In traditional teaching methods, it is difficult for the students present feedback at the end of every activity they are involved in such a feedback giving system enables the system to be improved, updated, and corrected. More important than this is that student feel themselves as a part of the system and they are involved in every step. This belief makes it easier for the students to get adapted to the system (Zorba 2003).

At DEU SMBM, feedback is gained from the students at the end of every activity. Every feedback is used to check whether or not the relevant activity is proper, contributes to reaching the learning objectives, and affects the students' improvement. The feedback also is used to evaluate the extent of the efficiency and effectiveness of the teacher while using the teaching aids, the relevant equipment, and the time.

The system of evaluation utilizes not only the feedback from the students but also that of the tutors. Especially the feedback of the tutors on the quality of the scenarios is made use of, as the students' evaluation in this matter can not be adequate. Such scenario evaluations through feedback contribute to bettering the scenarios in terms of the design, improving the perceptions about the learning objectives, completing the missing aspects, correcting the undesirable parts, etc.

#### 4. Quality Assessment in SMBM: A Case Study

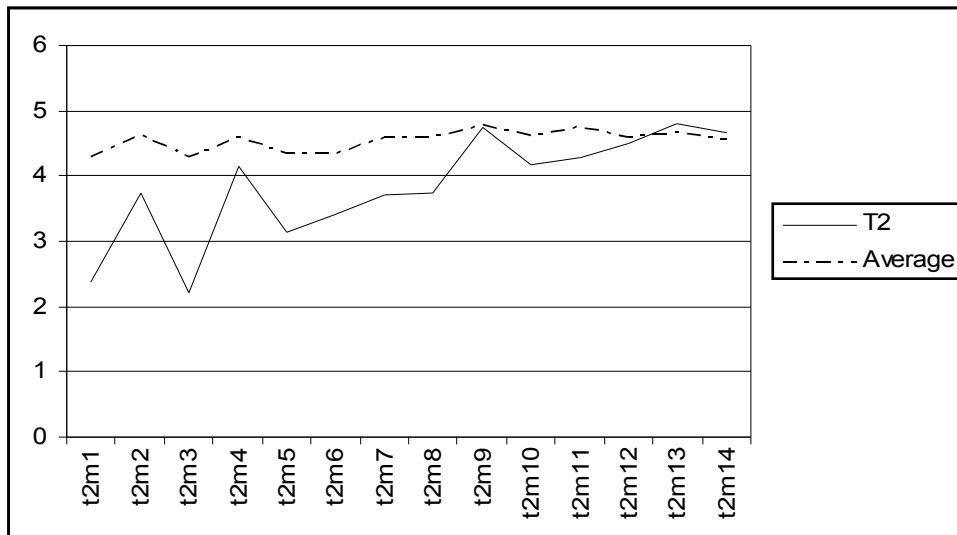
At the end of each module, the students are asked to evaluate the performances of tutors, on the bases of contribution to learning process, contribution to promoting critical thinking, contribution to promoting evaluation skills and contribution to promoting communication skills. The input is used in an evaluation system to monitor the performance of each tutor independently and to maintain quality cycle by conducting necessary corrective actions.

Academic year 2003-2004 evaluation of the tutors by term 2 students revealed that one of the tutors had been criticized on his contributions to promoting communication skills. All the other evaluation criteria values were distributed evenly without any significant differences. The average evaluation figures of contribution to promoting communication skills of each module, for each tutor can be seen at Table 1.

**Table 1:** Evaluation of tutors by term2 students

	t2m1	t2m2	t2m3	t2m4	t2m5	t2m6	t2m7	t2m8	t2m9	t2m10	t2m11	t2m12	t2m13	t2m14
T1	4,67	5	5	4,33	5,00	5,00	5	4,67	4,57	4,5	4,86	4,75	4,86	4,71
<b>T2</b>	<b>2,37</b>	<b>3,75</b>	<b>2,2</b>	<b>4,14</b>	<b>3,14</b>	<b>3,40</b>	<b>3,71</b>	<b>3,75</b>	<b>4,75</b>	<b>4,17</b>	<b>4,29</b>	<b>4,5</b>	<b>4,8</b>	<b>4,67</b>
T3	4,57	4,5	4,71	4,57	3,75	4,00	4,43	4,83	4,71	4,57	4,57	4,63	4,88	5
T4	5	5	5	5	4,86	4,67	4,71	4,83	4,83	5	5	4,43	4,33	4,4
T5	4,8	4,86	4,5	4,8	5,00	4,67	5	4,88	5	4,86	5	4,63	4,5	4
<b>avarage</b>	<b>4,28</b>	<b>4,62</b>	<b>4,28</b>	<b>4,57</b>	<b>4,35</b>	<b>4,35</b>	<b>4,57</b>	<b>4,59</b>	<b>4,77</b>	<b>4,62</b>	<b>4,74</b>	<b>4,59</b>	<b>4,67</b>	<b>4,56</b>

The complaints of the students were also obvious and could be clearly seen at the feedbacks presented. Figure 2 shows the difference between tutor number 2 (T2) and the average of five tutors. The SMBM management has recommended a corrective action to fix the observed problem.

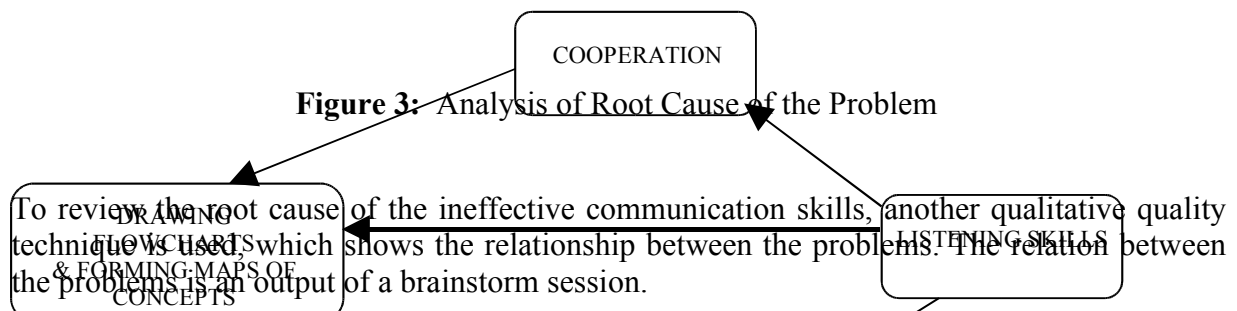


**Figure 2:** Evaluation of tutors

**Source:** Authors

As it is widely known, the core of the corrective action is to find the main cause of the problem. Another important factor which must be taken into consideration is that the causes of the problems, namely sub problems interact with each other. Root cause can be defined as the cause which interacts with other problems mostly. The aim of the present corrective action is to highlight the root of the arised impropriety.

A meeting has been held among the tutors of the deck department at the end of term 6. One of the qualitative quality techniques used to find the root of the problem is the fish bone diagram (See **Figure 4**). Brainstorming is used to find the causes of the problem. After finding the main causes of the problem, second step is finding the sub problems of the problems.

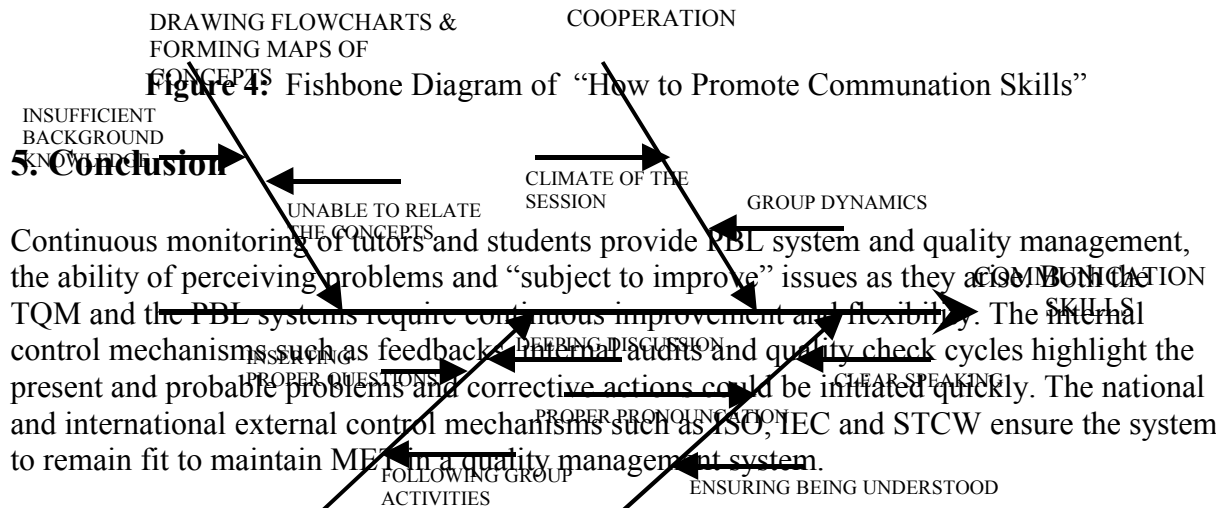


The method of creating the flowchart has been schematized at Figure 3. Listening is used as a tool to create cooperation and communication, cooperation and communication is used as tools to create the ideas to highlight the root cause of the problem, together with listening.

The committee has revealed that Tutor 2 had communication difficulties, despite his proper language knowledge. The fact that PBL sessions moderated by Tutor2 which usually ends earlier than the other groups may be a clue that the students of the mentioned group don't tend to discuss as much as the other groups. The climate of the sessions does not promote their communications, and the Tutor 2 has to give extra importance to the PBL environment, and encourage the members to participate the discussions.

Tutor 2 has attended the brainstorming session and he agreed on that he had interfered too much and he could not follow the group dynamics.

The improvement could not be observed very fast but after six weeks the feedback results reflected a significant improvement. The student feedbacks on promoting communication skills of Tutor 2 have risen up to the averages (see Figure 2).



Continuous monitoring of tutors and students provide PBL system and quality management, the ability of perceiving problems and “subject to improve” issues as they arise. Both the TQM and the PBL systems require continuous improvement and flexibility. The internal control mechanisms such as feedback, internal audits and quality check cycles highlight the present and probable problems and corrective actions could be initiated quickly. The national and international external control mechanisms such as ISO, IEC and STCW ensure the system to remain fit to maintain MEI in a quality management system.

The comprehension of the ability to improve the system is a tool of motivation for the students. They always have the chance to offer an improvement via feedbacks and discussion sessions, and they positively see the outputs of their personal thoughts in practice. Being at the center of the activities provide an active contribution of the students to the quality system.

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