

A Miscellaneous Adoption of Problem-Based, Task-Based, and Project-Based Learning in Higher Maritime Education: A Case Study at Dokuz Eylül University Maritime Faculty*

Denizcilik eğitiminde probleme dayalı, göreve dayalı ve projeye dayalı öğrenim yöntemleri karmasının uygulanması: Dokuz Eylül Üniversitesi Denizcilik Fakültesi örneği

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Özet

Yükseköğretimde belirli bir öğretim/öğrenim yöntemi benimserken genel hedef dikkate alınmalıdır. Günümüzde ağırlıklı olarak öne çıkan yaklaşım, yükseköğrenimini bitirdiğinde bir mezunun, karşılıklı ilişkilerde, takım çalışmalarında, problem çözmede, karar verme süreçlerinde etkili iletişim ve liderlik konularında işlevsellik kazandırıcı ve tetikleyici öğeler olarak kullanılmak üzere genel entelektüel yetkinlikler ve yaklaşımlar, yüksek düzeyde düşünme ve bilişsel beceriler ile aktarılabilir/transfer edilebilir beceriler ile donatılmış olması gerektiğini ortaya koymaktadır. Ayrıca son eğilimlerin kuardan uygulamaya, özelden genele ve genel eğitim amaçlarından genel transfer edilebilir yetkinliklere doğru yönelmiş olduğu da göz önünde bulundurulmalıdır. Özellikle yirminci yüzyılın son çeyreğinden bu yana bilişsel ve eğitim psikolojisi konulu çok sayıdaki çalışmada aktif ve işbirlikli öğrenme yöntemlerinin olumlu etkileri ve önemi vurgulanmaktadır. Daha etkili öğrenme yöntemleri arayışı doğrultusundaki çabalar/araştırmalar geleneksel öğretim yöntemlerinden aktif öğrenme yöntemine geçişin denizcilik eğitiminde kaliteyi arttıracaklarını işaret etmektedir. Bu gelişmelerin yakından izlenmesi sonucunda 2002 yılından başlamak üzere Dokuz Eylül Üniversitesi Denizcilik Fakültesi'nde probleme dayalı öğrenme yöntemi benimsenmiş, geliştirilmiş ve işe dayalı öğrenme ve projeye dayalı öğrenme yöntemleri ile desteklenmiştir. Bu çalışmanın amacı, denizcilik eğitiminde bu yöntem değişikliğinin nasıl gerçekleştirildiği konusuna açıklık getirmektir. Çalışmanın giriş bölümünde, bu geçişe bilişsel destek sağlayan ayrıntılı bir literatür taraması yer almaktadır. Sonraki bölümlerin her birinde, uygulanan öğrenme etkinlikleri ile üç öğretim yönteminin bir arada kullanımının değerlendirilmesi, artı ve eksileri açıklanmaktadır. Özellikle 20. yüzyıl ortalarından bu yana, sözü edilen üç öğretim yönteminin her birinin birçok Avrupa yükseköğretim kurumunda kullanılmakta olmasına karşın, bunların birbirini tamamlayacak şekilde karışımın uygulanması yeni bir yaklaşım olarak değerlendirilebilir. Bu açıdan, bu çalışmanın diğer denizcilik eğitim kurumlarına, denemeye değer böylesi bir eğitim yöntemi değişikliğine başvurmada cesur bir örnek teşkil etmesi umulmaktadır.

Anahtar sözcükler: İşe dayalı öğrenme, problem dayalı öğrenme, projeye dayalı öğrenme, yüksek öğretim, yüksek denizcilik eğitimi.

Abstract

While adopting a particular teaching/learning method to be practiced at higher education, the overall aim has to be taken into consideration. The prevalent view reveals that the undergraduate, when having completed higher education, is assumed to have been equipped with "general intellectual abilities and perspectives; higher order thinking and higher order cognitive abilities; and intellectual transferable skills to be activated as elements providing and triggering functionality in interpersonal relations, teamwork, problem-solving, decision-making, effective communication, and leadership." It should also be kept in mind that the recent trends seem to have shifted from theory to practice, from specific to general, and from general educational aims to general transferable competencies. Particularly, since the last quarter of the 20th century, a great wealth of studies on cognitive and educational psychology has favored active and cooperative learning methods. In pursuit of more effective means of education, certain effortful investigations have pointed out that shifting from the conventional teaching methods to active learning would promote the quality of higher maritime education. As a consequence, since 2002, problem-based learning has been adopted, improved and supplemented by task-based learning and project-based learning at Dokuz Eylül University Maritime Faculty. The purpose of this study is to clarify how such a change in higher maritime education has been managed. A thorough literature review providing cognitive support to this shift is briefed in the Introduction. Each of the other sections of this study describes the learning activities practiced along with an overall evaluation, pros and cons, of the miscellaneous adoption of the three instructional methods. Although each of the mentioned three instructional methods has quite widely been adopted and implemented by many European higher educational institutions particularly since mid 20th century, implementing a combination of them in such a manner that they supplement one another could be considered to be quite a new approach. Hence, this study is believed to set a courageous example that worths a try for the other higher maritime education institutions.

Key words: Higher education, higher maritime education, problem-based learning, project-based learning, task-based learning.

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The purposes in higher education are said to vary (Barnett, 1995). To some, “universities have two main and inter-related functions: teaching and research” (Kelly, 1995, p. 120) and to some others, the main function of higher education is “three-legged: teaching, research, and community service” (Duke, 1992, p. 41). The latter seems to have prevalently been shared as could be seen in the following extracts from the mission of some universities: “... research and scholarship, teaching and learning service outside the University... The university’s most distinctive feature is its ability to combine academic excellence and particularly in research, with a commitment to the community at regional, national and international levels, through continuing education... The university’s clearly defined purpose in teaching is to supply industry and commerce with a body of educated, well-trained and able graduates...” (Duke, 1992, p. 40-43).

Although the purposes talked about are said to be “those of the educator’s intentions” and “imposed on students” (Barnett, 1995, p. 33), at the center is the student placed. In Barnett’s terms, “it is the students who do the achieving, not the teaching staff, or the senior personnel, or the institutions. Those other actors and the institutional environment may help the student to achieve.”

While forming the aims in higher education, the points of crucial significance to be taken into consideration could be highlighted as follows: “the nature of the intellectual development that takes place in students’ minds” (Barnett, 1995, p. 1b); besides, “Higher education is not merely “additional” education... The title signifies a particular kind and, indeed, level of intellectual attainment”. In this respect, “the development of the individual student’s autonomy... intellectual integrity and the capacity to be their own person, ... the general powers of the mind, ... a breadth of vision and grasp beyond the confines of a single discipline, ... the enhancement of the student’s personal character, ... the acquisition of a distinctive socio-linguistic form of interaction ... and developing competence to participate in a critical commentary on the host society” (Barnett, 1995, p. 20-21) are to be taken into account.

In addition to the above quoted highlights to be considered in forming the aims of higher education, a significant part of the responsibility is “to move students from the dependent stance to being independent learners and ... beyond independent to interdependent learners” who get “information from a variety of sources” rather than rely on “a narrow range of sources and viewpoints” (Rugarcia et. al., 2000, p. 7). Since “it will never be possible to teach students everything they will be required to know when they go to work, ... a better solution

may be ... helping students integrate knowledge across courses and disciplines, and equipping them with lifelong learning skills”(Rugarcia et. al, 2000, p. 6).

The main focus of higher education is thought to be “the development of certain intellectual capacities and, in particular, the capacity to challenge the assertions of others ... the skills of experimental inquiry” rather than “transmission of information ... falsification rather than verification ... viewing the world from a questioning perspective” and offering the students “empowerment” so that they can have “control over their own destinies” (Kelly, 1995, p. 92-93). Likewise, as Marker (2000, p. 137) points out, higher education must be “the means by which humans deal critically and with reality and discover how to participate in the transformation of their world”.

As far as the vocational higher education is concerned, it is believed to be “one which will alter the existing industrial system and ultimately transform it” rather than “which will adapt workers to the existing industrial regime” (Hursh and Ross, 2000, p. 3). Besides, it is believed that there are two distinct points of view regarding the demands of the academic world and those of the world of professional work: a view that higher education should take as its starting point the world in which its graduates will find themselves, as professionals developing their careers and another view that the starting point of higher education must be the theoretical and conceptual structures of academic disciplines. It is, on the other hand, suggested that there is no sharp boundary between the demands of these two worlds (Barnett, 1995, p. 161-162). In terms of the competences, commonly required by these worlds, there has been a shift, for the last thirty years, from subject-specific to vocationally-specific (ability to cope with uncertainty, puzzle matters out for himself, envisage possible strategies and actions, formulate his own solutions) and from general intellectual competencies (analytical skills, being able to integrate material and see relationship within it, being able to form critical evaluation of the claims to knowledge encountered, being able to place one’s learning in a wider context, being able to form their own views and be ready to be judged by them) to general vocational (transferable) competencies (interpersonal skills, the ability to work in a team, decision-making, problem solving, communication skills, risk-taking and leadership) (Barnett, 1995, p. 157-160).

In order to provide the students with the above highlighted and most favored competencies, teaching/learning activities and the relevant curricula are to be prepared and carried out with utmost care. In such care, first of all, both student-specific characteristics such as “motivation, approach to study, epistemological belief and intellectual development” as well as task-specific aspects are to be considered (Laurillard,



1993). Besides, the dimensions of learning styles should be taken into account so that the proper teaching/learning styles could be adopted (Felder and Silverman, 1988, p. 675; Cardellini, 2002, p. 62-65; Woods et al., 2000, p. 26-39). Furthermore, as Pressley and McCormic (1995, p. 79) suggest, “no one or two instructional approaches are appropriate for all contexts,” various types of teaching are to be interconnected. Moreover, in order to accomplish motivating learning environments, it seems to be imperative that a cooperative and/or collaborative social situation exist wherein the goals of the separate individuals are linked together that there is a positive correlation among their goal attainments. In addition to providing such an environment, Pressley and McCormic (1995, p. 109) lists what to do as follows: “model interest in learning; lower anxiety in classrooms; induce curiosity and suspense; make abstract material more personal, concrete and familiar; offer students choices; provide as much student autonomy as possible”. Having considered all such imperative warnings, the focus of university teaching seems to have shifted, as Evans and Abbott (1998, p. 46) point out, “away from the corpus of knowledge in favor of the process of learning in higher education ... embracing a more student-centered ideology and incorporating mechanisms for developing intellectual skills and analytical competence”.

Having considered the extraordinary features of maritime industry and the above highlighted shifts in recent trends regarding both the academic world and the professional world, Dokuz Eylül University (DEU) Maritime Faculty has adopted a more student-centered active learning method. The purpose of this study is to brief how this new method has been practiced in each of the three departments of the Faculty.

Why Problem-Based Learning in Maritime Education and Training?

The recent trends in the world of professional work as well as the academic world demand that the undergraduate, when having completed higher education, have been equipped with general intellectual abilities and perspectives, higher order cognitive abilities and general personal competencies to be activated at interpersonal relations, getting involved in teamwork, problem-solving, decision-making, effective communication and leadership. Particularly, since the last quarter of the 20th century, cognitive and educational psychology seems to have favored active and student-centered learning methods if the above mentioned competencies are to get attained. In pursuit of more effective means of education, certain effortful investigations have pointed out that shifting to active learning would promote the quality of higher maritime education.

The prominent point enforcing the above mentioned shift in maritime education lies on the extraordinary features of this industry, which is one of the most international and multidisciplinary industries. The set of competencies required from the land-based personnel, undergraduates of Maritime Business Administration Department, differs greatly from that required from on board ship personnel, undergraduates of Marine Engineering Department and Marine Transportation Engineering Department. In fact, the competencies to be gained by the undergraduates of the last two departments differ from each other. A deck officer, for instance, is expected to be both a competent leader and a successful manager. He/she is also held responsible/liable towards both internal customers, e.g. the crew on board the ship, and external customers, e.g. navigational regulations, conventional requirements, owners and/or agents, and shippers and/or charterers. In order to cope with such critical liabilities, the officer does need to get provided with not only a wealth of professional knowledge but also certain interpersonal, problem-solving, decision-making and leadership skills.

The heavy liabilities of an officer on board the vessel and the challenging nature of life at sea forces maritime education to provide the students with certain attitudes, which could be highlighted as follows: tendency towards goal-oriented learning; intrinsic motivation; activating self-schemas and thus acting in the push of self-confidence, self-efficacy and independent thinking; adopting the principles of critical thinking, self-criticism and self-evaluation; acquiring the positive aspects of good communication; and adoption of observing, understanding, questioning and correcting; that is, predicting and appraising the environment and eventually proacting (Meece, 1994). Besides, maritime education is to focus more on team-spirits, group success, the sense of collaboration, becoming involved with and helping one another, thus promoting safety of life at sea. Furthermore, while leading any group activity, the officer should demonstrate effective listening and consider the interests and concerns of the group members. In other words, the officers are to be provided with certain positive attitudes towards exchanging ideas, correcting each other, respecting and participating group objectives. Moreover, the students in maritime education are to be provided with attitudes favoring proaction, not only reacting when encountered obstacles but also proacting via sound, logical, consistent and rational appraisal.

Having noticed the shortages of the traditional deductive teaching methods “merely conveying information” (Brown and Atkins, 1994, p. 4) rather than producing self-efficacy life-long learners, and reconsidered the distinctive demands



from maritime education, DEU Maritime Faculty has decided to adopt problem-based learning method, one of the student-centered active learning methods.

Some Highlights on Problem-Based Learning (PBL)

As the term itself suggests, PBL is a means of learning based on a problem, which stands for the stimulating aspect of the learning activity, raising desire, wonder or interest. It stands firm within the rationalist tradition and hence, is strongly influenced by cognitive psychology (Schmidt, 1993, p. 423). The problem, which could involve “observations; symptoms; signs or experimental results to be explained, even equations to be derived” (Barrows, 1984, p. 16) “serves as a challenge to students’ reasoning or problem-solving skills ... provides them with a sense of direction and the depth of study that needs to be undertaken” (Dolmans and Schmidt, 1994, p. 372-373). The principles to be kept in mind while designing a problem to be used in problem-based learning are highlighted by Dolmans et al. (1997, p. 185-186) as follows: “The content of a case should adapt well to students’ prior knowledge; it should contain several clues that stimulate students to elaborate; context should be relevant to the future profession; it should have relevant basic concepts to encourage integration of knowledge; it should stimulate self-directed learning; it should enhance students’ interest in the subject matter, by sustaining discussion about possible solutions and facilitating students to explore alternatives; and it should match one or more of the faculty objectives.” The essence of PBL, triggered by such a problem, lies on meeting the three basic conditions that facilitate learning: activating prior knowledge, encoding specificity, and elaborating the knowledge (Kalkan, 2010).

Starting with a problem, called scenario, and designed carefully in compliance with the curriculum and the learning objectives, each PBL discussion session is based on seven steps: The first step involves clarifying vague phrases, terms and concepts used in the problem thus making the problem clear and comprehensible. The second step is to define the problem and describe the phenomena that need to be explained. The third step is analyzing the problem and formulating hypotheses based on sound reasoning. The fourth step comprises drawing a systematic inventory of the explanations proposed at the previous step. The fifth step is formulating the required learning objectives. The objectives to be investigated are established and the likely sources to be made use of are discussed. The sixth step is devoted to self-study. Regarding the learning objectives, the members of each group (8-12 students with a moderating instructor) try to collect information, making use of all sources they can reach including the other supporting activities includ-

ed in the relevant module, e.g. presentations, case studies (group visits to the relevant industrial units), professional skills sessions and the like. In the seventh step, the members report their findings regarding each learning objective; these findings are grouped, integrated and checked if they are enough to describe the phenomena.

PBL Implementation at DEU Maritime Faculty

Since adopted in 2002, PBL implementation at DEU Maritime Faculty has been adapted to the particular features of the three departments-Maritime Business Administration, Marine Transportation Engineering, and Marine Engineering. The first produces land-based maritime business personnel, the second produces ocean-going deck officers in charge on board ships, and the third produces marine engineers in charge of the engine-room on board ships.

In Maritime Business Administration Department, PBL is practiced in the first three years, which is replaced by Project-Based Learning Method in the fourth year. Likewise, in Marine Transportation Engineering Department, Task-Based Learning Method replaces PBL in the fourth year. Marine Engineering Department, first started education in 2006, has chosen to cooperate with DEU Faculty of Engineering in supplementing the PBL method.

Project-Based Learning at Maritime Business Administration Department

The learners in the first three years are exposed to two or three week modules each of which covers a real-life or near real-life scenario consisting of a certain preplanned part of the overall curriculum in terms of the knowledge, skills and attitudes targeted. Prior to their graduation, the undergraduates are thought to get exposed to a larger spectrum, a broader range of maritime business activities. They need to gain the ability to gather/synthesize the parts of a larger business puzzle together in the best possible manner. This could be possible by shifting from the problem-based to the project-based learning.

Project-Based Learning covers a spectrum ranging from brief projects based on a single subject to year-long and multidisciplinary projects. In this method, students work in teams to explore real-world problems and create presentations to share what they have learned. The project groups are organized according to several real-life shipping projects where they are supposed to establish a shipping company to purchase, operate, and manage ships in a given market.

The projects for the groups are specifically designed to cover, as far as possible, situations which are typically encoun-



tered in the world of shipping industry, and to raise students' awareness of the application of managerial principles to industrial and commercial problems. The overall aim is to simulate situations which require solutions by small project teams.

The steps followed for the Project-Based Learning are as follows (Cerit et. al., 2006):

- **Overview of the Learning Objectives and Curriculum:** To create opportunities for the introduction of innovative project work for small groups, the learning objectives and the curriculum for the seniors are examined; a section of the core curriculum is rearranged for a year-long interdisciplinary team project.
- **Forming the Project Groups:** Taking into consideration the students' desire to specialize in specific markets in the shipping industry along with each student's competencies, the students are placed in five groups. An interview is carried out, prior to such grouping, to explore the students' interests and competencies as well as attitudes.
- **Determining the Topic of Project:** The topic and the question that will launch a Project-Based Learning Program is believed to be the one that will engage students (Blumenfeld et al., 1991). A real-world topic is taken for launching the project study. The question put forward is to be open-ended with no definite solution. Besides, the topic covers the whole curriculum designed for the senior students.
- **Designing the Project Plan and Schedule:** When designing the project, certain predetermined content standards are addressed. The activities supporting the topic/question are selected by utilizing the curriculum, thus fueling the project. The subjects related to ship purchase, management and operation are integrated into the project. Students are involved in this planning process, and they feel the ownership of the project when they have an active role in decision-making. As for schedule, a timeline for the project components is designed, and the groups are directed for managing their time and assisted when they need to finalize their findings and evaluations.
- **Monitoring the Progress of the Project and That of the Students:** Checklists are used as a guide to monitor the phases. Group members are given such roles as 'general manager', 'marketing manager', 'operations manager', etc.; group dynamics are observed and monitored during discussion sessions; minutes of meeting are filed to record the decisions made and activities allocated; in doing so, teamwork dynamics and real life company atmosphere are matched; interim and final reports covering the phases are asked from the groups; and at the end of each phase, the groups present their findings.

- **Assessing the Outcome:** At the end of each section, performance of each student is individually assessed; the final reports are evaluated using predetermined checklists; at the end of each module, the level of reaching the learning objectives is tested through a written exam; apart from such instructor assessments, peer-assessments are carried out for the projects presented.
- **Experience Evaluation and Feedback:** Both individual and group reflections and discussions are encouraged in the group meeting sessions; students are given time to reflect what they have discovered so that they can synthesize their new knowledge; the instructors also reflect their evaluations. General evaluation and reflection is a very important part of this learning process as it improves interrelations and supports group dynamics. This process also bares weaknesses and difficulties likely to prevent the group accomplishment; hence, it allows the proactive actions to be taken.

Task-Based Learning at Marine Transportation Engineering Department

The rapid growth of the shipping industry and the prevalent use of higher technologies at ships have made it imperative that officers on board such vessels have to improve their knowledge and competencies. The competencies and qualification standards as well as the simulator-like education and training equipment and facilities for masters, officers and watchkeeping personnel on seagoing merchant ships are set by the relevant committee of "The International Maritime Organization" through "The International Convention on Standards of Training, Certification and Watchkeeping-STCW". The rules of the minimum standards depicted in Part A of STCW are compulsory and those in Part B are advisory. The standards required are often updated and amended depending upon the changes and needs observed. The recent amendment took place in Sep. 2010 (STCW Convention Comprehensive Review, 2010). In the STCW Convention and Code, the competencies and qualification standards required are specified in detail. The specification covers the tasks to be fulfilled by masters, officers and watchkeeping personnel on seagoing merchant ships, addressing both marine transport engineering and marine engineering, and deploying the tasks separately designed for each position on board seagoing merchant ships. It is imperative that each of these tasks is to be carried out to perfect satisfaction. That's why the educational method to be followed in such a case, which would provide the students with the required competencies enabling the tasks to be fulfilled to the desired extent, is thought to be task-based learning method. Task-Based Learning is believed to adapt students to their working conditions on

board ships. The missions on which Task-Based Learning is based put together the related learning objectives and international regulations for maritime education.

The basic steps of Task-Based Learning practiced at Marine Transportation Engineering could be highlighted as follows: Determining the knowledge and skill targets; getting the targets together considering the real-life situations; developing the blocks; determining the duties and/or activities to be implemented in each of the blocks; and forming the simulator-based scenarios that will support the missions.

The blocks to be developed are listed as follows: Voyage planning, electronic navigation, ship construction and ship power plants, tanker operation and safety, bridge team management, dry cargo ship's operation and safety, ship management, and ship handling and emergency procedures.

Here is a flow of processes regarding any one of the blocks: After having formed the blocks, information forms are prepared. In these forms, the definition and the aim of the block together with the practices to be implemented during the allocated weeks are defined. These forms also include the learning objectives, and the basic concepts related to the missions are included (Deveci et. Al., 2006).

- Tanker Operation and Safety Block (applied at DEU Maritime Faculty) updating the learning objectives and transferring the technical information.
- Operational information and searching phase (the basic use of simulator and pre-knowledge phase) web-based practicing to develop operational skills.
- Implementation of the practices step by step (preparation before loading/loading plan/loading calculations and related document operations)
- Reporting the missions (calculating the cargo/prepare the documents after loading, protest letter etc.)
- Evaluation of the missions completed/repeating the missions if needed.

Through experiences and practices regarding the above mentioned tasks the students are provided with mastering on each task undertaken, resulting in safe, secure and effective missions basically required.

Task-Based Learning at Marine Engineering Department

The graduates of Marine Engineering Department are employed as officers on board merchant vessels in charge of supervising and coordinating the activities engaged in operating and maintaining engines, boilers, deck machinery, and electrical and refrigeration equipment.

The first-year students are exposed to 11 modules, three of which cover department-specific subjects and the others are on the basic engineering programs studied in collaboration with DEU Faculty of Engineering. The second and third-year curricula are mainly designed around marine engineering sub-system. The fourth-year curriculum is designed on Task-Based Learning approach and covers such eight blocks as Technical Ship Management, Engine Room Simulator Management, Main/Auxiliary Machinery Operations/Maintenance, Refrigeration and HVAC Systems, Technical and Operational Ship Management, Engine Room Simulator Advanced Skills, Safety at Sea and Emergency Operations, and Hydraulic and Pneumatic Control System.

Pros and Cons of a Shift from Conventional to Student-Centered Methods

While the conventional methods focus on “teaching”, student-centered active learning methods, e.g. problem-based, project-based and task-based learning, focus on learning. The literature supporting this view is prominently rich (Albanese and Mitchell, 1993; Barrows, 1984; Barrows and Myers, 1998; Bellanca, 1997; Bligh, 2000; Dolmans et al., 1994; Camp, 1994; Dolmans and Schmidt, 1994; Dolmans and Schmidt, 1996; Duke, 1992; Frederick, 1995; Gilbert and Foster, 1996; Kaufman and Mann, 1999; Norman and Schmidt, 2000; Paker and Kalkan, 2002; Samuelson, 1995; Thomas, 1997, Vernon and Blake, 1993; Alvarstein and Johannesen, 2001; Grave, et al., 1996; Moens, 1998; Kalkan, 2004 etc.) Besides; the first author of this study carried out a quantitative research comprising a large number of educational institutions both from home and abroad in 2004, which revealed various contributive effects of problem-based learning on improving and enhancing basic attitudes including ability to work in a team, problem-solving, decision-making and effective interpersonal relations ocean going ship masters are required to be provided with (Kalkan, 2004).

A miscellaneous combination of the student-centered teaching / learning methods cannot, of course, be practiced so smoothly. It brings about a number of challenges that are related mainly with financial issues, academic staff in number and qualification and the rather sound-rooted stubborn attitudes reactive to fundamental changes.

Some of the other challenges to be encountered in applying a miscellaneous combination of the student centered active learning could be highlighted as follows: Enough number of decently equipped small rooms for group discussions and enough number of academics to carry out problem-based discussion sessions and such other complementary instruc-



tions as presentations, vocational practices and case studies, an outstandingly high level of academic devotion in time and energy in properly forming and continuously updating scenarios, conducting the student-centered discussions to the most desired and fruitful extents, quite often gathering and evaluating feedback, continuous search for fostering both individual improvement and collaborative success, and while combating all such challenges, arranging all the educational and training activities in full compliance with both the overall curriculum as well as the national and international regulations and legitimacy issues.

Conclusion

Shipping industry is well-known to be one of the most international and multidisciplinary industries. Both the land-based and ship-based employment in this industry requires a great wealth and divergence of competencies. Such a distinctive fact makes it imperative for higher maritime education to plan and carry out the relevant educational and training activities with utmost care, taking into consideration the recently emerging needs in the industry in particular and the trends favored in higher education in general.

The recent trends both in the academic world and in the industrial world seem to have shifted from mere theory to practice, from subject-based knowledge to vocational competencies, from specific to general, and from general educational aims such as analyzing, synthesizing and integrating to general personal or transferrable competencies to be effectively activated at interpersonal relations, ability to work in a team, problem-solving, decision-making, effective communication, risk-taking entrepreneurship and leadership. It wouldn't be overestimating to state that such precise trends do match well with the fundamental requirements in maritime education and training. Besides, the cornerstones making higher education 'higher', such as higher order cognitive abilities, higher level of intellectual attainment, development of individual autonomy, gaining intellectual integrity and the capacity to be one's own person, enhancement of one's personal character, grasping a breadth of vision beyond the confines of a single discipline, acquisition of a distinctive socio-linguistic form of interaction, and developing competence to participate in a critical commentary or one's environment are all to be taken into account in higher maritime education.

The above highlighted trends imply that along with the task-specific aspects, student-specific characteristics like individual learning styles, motivation, epistemological beliefs and intellectual development are to be well considered in higher educational activities. Particularly in higher maritime educa-

tion, goal-oriented learning, intrinsic motivation, interdependent thinking, more focus on team-spirits, effective communication skills, appraising-predicting-proacting competencies and higher sense of collaboration are crucial personal competencies if safety of life at sea is to be sustained.

Having considered the above mentioned requirements and the shortages of the traditional teaching/learning methods in meeting such requirements, DEU Maritime Faculty has adopted since 2002 Problem-Based Learning Method, a means of learning based on real or near real-life problems that integrate various disciplines, raise interest in learning, stimulate self-directed learning, enhance collaboration and teamwork spirits, develop individual autonomy and personal character, improve communication, problem-solving and decision-making skills and establish predicting-appraising and proacting abilities. Besides, the feedback mechanism conducted systematically greatly helps improve self-appraisal, self-discipline and better both the system as a whole and the individual attitudes.

Problem-Based Learning Method has been replaced and supplemented by Project-Based Learning for land-based shipping activities and by Task-Based Learning for ship-based activities. The former has been practiced by the fourth year students in Maritime Business Administration Department and covers year-long multidisciplinary projects in managerial principles to industrial and commercial problems. The latter has been practiced by the fourth-year seniors in Marine Transportation Engineering Department and Marine Engineering Department, and cover the blocks comprising inter-related ocean going voyage activities in compliance with the relevant international regulations adopted by International Maritime Organization.

Following an intensive series of investigations through all the stakeholders of the shipping industry, including all the external and internal parties involved in shipping, and having completed the inevitable preparation fueled by synergetic efforts, DEU Maritime Faculty has managed to shift from the conventional teaching methods to student-centered active learning method. Since 2002, various modifications in this shift have been made so as to integrate into the specific conditions and requirements. It is the wish of the authors that the other maritime education and training institutions insistently keep searching for more effective means of producing well-equipped and profoundly qualified seafarers and maritime business managers with versatile competencies. The key to such attainment seems to be making best use of active and collaborative learning through certain modifications and alterations in accordance with the specific conditions and facilities available.

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