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Human Resources
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ENHANCING THE GLOBALMET TRAINING RECORD BOOK WITH THE INFUSION OF THE BOOK OF KNOWLEDGE

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Abstract. The Training Record Book (TRB) is an essential document cadets use during their shipboard training. The TRB guides the student and the shipboard training officer, ensuring cadets attain the necessary competencies under the STCW Tables A-III/1 and II/1. The limitation of the TRB is that it is dominated by the psychomotor domain of learning. At a forum of the International Association of Maritime Universities (IAMU) in 2020, the most in-demand skill by 2050 is soft skills, followed by technological skills. This entails the development of not only psychomotor, but also cognitive and affective domains. In addition, the skills and competencies needed will go beyond the technical competencies stated in the STCW. The methodology utilized a qualitative design with an exploratory concept wherein the Book of Knowledge (BoK) was incorporated in the cross-referencing of the learning outcomes, and the TRB tasks develop a more holistic, comprehensive, and future-proof shipboard training.

Keywords: maritime education and training; training record book; global maritime professional; shipboard training

Introduction

According to the 2021ICS/BIMCO report, there will be an estimated shortage of 96,000 seafarers in 2026. The sustainability of the maritime workforce heavily depends on the current training and education of maritime cadets. With the changing landscape of the maritime industry, the challenge to catch up with the evolving competencies and skills necessary to keep up with the growing demands of the industry is the issue that is taking center stage (Bauk & Ilcev 2021). With the increasing trend of the sophistication of technology, one might think that the demand for soft skills is declining, which is not the case nowadays. The demand for the holistic development of a future merchant officer becoming a global maritime professional is also increasing – complete with technical, technological, and soft skills in the three domains of learning. With the recent discussions of maritime higher education institutions led by IAMU, a survey was conducted regarding the most in-demand skills seafarers

must possess by 2050 in order to be globally competitive and effective. Soft skills and technological competencies came at the top of the list. This is a testament to the changing demand and landscape of the maritime industry, especially in terms of the human element, as automation and the shift to green shipping is in full swing.

Here in the Philippines, the curriculum for maritime students under the BS Marine Engineering and BS Marine Transportation programs comprises two major stages. The first is the academic stage, in which the students undergo three years of academic instruction to develop the needed knowledge and understanding, as stated in Tables A-II/1 and A-III/1 for the deck and engine, respectively. The second stage comprises the shipboard training period, which serves as their on-the-job training in which they are allowed to board as cadets into domestic and international vessels, depending on the type of certification and capacity they are applying for their certificate of competency/proficiency. This constitutes 40 units of their baccalaureate degree or two semesters of the academic program[1]. There are essential documents that the cadets should accomplish as they undergo this program. The most important is the Training Record Book (TRB) and their Record of Daily Journal. Regarding the TRB, there are several providers of such as long as the administration approves it. The most common TRBs available are by the GlobalMET, the International Shipping Federation, and the International Chamber of Shipping[3]. A TRB is a guideline documentation and proof of training by the cadets as administered by their shipboard training officer. The TRB consists of the important particulars of the vessel that the cadet boarded, safety familiarization and training records, and most importantly, the different tasks that the cadets should be able to perform in the course of the training period. The accomplishment of the different tasks listed in the TRB is used as an assessment and evaluation tool of the shipboard training department of the schools on the competence and skills acquired by the cadets during the said period[2]. Aside from the TRB and the Daily Journal, sea projects are also required by the institution, along with the evaluation of the officers and shipboard training officer of the cadet. Overall, the aforementioned documents will comprise the final grade of the students for the 40 units covering the shipboard training period.

The TRB is an essential instrument that helps the shipboard training officer implement a structured shipboard training program in compliance with the STCW Code. This is also a very important tool in creating a uniform and standardized program for all cadets across different nationalities, companies, and types of vessels. However, there are limitations observed by institutions and instructors when it comes to the ability of the TRB to truly assess the competency of the student in a holistic approach. The content and methodology of monitoring the progress of cadets using a TRB are solely focused on the psychomotor domain of learning, with the tasks homing in on the actions performed by the cadet. With the increased automation and sophistication of ships, especially in the future, the development of the affective domain of learning, leading to the development of soft

skills, and the cognitive domain of learning, leading to critical thinking and science and technology proficiency, is of utmost importance. This is the aspect where the TRB needs to be improved to ensure that a cadet that has undergone shipboard training develops the competencies needed holistically.

The Book of Knowledge (BoK) developed by IAMU under the Global Maritime Professional Initiative was developed to address the changing needs and demands on the human element of seafaring amidst the transition and sophistication. The BoK provides a comprehensive guide to developing learning outcomes for maritime institutions. The primary goal is to create a spiraling structure of learning with a holistic approach, developing the cognitive, affective, and psychomotor aspects of the learners. The BoK has four tiers that address the necessary learning outcomes from the operational level officers, management level officers, management level officers with postgraduate studies, and management level officers with advanced postgraduate studies. The approach was also to develop a future-proof global maritime professional with the necessary foundational skills, academic skills, technical skills, and professional soft skills. The guideline is beneficial in developing a curriculum that deals with the contemporary issues of the maritime industry as well as the developing technologies[5].

In this study, a qualitative design was used in an exploratory manner where a new framework was developed from the existing policies and guidelines widely used, which involved the incorporation of the concept and the perspective of the BoK into the TRB as part of the mission to enhance the TRB into a holistic and future-proof training program. The study only concerns the infusion of the BOK to the GlobalMET TRB for the BS Marine Engineering program. Overall, the result of the study is to develop a TRB framework for the marine engineering program with cross-mapping with the BoK. Specific goals as part of the final output are the development and mapping of the levels of achievements and the learning outcomes matrix. As of the time of writing, there are no relevant studies regarding the enhancement of the TRB, but there are a few studies evaluating the efficacy of the TRB in the conduct of the shipboard training program. There are several feedback items from the shipboard training officer and cadets regarding the difficulties and challenges they faced in implementing the shipboard training program. The first one is the issue of the time constraint in which the time for the training of cadets coincided with the time for work. With the countless jobs to be performed onboard on top of the time allocated to the evaluation and training of cadets (Herrera & Cortez 2021, pp. 6-13), a limited amount of time can be tapped, leading to a compromised quality of training. The second limitation is the unfamiliarity of the assigned shipboard training officer in the proper implementation of the shipboard training program and proper evaluation methods. This results from the lack of orientation and training for the designated training officers regarding the proper conduct of the shipboard training program with the application of pedagogical concepts and knowledge of the STCW Convention. The third issue is the ability of the training

officers to assess the progress of the cadets, which stemmed from the second issue of inadequate training and unstructured implementation of shipboard training by the administration (Demirel & Bayer 2016, pp. 12 – 22). There is also a study in which the documentation provided in the TRB was cross-checked with shore-based evaluation methods from the school. The primary findings were that the curriculum being implemented in the Philippines is misaligned with the TRB provided by the International Shipping Federation (ISF) and that the tasks accomplished by the students, as stated in the TRB, are not a guaranteed seal of acquisition of the specified skill. A particular task has been performed as documented in the TRB. However, the proficiency in the performance of that task is relatively unknown and needs to be reevaluated by the institution (Camarines & Ampong 2016, pp. 162 – 164). According to the comprehensive study conducted by IAMU, there are several aspects of shipboard training currently implemented that need to be improved, such as the assignment of a qualified and trained shipboard training officer, the structure of the shipboard program, implementation of the shipboard program, and the direst is the lack of shipboard training program on some ships[4].

The development of the framework for the TRB enhancement starts with the mapping of the level of achievements of the BoK applicable to the program. Since the TRB is geared toward acquiring the skills and competencies for an operational-level officer, tier A was selected. The level of achievements for the four focus areas with 28 sub-focus areas was mapped under Tier A for the three domains: cognitive, affective, and psychomotor. Afterward, the intended learning outcome (ILO) matrix under Tier A was mapped out under each domain of learning. The tasks indicated in the GlobalMET TRB for engine cadets were mapped out with the cognitive, affective, and psychomotor ILO from the BoK. The appropriate and necessary ILOs were analyzed with the guidelines stated in the STCW and the Procedures, Standards, and Guidelines released by the administration. The resultant map is the cross-referencing of the TRB Tasks with the different ILOs from the BoK. The framework can be used to develop additional tasks for monitoring the progress of the cadets in the cognitive and affective domains. It can also be used as a guideline for the assessment of the shipboard training officer onboard. Lastly, the framework can also be used as the basis for enhancing the TRB or for developing a new version of TRB with three domains of learning.

The concepts of the BoK relevant to the TRB

With the structure of the TRB focused on attaining the practical knowledge needed for certification as officer-in-charge of the watch, the tasks indicated in the TRB are more on the psychomotor aspect. It is structured in such a way that it resembles a checklist of the task needed to be performed and accomplished.[2] The structure is patterned after the STCW Table for the officer-in-charge of the watch based on the functions, competencies, knowledge, understanding, and proficiency (KUP). With

the concepts and guidelines provided by the BoK, the tier was determined to be tier A since the graduates of the BS Marine Engineering program are poised to become officers-in-charge of the engineering watch. The level of achievement under each focus area is determined by mapping the level of learning they need to attain. Since the operational level officers are primarily tasked with the direct operation, monitoring, and supervision of the different machinery in the engine room, the level of learning is comparatively lower than those of tiers B, C, and D, with the average level of learning at three. Tables 1, 2, and 3 show the mapping for the levels of achievement in the cognitive, affective, and psychomotor domains, respectively.

Table 1. Level of achievement map for the cognitive domain

Focus Areas	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Foundational Elements						
1. Mathematics	A	A	A			
Academic Elements						
9. Academic Research	A	A	A			
10. Contemporary Global Issues	A	A				
Professional-Technical Elements						
11. Technical Competencies as per International Requirements (STCW)	A	A	A			
Professional-Soft Elements						
18. Technological Awareness (Global)	A	A	A			

Source: Global Maritime Professional: Book of Knowledge.

Table 2. Level of achievement map for the affective domain

Focus Areas	Receive (Awareness)	Respond (React)	Value (Understand & Act)	Organize Personal Value System	Internalize Value System (Adopt)
Professional-Technical Elements					
11. Technical Competencies as per International Requirements (STCW)	A	A	A		
12. Risk Assessment and Management	A	A	A		

Professional-Soft Elements					
18. Technological Awareness (Global)	A	A	A		
19. Leadership, Teamwork, and Discipline	A	A	A		

Source: Global Maritime Professional: Book of Knowledge.

Table 3. Level of achievement map for the psychomotor domain

Focus Areas	Perception (Awareness)	Set	Guided Response	Mechanism (Basic Proficiency)	Complex Overt Response (Expert)	Adaptation	Organization
Professional-Technical Elements							
11. Technical Competencies as per International Requirements (STCW)	A	A	A				
12. Risk Assessment and Management							
13. Situational Awareness, Preparedness, and Response	A	A	A				

Source: Global Maritime Professional: Book of Knowledge.

Application, adopting, and guided response are the highest levels of learning that need to be attained on certain sub-focus areas in the cognitive, affective, and psychomotor domains, respectively. This is because the four higher levels are under the responsibilities of the management-level officers. In the psychomotor domain, only two areas need to be addressed, namely, the STCW-based competencies and situational awareness, preparedness, and response[6]. These are the sub-focus areas that are of utmost relevance in the actual work that involves onboard ships. The level of the achievement maps provides a guideline on the level of competency expected in the different domains of learning from the cadets. The level of achievement also serves as the basis for the method of training and assessment. A derivative mapping as a result of the level of achievement mapping is the ILO matrix. The ILO matrix provides the specific learning outcomes expected on the different levels of learning. Tables 4 – 6 show a representative table of the ILO matrices for cognitive, affective, and psychomotor, respectively. Tables 1 – 3 show the extensiveness of the matrix

for an overview perspective since presenting the complete table in an editable form is impossible due to format limitations.

Table 4. Cognitive domain ILO matrix

Focus Areas	Remembering	Understanding	Applying	Analyzing	Evaluating	Creating
Foundational Elements						
1. Mathematics	**Identify** key mathematics information and **recall** equations related to academic and professional skills	**Explain** the relevant mathematical principles	**Demonstrate** the application of mathematical principles to the solution of relevant problems			
2. Natural (Physical) Sciences	**Recall** key factual information relating to physics and chemistry for academic and professional skills	**Explain** relevant concepts in physics and chemistry	**Demonstrate** the application of principles of the physical sciences and examine solutions in light of this analysis			

Table 5. Affective domain ILO matrix

Focus Areas	**Receive (Awareness)**	**Respond (React)**	**Value (Understand & Act)**	**Organize Personal Value System**	**Internalize Value System (Adopt0**
Foundational Elements					
3. General Humanities and Sciences	**Choose** key relevant information from the general humanities and social sciences and **relate** such information to maritime professional practice	**Discuss** theories and principles from the humanities and social sciences as they relate to specific scenarios in maritime professional practice	**Demonstrate** commitment to appropriate values derived from an understanding of key factual information from the humanities and social sciences in a maritime context	**Formulate** a value system based on a comparison of principles inherent in the humanities and social sciences	**Display** optimum values related to critiqued principles inherent in the humanities and social sciences in new challenging situations

Table 6. Psychomotor domain ILO matrix

Focus Areas	Perception (Awareness)	Set	Guided Response
Professional-Technical Elements			
11. Technical Competencies as per International Requirements (STCW)	**Identify** maritime actions that involve complex movement patterns and **choose** correct action(s) among various options to meet operational requirements of efficiency and safety as per international requirements	**Explain** the most professional, efficient, and safe way of performing practical motor tasks. **Prepare** optimally for commencing such tasks	**Respond** to and **follow** instructions regarding specific technical operations that require practical motor-skills

Not all the focus areas have corresponding ILOs for each level of learning since only the appropriate focus areas with measurable and attainable outcomes suitable for a particular domain are provided with such. The learning outcome statements are general but with a concrete output intended for the trainee to accomplish in a certain condition to a given standard. The learning outcomes are guide statements for the trainer to formulate additional tasks or improve the task provided in the TRB. The task to be given should be in line with the STCW and the TRB as a whole.

The influence of BoK in the enhancement of the TRB

With the aim of the BoK to develop global maritime professionals adept in the three domains of learning (cognitive, affective, and psychomotor) of foundational education to soft skills, ILOs are provided for each level of learning and tier. The BoK can be used by any educational institution to formulate its program and courses to ensure a holistic approach to education and training[5]. One such application is in the enhancement of the TRB tasks. Once the levels of achievement are properly mapped and analyzed, the ILO matrix was easy to develop. The next procedure was cross-mapping the ILO matrix with the TRB tasks indicated in the GlobalMET TRB. The resultant map is a two-axis framework in which the TRB tasks are lined up on the y-axis with the appropriate ILOs lined up at the x-axis. There are three tables since

each domain of learning has its respective mapping. The framework can then be used in shipboard training to develop new tasks and assessments given to the cadets during their shipboard training or modify and supplement the given tasks to make them more holistic and comprehensive. The resulting framework can be the groundwork for future improvement of the TRB to address the limitations that the current TRB has and to produce a truly global maritime professional at the onset. Table 7 shows the representative of the resultant framework for function 1 under the cognitive domain of Table A-III/1 of the STCW Code. An overview is shown in Tables 4–6 to show the extensiveness of the framework under the cognitive, affective, and psychomotor domains, respectively. Each domain will have its enhancement matrix to ensure a holistic approach to the implementation of the training.

Table 7. Representative TRB enhancement matrix for function 1 – cognitive domain

STCW KUP	Intended Learning Outcomes		
	Mathematics	**Natural (Physical Sciences)**	**General Humanities and Sciences**
Function 1: Marine Engineering at the Operation Level			
Competence: Maintain a safe engineering watch			
1.1: Taking over and accepting a watch and handing over a watch	Identify key mathematics information and recall equations related to academic and professional skills	Recall key factual information relating to physics and chemistry for academic and professional skills	Identify key factual information from different areas of the humanities/ social sciences and recognize how they relate to maritime professional practice
1.1.1 Demonstrate good understanding of procedure for handing over of engineering watch (a) at sea (b) in port	Explain the relevant mathematical principles	Explain relevant concepts in physics and chemistry	Explain relevant concepts from the humanities/ social sciences
1.1.2 Demonstrate good understanding of procedure for taking over of engineering watch: (a) at sea (b) in port	Demonstrate the application of mathematical principles to the solution of relevant problems	Demonstrate the application of principles of the physical sciences and examine solutions in light of this analysis	Compare and contrast different humanities/ social science concepts and examine how they relate to maritime professional practice

Routine duties undertaken during watchkeeping

The framework is of enormous help in improving the shipboard training instruction and assessment by having an overview map wherein the necessary

criteria can be confirmed at a glance. The framework can also be used as a development tool in the overall outcomes of the shipboard training itself to paint a broader picture and goal of what the trainees will be at the end of the training duration.

Conclusions and summary

As a result of the cross-analysis of the BoK and the TRB, the tasks provided in the TRB can be assessed and further developed, considering the learning outcomes provided. The TRB column will then be split into three with an evaluation of the cognitive, affective, and psychomotor aspects of learning. In the mapping for the levels of achievement, not all levels of learning for the three domains are applicable for the operational level officers. In mapping for the ILO matrix, the learning outcomes are also analyzed to determine if they are measurable and suitable for the focus area and the domain it is measuring or teaching. Lastly, with the cross-mapping of the ILOs to the TRB tasks, further analysis and confirmation of the suitability of the ILO to the particular tasks and domain should be performed. In addition, future-proofing of the TRB will be enabled by considering the focus areas. The resulting TRB will enhance the traditional form currently used. The BoK also provided a guideline for improving the current TRB by providing a framework and map which the trainer can use to craft additional tasks and assessment methods to be given to the trainees. The framework can then be used as the groundwork for improving the TRB in the future. A holistic approach will be implemented to contribute to realizing the global maritime professional initiative.

Table 8. Level of achievement map-cognitive domain

Level of Achievements in Cognitive Domain						
Focus Areas	**Remembering**	**Undestanding**	**Applying**	**Analyzing**	**Evaluating**	**Creating**
Foundational Elements						
1. Mathematics	A	A	A			
2. Natural (Physical) Sciences	A	A	A			
3. General Humanities and Sciences	A	A	A			
4. English Language and Maritime Communication	A	A	A			
5. Computing and Informatics	A	A	A			
6. Physical and Mental Fitness	A	A	A			

Academic Elements						
7. Problem Recognition/ Solving						
8. Critical Thinking	A	A				
9. Academic Research	A	A	A			
10. Contemporary Global Issues	A	A				
Professional-Technical Elements						
11. Technical Competencies as per International Requirements (STCW)	A	A	A			
12. Risk Assessment and Management	A	A	A			
13. Situational Awareness, Preparedness, and Response	A	A	A			
14. Technological Awareness (Job-Specific)	A	A	A			
15. Maritime Law, Policy, and Governance	A	A				
16. Logistics and Supply Chain	A	A				
17. Maritime Business	A	A				
Professional-Soft Elements						
18. Technological Awareness (Global)	A	A	A			
19. Leadership, Teamwork, and Discipline	A	A	A			
20. Effective (Interpersonal) Communication	A	A	A			
21. Sustainable Development	A	A				
22. Human Resource Management	A	A				
23. Cultural/ Diversity Awareness, Sustainability, and Stewardship	A	A	A			
24. Progressive Mindset and Lifelong Learning	A	A				
25. Environmental Awareness, Sustainability, and Stewardship	A	A	A			
26. Decision-Making and Proactivity	A	A				
27. Mentorship	A	A				
28. Professionalism and Ethical Responsibility	A	A	A			

Source: Global Maritime Professional: Book of Knowledge.

Table 9. Level of achievement map-affective domain

Level of Achievements in Affective Domain					
Focus Areas	**Receive (Awareness)**	**Respond (React)**	**Value (Understand & Act)**	**Organize Personal Value System**	**Internalize Value System (Adopt)**
Foundational Elements					
1. Mathematics					
2. Natural (Physical) Sciences					
3. General Humanities and Sciences	A	A	A	A	A
4. English Language and Maritime Communication					
5. Computing and Informatics					
6. Physical and Mental Fitness	A	A	A	A	A
Academic Elements					
7. Problem Recognition/ Solving	A	A	A		
8. Critical Thinking	A	A	A		
9. Academic Research	A	A	A		
10. Contemporary Global Issues	A	A	A		
Professional-Technical Elements					
11. Technical Competencies as per International Requirements (STCW)	A	A	A		
12. Risk Assessment and Management	A	A	A		
13. Situational Awareness, Preparedness, and Response	A	A	A		
14. Technological Awareness (Job-Specific)	A	A	A		
15. Maritime Law, Policy, and Governance					
16. Logistics and Supply Chain					
17. Maritime Business					
Professional-Soft Elements					
18. Technological Awareness (Global)	A	A	A		
19. Leadership, Teamwork, and Discipline	A	A	A		
20. Effective (Interpersonal) Communication	A	A	A		
21. Sustainable Development	A	A			

22. Human Resource Management	A	A	A		
23. Cultural/ Diversity Awareness, Sustainability, and Stewardship	A	A	A		
24. Progressive Mindset and Lifelong Learning	A	A	A		
25. Environmental Awareness, Sustainability, and Stewardship	A	A	A		
26. Decision-Making and Proactivity	A				
27. Mentorship	A	A			
28. Professionalism and Ethical Responsibility	A	A	A		

Source: Global Maritime Professional: Book of Knowledge.

Table 10. Level of achievement map-psychomotor domain

Level of Achievements in Psychomotor Domain							
Focus Areas	**Perception (Awareness)**	**Set**	**Guided Response**	**Mechanism (Basic Proficiency)**	**Complex Overt Response (Expert)**	**Adaptation**	**Organization**
Foundational Elements							
1. Mathematics							
2. Natural (Physical) Sciences							
3. General Humanities and Sciences							
4. English Language and Maritime Communication							
5. Computing and Informatics							
6. Physical and Mental Fitness							
Academic Elements							
7. Problem Recognition/ Solving							
8. Critical Thinking							
9. Academic Research							
10. Contemporary Global Issues							

Professional-Technical Elements							
11. Technical Competencies as per International Requirements (STCW)	A	A	A				
12. Risk Assessment and Management							
13. Situational Awareness, Preparedness, and Response	A	A	A				
14. Technological Awareness (Job-Specific)							
15. Maritime Law, Policy, and Governance							
16. Logistics and Supply Chain							
17. Maritime Business							
Professional-Soft Elements							
18. Technological Awareness (Global)							
19. Leadership, Teamwork, and Discipline							
20. Effective (Interpersonal) Communication							
21. Sustainable Development							
22. Human Resource Management							
23. Cultural/ Diversity Awareness, Sustainability, and Stewardship							
24. Progressive Mindset and Lifelong Learning							
25. Environmental Awareness, Sustainability, and Stewardship							
26. Decision-Making and Proactivity							
27. Mentorship							
28. Professionalism and Ethical Responsibility							

Source: Global Maritime Pro fessional: Book of Knowledge.

Table 11. TRB-BoK enhancement matrix-cognitive domain

STCW KUP	Intended Learning Outcomes		
	Natural (Physical Sciences)	**General Humanities and Sciences**	**English Language and Maritime Communication**
Function 1: Marine Engineering at the Operation Level			
Competence: Maintain a safe engineering watch			
1.2 Routine duties undertaken during watchkeeping	Recall key factual information relating to physics and chemistry for academic and professional skills	Identify key factual information from different areas of the humanities/ social sciences and recognize how they relate to maritime professional practice	Recognize features of the English language and recall maritime phrases relevant to maritime professional communication
1.2.1 Show understanding of various duties of Assistant Engineer Officer during (a) sea watches (b) port watches (c) anchor watches	Explain relevant concepts in physics and chemistry	Explain relevant concepts from the humanities/ social sciences	Explain key concepts and structuring of the English language and the use of suitable maritime communication phrases
1.2.2 While assisting during watchkeeping, show knowledge and basic skills to carry out all routine watchkeeping duties	Demonstrate the application of principles of the physical sciences and examine solutions in light of this analysis	Compare and contrast different humanities/ social science concepts and examine how they relate to maritime professional practice	Make use of relevant and appropriate language and communication in professional maritime practice. Communicate effectively in written and spoken English in a cross-cultural context both for social and professional purposes

Table 12. TRB-BoK enhancement matrix-affective domain

STCW KUP	Intended Learning Outcomes	
	General Humanities and Sciences	**Physical and Mental Fitness**
Function 1: Marine Engineering at the Operation Level		
Competence: Maintain a safe engineering watch		
1.1: Taking over and accepting a watch and handing over a watch	Choose key relevant information from the general humanities and social science and relate such information to maritime professional practice	Listen to orders in respect of the development and maintenance of physical and mental fitness

1.1.1 Demonstrate good understanding of procedure for handing over of engineering watch (a) at sea (b) in port	Discuss theories and principles from the humanities and social sciences as they relate to specific scenarios in maritime professional practice	Comply with orders to develop physical and mental fitness and select suitable actions for such development
1.1.2 Demonstrate good understanding of procedure for taking over of engineering watch at: (a) at sea (b) in port	Demonstrate commitment to appropriate values derived from an understanding of key factual information from the humanities and social sciences in a maritime context	Initiate own actions to develop/ maintain physical and mental fitness and justify the choice of these actions
1.2 Routine duties undertaken during watchkeeping	Formulate a value system based on a comparison of principles inherent in the humanities and social sciences	Integrate optimum methods/ approaches for developing/ maintaining physical and mental fitness into its own routine and organize relevant activities accordingly
1.2.1 Show understanding of various duties of Assistant Engineer Officer during (a) sea watches (b) port watches (c) anchor watches	Display optimum values related to critiqued principles inherent in the humanities and social sciences in new challenging situations	Revise methods/ approaches used for developing/ maintaining physical and mental fitness to suit different circumstances and contexts

Table 13. TRB-BoK enhancement matrix-psychomotor domain

STCW KUP	**Intended Learning Outcomes**	
	Technical Competencies as per STCW	**Situational Awareness, Preparedness, and Response**
Function 1: Marine Engineering at the Operation Level		
Competence: Maintain a safe engineering watch		
1.2.3 Know the procedure to change over automatic temperature controlled systems from automatic to manual operation	Identify maritime actions that involve complex movement patterns and choose the correct action(s) from various options to meet operational requirements of efficiency and safety as per international requirements	Identify and describe motor activities that underpin required performance in respect of maintaining a state of preparedness and for emergency response e.g. for fire prevention and fighting
1.2.4 Observe and note normal operating temperatures and pressures. Make adjustment as necessary	Explain the most professional, efficient, and safe way of performing practical motor tasks. Prepare optimally for commencing such tasks	Explain specific steps required in carrying out practical maritime tasks with motor skills and prepare to take those steps

1.2.5 Ensure various manual drains are operated routinely abd auto drains are functioning properly	Respond to and follow instructions regarding specific technical operations that require practical motor-skills	Follow practical instructions to perform the motor-skill-based task to maintain state of preparedness for and response to emergency maritime situations

NOTES

1. COMMISSION ON HIGHER EDUCATION – MARITIME INDUSTRY AUTHORITY, 2022. *Revised Policies, Standards, and Guidelines for the Bachelor of Science in Marine Transportation and Bachelor of Science in Marine Engineering Programs (JCMMC 01 s. 2022).* In: CHED-MARINA Publications. Manila: CHED-MARINA Issuance.
2. GLOBALMET, 2011. Engine Cadet Structured Shipboard Training Programme. In: *Anglo-Eastern Ship Management Publications*. Hong Kong: GlobalMET Documents.
3. INTERNATIONAL CHAMBER OF SHIPPING; BALTIC AND INTERNATIONAL MARITIME COUNCIL, 2021. Seafarer Workforce Report. In: *ICS Publications*. London: ICS/BIMCO Reports.
4. INTERNATIONAL ASSOCIATION OF MARITIME UNIVERSITIES, 2020. Development of Measures to Ensure the Quality of Onboard Training as Part of the Mandatory Seagoing Service Required by the STCW Convention. In: *Sub-Committee on Human Element, Training and Watchkeeping*, 7th Session, Agenda Item 10. London: Pre-Session Public Release.
5. INTERNATIONAL ASSOCIATION OF MARITIME UNIVERSITIES, 2019. *Global Maritime Professional: Book of Knowledge*. Tokyo: International Association of Maritime Universities (IAMU). ISBN 978-4-907408-26-8.
6. INTERNATIONAL MARITIME ORGANIZATION, 2017. *STCW international convention on standards of training, certification and Watchkeeping for seafarers: Including 2010 Manila amendments; STCW convention and STCW code*. London: International Maritime Organization (IMO).

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NOTES

1. BAUK, S.; ILCEV, S.D., 2021. *The 1st International Conference on maritime education and development: ICMED*. Switzerland: Springer Nature. ISBN 978-3-030-64088-0.

REFERENCES

CAMARINES, Jr., N.; AMPONG, A., 2016. Performance of Maritime Students' in International Shipping Federation – Training Record Book (ISF – TRB) – Based Navigation. *International Journal of Scientific and Research Publications*, vol. 6, no. 9, pp. 162 – 164. ISSN 2250-3153.

DEMIREL, E.; BAYER, D., 2016. A Study on the Assessment of Sea Training as Integral Part of Maritime Education and Training. *The Online Journal of Quality in Higher Education,* vol. 3, no. 3, pp. 12 – 22. ISSN 2148-2950.

HERRERA, M.; CORTEZ, H., 2021. The Apprenticeship Difficulties Managed by Seafarers while Training Onboard. *University of Perpetual Help System - Jonelta Journal,* pp. 6 – 13.

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