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Academic Preparation towards Improved World Class Maritime Shipboard Performance

VICTORIA Q. PARAGGUA
http://orcid.org/0000-0002-0284-5555
victoriaparaggua@gmail.com
Philippine Merchant Marine Academy
San Narciso, Zambales, Philippines

RONALD G. MAGSINO
http://orcid.org/0000-0002-0956-5564
rgmagsino92@gmail.com
Philippine Merchant Marine Academy
San Narciso, Zambales, Philippines

RACHELLE C. DIVIVA
http://orcid.org/0000-0002-6994-5817
crisostomorachelle@gmail.com
Philippine Merchant Marine Academy
San Narciso, Zambales, Philippines

ANA LEE M. PANADO
http://orcid.org/0000-0001-7563-5009
pmmaresearch@gmail.com
Philippine Merchant Marine Academy
San Narciso, Zambales, Philippines

JAMILA M. MILLAR
pmmaresearch@gmail.com
Philippine Merchant Marine Academy
San Narciso, Zambales, Philippines

ABSTRACT

Continuous monitoring and evaluation are necessary in keeping graduates abreast of the trends and demands in maritime in order not to lag behind in a highly competitive environment like the shipping industry. The study evaluated the academic preparation and shipboard training performance of the PMMA cadets as basis for improvement of the program towards customer satisfaction. The descriptive design was utilized to gather and evaluate the perception of the respondents. The trainee-respondents rated the curriculum, faculty competency, and laboratory and equipment as very satisfactory. Evaluator-respondents rated the work competency, ethical standards, and knowledge and skills of the trainees as very satisfactory. Trainees positively regarded the preparation of reports. They also handled tasks and functions stipulated in their training record book though there are some areas where a significant majority did not experience. The latest trends and demands that should be addressed and incorporated in the maritime curriculum are the following: full compliance with security and safety; installation and use of up-to-date and modern navigational equipment; the presence of electronically controlled camless main engine; simpler but durable cargo handling equipment; and garbage management system. The weaknesses and gap revealed that the maritime curriculum and shipboard training need consideration and reflection to maintain the country's status as the prime provider and producer of highly qualified marine officers.

Keywords **—** Maritime Education, academic preparation, shipboard training, performance evaluation, international vessels, Philippines

INTRODUCTION

In a dynamic working environment like the shipping industry, maritime professionals are expected to be versatile for them to keep up with the fast-changing global trends and demands. Technological advancements brought

numerous changes in the regulations applicable in the sea lanes of the world. Therefore, quality maritime education and training play a role in fostering a corps of able marine professionals who will be resilient and continuously adapts to changes. In this aspect, the institutions of higher learning play a significant part in ensuring that the education they provide meets the expectations of students and the requirements of employers, both today and for the future (Henard & Rosevaera, 2012).

With constant monitoring and evaluation, new trends, challenges, and opportunities can be easily identified. The identification of these areas can serve as a basis for improvement, changes, and upgrade in the curriculum, aids for instruction and competencies of the faculty. One way to identify these areas is through a satisfaction survey. Trainees who have undergone the shipboard training and stakeholders are subjected to the survey (B. Kim & H. Kim, 2013; Alimen, Gayo, Jaleco & Gayo Jr., 2009).

The Philippines provides the workforce needs of the shipping industry – including international waters. The country is dubbed as the "manpower capital" of the maritime sector comprising of at least 30% out of 1.2 million seafarers worldwide as of 2012. Since the Filipinos are most-sought-after in sea-based jobs, it is essential that the quality of the workers should be maintained to sustain the interest of the demanding parties worldwide.

The Philippine maritime higher education institutions strive to meet the rapid demand of Filipino seafarers. The Philippine Merchant Marine Academy (PMMA) being one of the largest producers and the only state-owned institution specializing in maritime education and training (MET) share with this undertakings.

Most importantly, the shipboard training program should serve its purpose to train future mariners to equip them with knowledge better and dynamically apply their maritime skills to a sea-going vessel. This supports the MARINA's mandate to develop and maintain a reservoir of adequately trained, competent, and qualified workforce—who are internationally competitive and familiar with globally-recognized practices and standards—by providing right education and training necessary in the area of expertise of maritime students (Maritime Industry Authority, n.d.).

FRAMEWORK

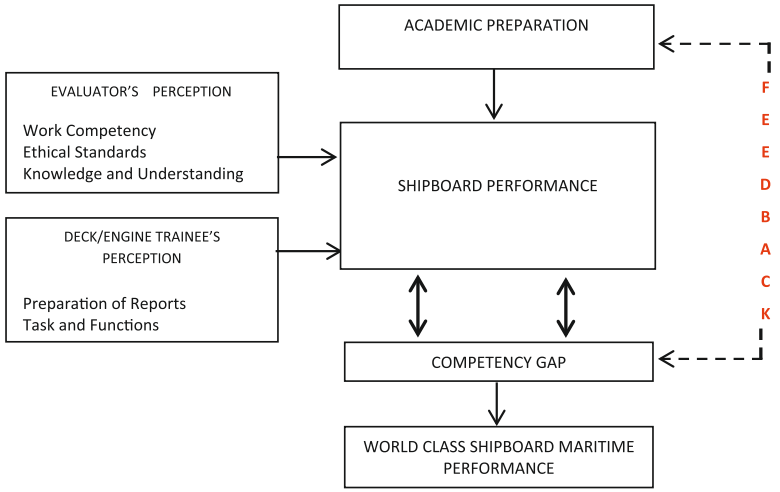

Figure 1. Conceptual Paradigm

To conclude if the program is successful or effective, evaluation and monitoring are necessary. This is a way to realize the strengths, areas of weaknesses and other significant factors that may affect the shipboard training program. Harvey (2003) claimed that "feedback has two main functions: internal information to guide improvement and external information for potential students and other stakeholders, including accountability and compliance requirements." Collating all the feedback of the trainee-respondents and evaluator-respondents served as the basis for improvement or changes that will strengthen the academic preparation of the cadets of PMMA to attain world-class shipboard maritime performance.

OBJECTIVES OF THE STUDY

The study evaluated the academic preparation of the PMMA 2CL midshipmen/women as a basis for improvement toward world-class shipboard maritime performance. Specifically, it sought to: 1) find out the profile of the PMMA trainees and evaluator respondents; the trainee-respondents' perceptions on their academic preparations prior to shipboard training as provided by the PMMA; their view of preparation of reports and actual tasks and functions

vis-a-vis ISF/Training Record Book; 2) determine the evaluators perception of the trainees' performance; and 3) determine the trainee/evaluator-respondents perception on the latest trends and demands in the maritime industry.

METHODOLOGY

The descriptive design was utilized to describe the academic preparation provided by the Philippine Merchant Marine Academy for the shipboard trainees. A total of 151 trainee-respondents (69 deck-trainees and 82 engine-trainees) and 29 evaluator-respondents who served as the immediate supervisors/training supervisor from the different shipping and manning companies were surveyed.

A researcher-made questionnaire for the trainee-respondents' perception on the curriculum and laboratory and equipment was utilized. NBC 461 Instrument for Teaching Effectiveness was utilized to collect trainee-respondents' perception on faculty competency. Documentary analysis was also conducted to scrutinize the Training Record Books/ ISF which were obtained from the Department of Shipboard Training. To support the quantitative data, structured and unstructured interviews were conducted among the trainees, the officers who supervised the trainees; the deans of both colleges; and the panel of experts. Quantifiable responses were treated with statistical tools such as frequency, weighted mean, rank, and percentage.

Ethics Protocol

The researchers sought permission or informed consent from all the respondents who were surveyed and interviewed.

RESULTS AND DISCUSSION

Profile of the Respondents

Based on the data gathered, the majority of the deck and engine trainee-respondents are 18 to 20 years old cadets aboard bulk, tanker or container vessels. On the other hand, most of the shipboard training evaluator-respondents are 41-62 years old acting as supervisor/crew manager of a cargo vessel.

Perception on Academic Preparation for Shipboard Training

Curriculum

Table 1. Curriculum – Marine Transportation

DECK	WM	QI	DECK	WM	QI
Navigation			**Seamanship**		
Planning and conduct of a passage and determine position	3.75	Very Satisfied	Monitoring the Loading, Stowage, Securing and Unloading of Cargoes and their Care during the Voyage	3.64	Very satisfied
Application of the Use of Radar and ARPA to Maintain Safety of Navigation	3.74	Very satisfied	Monitoring of Loading of Cargoes	3.63	Very satisfied
Maneuvering of the Ship	3.66	Very satisfied	Monitoring of Discharging of Cargoes	3.74	Very satisfied
Steering the Ship	3.63	Very satisfied	Maintenance and Overhauling of Cargo Systems and Associated Equipment – For Tankers	3.33	Satisfied
			Maintenance of Seaworthiness of the Ship	3.69	Very satisfied
Deck Watch					
Maintenance of a Safe Navigational Watch	**3.80**	Very satisfied	**Maritime Law**		
			Prevention, Control and Fights Fire on-board	3.62	Very satisfied
English 3 IMO Standard Marine Communication Phrases			Operation and Maintenance of Life-saving Appliances	3.72	Very satisfied
Application of the Use IMO Standard Marine Communication Phrases and Write and Speak English	**3.77**	Very satisfied	Application of Medical First Aid on-board	3.62	Very satisfied
Maritime Communications			Monitoring of the Compliance with Legislative Requirements	3.63	Very satisfied
Transmittance and Receive Information through Appropriate GMDSS Equipment	**3.69**	Very satisfied	Response to Emergencies	3.73	Very satisfied
Marine Environment			Response to a Distress Signal at Sea	3.7	Very satisfied
Ensure Compliance with Pollution Prevention Requirements	**3.74**	Very satisfied			

Tables 1 and 2 reflect the satisfaction rating of the deck and engine trainee-respondents on the PMMA curriculum which is based on their familiarity and knowledge of the different areas indicated. The items shown are parts of the Training Record Book required for them to accomplish while they are in training. Findings reveal that both the deck and engine trainee-respondents are **very satisfied** with the ***curriculum*** in preparing them for shipboard training.

However, particular areas should be highlighted. The *"maintenance and overhauling of cargo systems and associated equipment"* was rated by the deck trainee-respondents only as **satisfied**. It was found out that those who were assigned to Tanker vessels perceived their preparation needs to be strengthened. Another area that should be noted is *"safety"* and *"prevention, control, and firefighting onboard"* rated by the Engine trainees as **outstanding** (as shown in Table 2). This finding can be attributed to the availability of Safety training facilities in the academy, i.e., Safety Center that provides training in Firefighting and Safety for its cadets and other Filipino seafarers (PMMA Prospectus, 2015).

Nevertheless, the overall satisfaction of the trainees implies that the curriculum of the PMMA has trained and equipped them for shipboard training.

Table 2. Curriculum – Marine Engineering

ENGINE	WM	QI	ENGINE	WM	QI
Machine Shop			Auxiliary Machinery		
Use of Appropriate Tools for Fabrication and Repair Operations	4.10	Very satisfied	Auxiliary Boiler	4.02	Very satisfied
Use of Measuring Equipment such as Calipers, Dividers, Gauges, Steel Rule, Thread Gauge, etc.	4.11	Very satisfied	Pumping and Pumping Systems	4.00	Very satisfied
			Air Conditioning System	4.02	Very satisfied
Electrotechnology			Fresh Water Generator	4.11	Very satisfied
Use of Electrical and Electronic Measuring and Test Equipment	3.97	Very satisfied	Oily Water Separator	4.03	Very satisfied
Procedures in Response to Black-out and Emergency Situations	3.81	Very satisfied	Sewage Treatment Plant	4.00	Very satisfied
			Waste Oil Management	4.09	Very satisfied

ENGINE	WM	QI	ENGINE	WM	QI
Automation			Purifiers, Clarifiers and Separators	4.09	Very satisfied
Maintenance and Operation of Alternators, Generators and Control Systems	3.89	Very satisfied			
Control/Safety Air System	3.99	Very satisfied	Maritime Law		
			Safety	4.23	Out-standing
Power Plant Diesel			Prevention, Control and Firefighting on-board	4.24	Out-standing
Main Engine	4.08	Very satisfied	Operation and Maintenance of Life-saving Appliances	4.10	Very satisfied
Auxiliary Engine	3.99	Very satisfied	Application of Medical First Aid onboard Ship	4.10	Very satisfied
Engine Operation	4.16	Very satisfied			

Faculty Competence

Table 3. Faculty Competence

	DECK		ENGINE		Total
	WM	**QI**	**WM**	**QI**	
Knowledge of Subject	3.64	Very Satisfactory	4.12	Very Satisfactory	3.88
Teaching for Independent Learning	3.72	Very Satisfactory	4.09	Very Satisfactory	3.91
Management of Learning	3.63	Very Satisfactory	4.06	Very Satisfactory	3.85
Commitment	3.56	Very Satisfactory	4.12	Very Satisfactory	3.84
Overall	**3.64**	**Very Satisfactory**	**4.10**	**Very Satisfactory**	**3.87**

Table 3 shows that both the Deck and Engine trainee respondents are **very satisfied** with the competency of the members of the Technical faculty of the Philippine Merchant Marine Academy. However, despite the positive feedback of the trainee-respondents, it can be noticed that areas that the items commonly related to Management of Learning and Commitment are rated lower.

Laboratory and Equipment

Table 4. Laboratory and Equipment

DECK	WM	QI	ENGINE	WM	QI
Navigation equipment	3.85	Very Satisfied	Marine electricity tools	4.10	Very satisfied
Deck workshop tools and equipment	3.75	Very satisfied	Ship shaft laboratory	4.08	Very satisfied
Cargo handling room	3.79	Very satisfied	Engine control room equipment	4.13	Very satisfied
Ship stability equipment	3.67	Very satisfied	Engine machine shop and tools	4.03	Very satisfied
Conduciveness and safety of laboratory rooms for practical experiments	3.78	Very satisfied	Pneumatics and hydraulics laboratory	4.10	Very satisfied
Instrumentation and control laboratory room	3.80	Very satisfied	Laboratory rooms for practical experiments	4.06	Very satisfied
Latest technology and simulators (Bridge and Engine Room Simulator)	3.84	Very satisfied	Instrumentation and control laboratory room	4.05	Very satisfied
Learning venue such as training ship (RPLS Luna)	3.69	Very satisfied	Latest technology and simulators (Bridge and Engine Room Simulator)	4.08	Very satisfied
Safety equipment and tools	3.84	Very satisfied	Learning venue such as training ship (RPLS Luna)	3.95	Very satisfied
Security equipment	3.63	Very satisfied	Safety, security, lifesaving and personal survival equipment and tools	4.10	Very satisfied
Life-saving and firefighting equipment	3.75	Very satisfied	Computer laboratory and internet access	4.03	Very satisfied
Lifeboats and personal survival equipment	3.69	Very satisfied	Other maritime-related facilities (swimming pool and firehouse)	4.09	Very satisfied
Computer laboratory	3.68	Very satisfied	**Overall Weighted Mean**	**4.07**	**Very Satisfied**
Other maritime-related facilities (swimming pool and firehouse)	3.72	Very satisfied			
GMDSS equipment	3.69	Very satisfied			
Overall Weighted Mean	**3.74**	**Very Satisfied**			

Table 4 shows that the deck and engine trainee-respondents are **very satisfied** with the aid of the laboratory and equipment of PMMA in preparing them for shipboard training. It must be noted that this area is vital in the learning

experience of the students. It is in laboratories where the application of theories is possible. Tools and equipment therein increase the capability of the students to retain a multitude of information (Lunetta, Hofstein, & Clough, 2007).

Evaluation of the preparation of the reports during shipboard training

Table 5. Preparation of Reports

		%			%
Training Schedule	Often affects	39.58	**Conformity of Content to actual training**	Often conforms	53.15
	Sometimes affects	53.23		Sometimes conforms	40.72
	Seldom affects	4.62		Seldom conforms	6.20
	Never affects	2.57		Never conforms	0.53
	Total	**100**		**Total**	**100**
Understanding of tasks	Often Difficult	17.32	**Sequencing of Tasks with actual training**	Often sequenced	45.49
	Sometimes Difficult	54.75		Sometimes sequenced	48.16
	Seldom difficult	20.37		Seldom sequenced	5.82
	Never difficult	7.56		Never sequenced	0.53
	Total	**100**		**Total**	**100**
Duplication of Report	Strongly Agree	31.58	**Queries about the topics**	Often answered	44.19
	Agree	57.24		Sometimes answered	48.57
	Disagree	9.17		Seldom answered	6.72
	Strongly Disagree	2.01		Never answered	0.53
	Total	**100**		**Total**	**100**
			Ease of acquiring certification from Supervisor	Often easy	37.95
				Sometimes easy	56.15
				Seldom easy	4.32
				Never easy	1.58
				Total	**100**

As summarized in Table 5, most of the trainees agreed that preparation of reports sometimes affects their training schedule and that is consuming most of their time. A majority of them also said that tasks are sometimes difficult to understand, but it often conforms to the actual training and tasks are properly sequenced. Moreover, a significant majority also agreed that there is a duplication

of the ISF Record Book and the PMMA Sea project. The trainees agreed that it was sometimes easy to acquire certification of the reports from supervisors and their colleagues and supervisors are helpful in assisting them in the preparation of reports.

Perception of the evaluator-respondents on the performance of the trainees

Table 6. Performance of the trainees

Competence/Performance	Weighted Mean	Interpretation	Rank
WORK COMPETENCE > attitude while working; have the ability to communicate instructions to a multi-lingual crew; a team-player have the capacity to withstand hard and cumbersome workload and training; and others.	3.99	Very Satisfactory	1
ETHICAL STANDARDS > understand the nature of naval and maritime services well; have served as inspiration for their dedication and high purpose; have encouraged the practice of ethical principles and standards of professional practice; have refrained from committing offenses; and others.	3.87	Very Satisfactory	2
KNOWLEDGE AND UNDERSTANDING > display of knowledge of their duties and responsibilities onboard; by being watchful during emergency drills and safety practices; by possessing skills on tasks assigned to them; by their display of academic, mental, physical and professional preparedness; and by demonstrating their familiarity of the vessel, operating procedures, and others.	3.57	Very Satisfactory	3

The evaluators rated the PMMA shipboard trainees' overall performance regarding **work competency, ethical standards,** and **knowledge and understanding** as **very satisfactory.**

Tasks and Functions accomplished by the Trainees on their Shipboard Training

Table 7. Tasks and Functions - Engine Cadets

	*values in % *With Actual Experience	*Did not Experience
Marine Engineering at the Operational Level		
Maintain a Safe Engineering Watch	73.40	26.60
Use English in Written and Oral Form	60.00	40.00
Operate Main and Auxiliary and Associated Control Systems	65.49	34.51
Operate Pumping Systems and Associated Control Systems	67.97	32.03
Electrical, Electronic and Control Engineering at the Operational Level		
Operate Alternators, Generators and Control Systems	60.79	39.21
Maintenance and Repair at the Operational Level		
Maintain Marine Engineering Systems including Control Systems	56.11	43.89
Controlling the Operation of the Ship and Care for Persons onboard at the Operational Level		
Ensure Compliance with Pollution Prevention Requirements	42.26	57.74
Maintain Seaworthiness of the Ship	42.79	57.21
Prevent, Control and Fight Fires on-board	59.48	40.52
Operate Life-Saving Appliances	57.88	42.12
Apply Medical First Aid onboard Ship	56.75	43.25
Monitor Compliance with Legislative Requirements	47.12	52.88

Table 8. Tasks and Functions – Deck Cadets

*values in %			* values in %		
Tasks and Functions (Deck Cadets)	*With Actual Experience	*Did not Experience	**Tasks and Functions (Deck Cadets)**	*With Actual	*Did not Experience
Navigation at the Operational Level			**Cargo Handling and Stowage - For Tankers**		
Plan and Conduct a Passage and Determine Position	85.75	14.25	Monitor Loading of Cargoes	24.19	75.81
Maintain a Safe Navigational Watch	81.41	18.59	Monitor Discharging of Cargoes	24.19	75.81
Use of Radar and ARPA to Maintain Safety of Navigation	85.44	14.56	Maintain and Overhaul Cargo and Associated Equipment	22.37	77.63
Respond to Emergencies	83.20	16.80			
Respond to Distress Signal at Sea	54.83	45.17	**Controlling the Operation of the Ship and Care on-board at the Operational Level**		
Use of IMO Standard Marine Communication Phrases and Write and Speak English	53.08	46.92	Ensure Compliance with Pollution Prevention Requirements	70.14	29.86
Transmit and Receive Information by Visual Signaling	73.55	26.45	Maintain Seaworthiness of the Ship	63.39	36.61
Maneuver of the Ship	78.47	21.53	Prevent, Control and Fight Fires on-board	70.69	29.31
Steering the ship	68.49	31.51	Operate Life-Saving Appliances	70.17	29.83
			Apply Medical First Aid onboard Ship	66.08	33.92
Cargo Handling and Stowage at the Operational Level			Monitor Compliance with Legislative Requirements	71.62	28.38
Monitoring the Loading, Stowage, Securing and Unloading of Cargoes and their Care during the Voyage	54.62	45.38			

Tables 7 and 8 reflect the required tasks and functions of both the deck and engine trainees. Most of the trainees have accomplished the tasks and functions required of them. However, some areas need attention. As shown in Table 7, more than half of the engine-trainees did not experience at least 3 areas under **Controlling the Operation of the Ship and Care for Persons onboard at the Operational Level** such as *"Ensure Compliance with Pollution Prevention*

Requirements", "Maintain Seaworthiness of the Ship", and *"Monitor Compliance with Legislative Requirements".* Also, a significant majority of the deck-trainees who were assigned in Tanker vessels did not experience handling tasks that are under **Cargo Handling and Stowage** (Table 8).

Moreover, the areas which have a higher number of trainees who did not experience handling the tasks only imply that some shipping companies do not involve them in activities that are needed to be complied. Therefore, it is necessary for the academic institution to communicate with the shipping companies to rectify this gap. This will ensure a fair training experience among the shipboard trainees.

Latest Trends and Demands on Maritime Industry as Perceived by the Trainees and Evaluators

Safety and Security

Strict and full compliance with security and safety which includes frequent implementation of safety meetings, provision of up-to-date security information and procedures, full understanding of International Ship and Port Facility Security (ISPS) Code contingency plan, use of multimedia for safety awareness, provision of more reliable safety and security equipment.

Navigational Equipment

Installation and use of up-to-date equipment and modern navigational equipment such as radar, global positioning system (GPS), and gyro compass to comply with the international standards to give way to Auto Pilot system. Systems like Bridge Navigational Watch Alarm System (BNWAS) and Electronic Chart Display and Information System (ECDIS).

Cargo Handling Equipment

Presently, main and additional cargo handling equipment aboard are simpler but more durable and user-friendly; there are available derricks on both sides, computerized cargo cranes and more convenient and proactive equipment; and fast processing of equipment request to repair exposed items and damaged prone materials are now practiced.

Engineering Machinery and Equipment

The trends in engineering machinery and equipment include the presence of the electronic main engine, even camless and automatic machinery.

Marine Environment Sustainability

Deck trainees confirmed that ships are fully compliant with MARPOL specifically International Convention for the Prevention of Pollution for Ships regulations; adherence to the SQE policy, practice of garbage management, and existence of latest equipment to prevent and reduce pollution were included.

Maritime Law and Ship Business Trends

Ship business trend includes adherence to MARPOL and the Safety Management System (SMS), occupational health and safety law, ships running in eco modes, awareness of charter party, compliance to maritime laws, and rest hours of crew during holidays and Sundays.

CONCLUSIONS

The student-respondents are very satisfied with their academic preparation regarding curriculum, faculty competence, laboratory, and equipment, but additional topics on familiarization and operation of specialized vessels such as tankers will be useful.

In the preparation of reports during shipboard training, there is duplication in the ISF Record Book and PMMA Sea Project; tasks are "sometimes" to "often" difficult to understand, but activities conform and are sequenced according to required training; and supervisors are supportive in the preparation of their reports.

The trainees mostly experienced all the tasks and functions required during shipboard training except three sub-areas under the engine group where more than one-half did not perform the tasks and one major area under deck group which specific tasks were not experienced by a majority of the deck-trainees.

Also, the evaluators are very satisfied with the performance of the PMMA shipboard trainees concerning work competency, ethical standards and knowledge, and understanding.

Finally, new technologies are being introduced covering safety and security; and equipment in navigation, cargo handling, and engineering machinery. Sustainability of the marine environment maritime law and shipping business are also emphasized.

The need for the utmost consideration and reflection of the maritime institutions towards shipboard training program is very relevant to maintain the country's status as the primary supplier and producer of highly qualified marine officers. Maritime Education and Training institutions should update and enrich

their Maritime programs to comply with the needs of the industry, current trends and practices, and effect of promulgation and implementation of new local and international laws, rules and regulations.

TRANSLATIONAL RESEARCH

The results of the study were disseminated to the PMMA Department of Shipboard Training and the Academic Council who are responsible in crafting an improved Shipboard Training policy and program for the cadets. A stronger Memorandum of Action between PMMA and its partner shipping companies in monitoring and evaluation of the required task and functions in the Training Book/ISF is being implemented. Review of the curriculum and teaching syllabus is being undertaken to incorporate the latest trends and demands in the maritime industry.

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