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Competencies of Marine Engineering Students of a Maritime Higher Education Institution: An Assessment

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Abstract— *Competency assessment plays a critical role in determining the proficiency and effectiveness of future marine officers. The competence of marine engineering students focusing on their performance, the perceived factors that affect their competency, and the challenges they met during practical assessment were assessed. Using quantitative descriptive design, a practical assessment using the adopted practical assessment from the Maritime Administration and a survey questionnaire were used to achieve the research objectives. Total enumeration of the 30 marine engineering students and ten engine instructors who handle laboratory courses were the participants and respondents. Results include the general exemplary performance of the participants except in Function 2; several factors affect the students' performance, such as student-related factors, instructor-related factors, facilities and equipment, and policy-related factors; and 46 challenges were identified. Several recommendations were presented. Among them are the incorporation of more simulation-based training that presents real-life scenarios requiring quick and effective decision-making; use of mnemonics memory aids; digital versions of learning materials for easy access; provision of scholarship grants, and others.*

Keywords— ***Competence, Marine Engineering, Outcome-based education, Performance, Standard of Competence***

I. INTRODUCTION

Filipino seafarers are highly valued for their remarkable abilities, versatility, and tenacity, making them an invaluable resource for global marine operations. These characteristics highlight how important Filipino seafarers are to preserving the vital link that sustains international trade. As the Philippines became a major source of cheap labor, the manning industry grew influence when it came to conditions of employment for Filipino seafarers to shape its labor, especially in compliance with the international obligations to fully perform the standardization of maritime education and training.

The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) Annex IV Table A-III/1 states, "Specifications of minimum standards of competence for officers in charge of an engineering watch in a manned engine-room or designated duty engineers in a periodically unmanned engine room, enumerate all the competences needed for practical assessment: Function 1- Marine Engineering at the operational level; Function 2- Electrical, Electronics, and Control Engineering; Function 3-Maintenance and repair at the operational level; and Function 4- Controlling the operation of the ship and care for persons on board.

Captain Noestvik emphasized what is lacking in a seafarer that results to non-competence. This includes lack of basic skills, substandard shipboard training, no proper screening, and non-alignment of practical and theoretical exams with the International Convention on Standards of Training Certification and Watch keeping (AHK News, 2022). In the article "Maritime Knowledge, Seafarers", (2019) state that the standard of competence is the minimum knowledge, understanding, and proficiency a seafarer achieves to be considered competent. As Dr. William H.

Moore emphasized, the commitment to competence assurance is vital to retaining the seafarers' skill sets and employment and defines competence as the ability to perform tasks and duties to the standards of performance expected in the workplace (Moore, W. 2017).

Filipino seafarers are highly valued for their remarkable abilities, versatility, and tenacity, making them an invaluable resource for global marine operations. These characteristics highlight how important Filipino seafarers are in preserving the vital link that sustains international trade.

Nevertheless, international business groups have highlighted deficiencies in the quality of training and education received by Filipino seafarers, even though their services remain in high demand (The Manila Times 2022). Despite being a major supplier of seafarers globally, the Philippines faces growing concerns regarding the competency of its maritime workforce. Therefore, ensuring these seafarers possess the necessary competencies to meet the safety and efficiency standards of global shipping operations is a critical challenge.

Raising Filipino standards is an endeavor that holds the potential to elevate the nation's progress and prosperity. Under Executive Order No. 63, the Maritime Administration shall ensure that all maritime educational institutions comply with the set international standards prescribed under the STCW Convention (Manila Bulletin, 2018). Moreover, Joint CHED MARINA Circular No.3 series of 2022, Article I Section 2 Policies and Legal Bases, states that the Authority of CHED and MARINA are to monitor the performance of maritime higher education institutions. With this, the Philippine Commission on Higher Education (CHED) Memorandum No. 46 implemented the shift to learning competency-based standards/outcomes-based education. It adopts the competencies needed to comply with the Standards Certification and Watch keeping (STCW) Convention, 1978, as amended. Article IV, under program specifications, Section 4, BSMarE, is a maritime education program that covers the mandatory education and training for Officers in Charge of an Engineering Watch required under Regulation III/1 of the STCW Convention, 1978, as amended.

The vision of the Maritime Industry Authority (MARINA) is to sustain the status of the Philippines as a major provider of qualified and competent seafarers in the world labor market, and its mission is to ensure that Filipino seafarers are well-educated, well-trained, and well-equipped with knowledge and competencies aligned with the national and international standards to develop into a globally competitive seafaring workforce (MARINA-STCW). In line with this, MARINA commits to ensure the competence of Filipino seafarers through the effective and efficient implementation of the regulations under Chapters II, III, IV, V, and VI specified in the STCW Convention as amended and compliance with the applicable statutory and regulatory (STCW 2018 Amendment).

The Joint-CHED MARINA Circular No. 02 series of 2022, under Section 2, explains the authority of CHED in the administration and supervision of maritime education programs and institutions of higher learning. The Office of Programs and Standards Development (OPSD) implements the joint evaluation and inspection of maritime educational programs and ensures coordination with the STCW Office of MARINA. On the other hand, the authority of the MARINA in the administration and supervision of the maritime education programs is to implement and enforce the STCW Convention 1978, as amended.

Under Article1, Section 1 of the Joint CHED-MARINA Memorandum Circular No.01 series of 2023, educational reforms aim to enhance the basic education curriculum. Additionally, in compliance with Regulation I/6 of the STCW Convention, curriculums are structured according to Table A-II/1 and Table A-III/1 of the STCW Code.

Maritime Higher Educational Institutions (MHEI) in the Philippines is unique. Educational standards do not just govern these schools, but more importantly, from the point of view of global competition, they are regulated by an International Convention, the Standard of Training, Certification and Watch keeping for seafarers (STCW 1978,) as amended, of the International Maritime Organization (IMO). It provides enhancement for growth, expansion and positive change to face the challenges in the maritime industry.

Among these MHEIs is the Manuel S. Enverga University Foundation Lucena City, College of Maritime Education Department. It is a CHED-recognized, PACUCOA Level III Accredited Maritime Educational Institution which provides technical courses such as Bachelor of Science in Marine Transportation and Bachelor of Science in Marine Engineering based in Lucena City, Quezon Province.

As this educational institution aims to continuously provide its students with the competencies that they need according to STCW 1978, as amended, this assessment was pursued. Along with the factors that affect the students' performance, the study's result may serve as baseline for improvement by maritime higher education institutions.

II. FIGURES AND TABLES

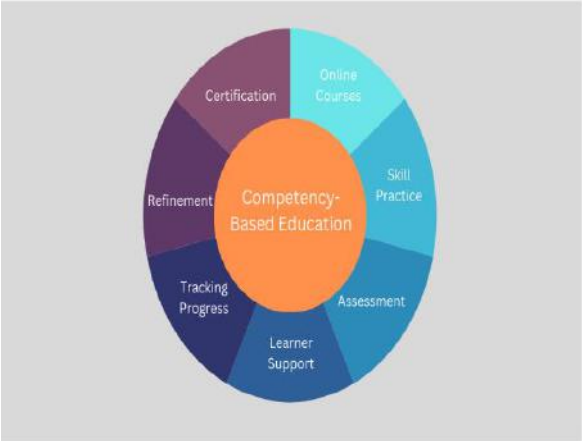

Fig.1: Competency-Based Education

CBE involves authentic assessment, constructive alignment, and criterion-reference assessment principles. It emphasizes that assessments should measure specific learning outcomes and be directly aligned with well-defined criteria for mastery. The primary purpose of assessment in competency-based education is to determine whether a student has mastered a particular competency. Assessments are not used solely for grading but as tools for formative feedback and continuous improvement.

The CBE curriculum is also designed, developed, and directly relevant to the student's future careers and real-life situations, providing practical skills applicable in the workplace. This personalized approach helps accommodate diverse learning styles and paces. The assessments accurately measure the student's proficiency in the targeted competencies.

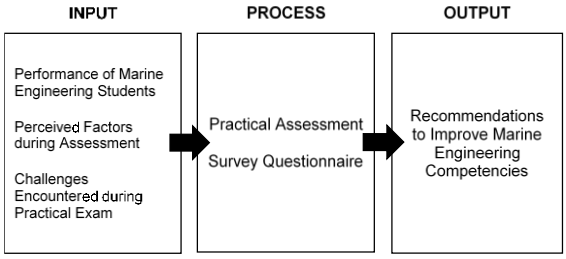

Fig.1: Research Paradigm

Table 1 Cronbach's Alpha Result

Section	Number of Items	Cronbach's Alpha	Internal Consistency
A. *Perceived Factors Affecting the Performance of Marine Engineering Students*			
▪ *Student*	*9*	*0.945*	*Excellent*
▪ *Instructor*	*6*	*0.921*	*Excellent*
▪ *Facilities and Equipment*	*15*	*0.922*	*Excellent*
▪ *Policy*	*6*	*0.762*	*Acceptable*
▪ *Financial*	*5*	*0.887*	*Good*
▪ *Family Background*	*5*	*0.764*	*Acceptable*
▪ *Belief*	*3*	*0.888*	*Good*
B. *Challenges During Practical Assessments*	*51*	*0.986*	*Excellent*

III. CONCLUSION

Based on the findings, the following conclusions are drawn:

The students demonstrated exemplary competence in marine engineering except Function 2: Electrical, Electronic, and Control Engineering at the Operational Level in many aspects. Moreover, there were specific competences that require improvement. Putting more attention to them would result in better performance.

The majority of the factors included in the survey affect the performance of marine engineering students. These must be considered for any related development planning, as they can serve as motivation for improved performance.

The significant difference in the students and instructors' responses covering instructor-related factors may have been affected by differing views as the instructors are performing self-evaluation. Self-appraisal is subjective, but the third-party assessment made by students provides the balance it needs.

Numerous challenges are met by the students during practical assessment. Addressing them can help improve performance.

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