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Research Article

Competence of Entrants and Accounts on the Implementation of Senior High School Pre-Baccalaureate Maritime Program in Negros Occidental

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ABSTRACT

The Philippines is one of the single biggest nationality blocs in the maritime and shipping industries; thus, the country's efforts to improve the Maritime Program in secondary and tertiary education are highly significant. This study aimed to determine the level of competence of Maritime Senior High School students and gather accounts of implementing the maritime program in the basic education system in Negros Occidental. It adopted the mixed-methods sequential explanatory design. The paper used mean, standard deviation, and Mann-Whitney for comparing differences between two independent groups for the statistical treatment analysis of the quantitative data. Coding and identifying common themes, patterns, and responses were used in the thematic analysis of the descriptive information provided by the interviewees. The findings revealed that the competence of the SHS students in the pre-baccalaureate maritime program was at the skill level in terms of introduction to maritime careers and introduction to marine transportation and engineering, and at the leadership level in terms of introduction to maritime safety, irrespective of the school enrolled and preferred program. The development of the quality system and support, execution of the curriculum, administration of assessments, and sustained and continuous pursuit of excellence that comprise the ideal practices of the school explained the current findings. Laying the foundation (PSG), Embedding the PSG into the school norms and practices, acting on or carrying out the program, and Determining Outcomes are the four steps that make up the new paradigm for conducting pre-baccalaureate maritime programs known as LEAD.

Keywords: *Assessment, Curriculum, Maritime, Shipping industries*

Introduction

The ongoing pandemic has highlighted the industry's indispensable role in the global

economy. Seafarers are at the heart of shipping and are critical to operating today's modern and technologically sophisticated ships safely

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and efficiently. The Philippines was the top supplier for officers and ratings in the BIMCO/ICS Seafarer Workforce Report 2021, followed by the Russian Federation, Indonesia, China, and India. Together, these nations supplied 44% of the world's seafaring labor force (Gorecho, 2022).

In contrast to other programs, maritime programs must adhere to exact international agreements and standards, have a solid multidisciplinary component, and forge a close connection between academic research and the profession (Simić et al., 2015). Seafarers must demonstrate the skills required by the 2010 amendments to the STCW Convention and Code to meet the demand and supply of seafarers on the global market. These regulations were implemented to ensure that the needed worldwide standards were in place for seafarers, especially those working on cruise ships, to receive the training and certification necessary to manage technologically advanced ships (IMO SOLAS and STCW rules took effect in 2010). In addition, the Standards of Training, Certification, and Watchkeeping (SCTW) have set rigorous standards, and schools must ensure that all students successfully meet the expected standards. In general, maritime competencies are seen as the strengths needed for future seafarers to function, excel, and find a place in the labor market.

However, due to a lack of institutional infrastructure and ability, developing countries like the Philippines fail to achieve even the most basic standards for Maritime Higher Education Institutions (MHEIs) (Singh et al., 2022). The government has often received warnings from the European Union that its maritime schools do not satisfy international standards due to the current state of the nation's MHEIs. Its maritime schools had failed the audit being conducted by EMSA since 2006 (De Vera & Noriega, 2014). There is then a fear that the country might not pass the upcoming set of audits to be carried out by the European Maritime Safety Agency (EMSA).

Focusing on the secondary maritime education system, the priority level in maritime domains has been prioritized (Cunningham, 2015). The full implementation of the new K-12 system in 2016 highlighted the senior high

school maritime program. However, until now, senior high schools have had little or no current data or research on the outcomes of senior high school programs in general and maritime programs in particular.

Based on these assumptions, the researcher was inspired to add to the body of knowledge regarding the entry-level proficiency of maritime students and to amass information on the state of the secondary maritime program in the country. The study specifically sought to ascertain whether or not senior high school students enrolled in the maritime program in the province had the necessary skills as outlined in the Amended Standards of Training, Certification, and Watchkeeping (STCW). The paper also provided a more thorough account of how the pre-baccalaureate marine program was implemented in senior high school primary education.

The LEAD model for program implementation of the maritime specialization in the SHS emerged from the findings of this study. It can serve as a benchmark for improving current and future government initiatives to foster the expansion and advancement of the maritime sector in the Philippines.

Statement of the Problem

The primary purpose of this study was to determine the level of competence of entrants and present accounts of the implementation of the basic education maritime program in Negros Occidental during the academic year 2021-2022.

Specifically, this research aimed to seek answers to the following questions:

1. What is the level of competence of senior high school students enrolled in the pre-baccalaureate maritime specialization in the areas of introduction to maritime careers, introduction to marine transportation and engineering, and introduction to maritime safety when taken as a whole and grouped to:
 - 1.1. school enrolled in, and
 - 1.2. preferred program?
2. Is there a significant difference in the level of competence of senior high school students enrolled in the pre-baccalaureate

maritime specialization in the areas of introduction to maritime careers, introduction to marine transportation and engineering, and introduction to maritime safety when taken as a whole and grouped and compared according to the aforementioned variables?

3. How is the pre-baccalaureate maritime program in basic education implemented in senior high schools?

Statement of Hypothesis

The level of competence of senior high school students enrolled in the pre-baccalaureate maritime specialization in the areas of introduction to marine transportation and engineering and maritime safety is the same when grouped and compared according to school enrolled and preferred program.

Theoretical Framework

Bandura's self-efficacy theory underpins the article. Self-efficacy is the belief that one can attain performance objectives (Bandura, 1986). This also entails believing one can manage one's motivation, conduct, and social environment (Bandura, 1977). Cognitive self-evaluations affect objectives, effort, and behavioral performance (Bandura, 1997).

Self-efficacy is a person's confidence to mobilize the motivation, cognitive resources, and actions needed to execute a task in a particular context. If they work hard, highly effective people will succeed. Low self-efficacy makes people quit early and fail (Stajkovic & Luthans, 1998).

Betz (2000) analyzed the main postulates of self-efficacy theory and applied them to job choice and growth. She claims that there is a related assessment of perceived self-efficacy for domains of professional behavior, measurement, and study on occupational, mathematical, fundamental domains of activity, and career choice self-efficacy. She also underlines the link between self-efficacy and professional interests and the theory's importance to women and members of racial, ethnic, or minority groups' career development.

According to self-efficacy theory, socially cognizant people can self-regulate their ideas, motivation, and actions. The social-cognitive

approach views people as goal-directed and actively shaping the task environment. Cognitive processes and other human resources also affect behavioral approaches and their implementation (McCormick, 2001).

Experience modified Bandura's (1986) thought about behavior, or the purpose to act. Bandura believed that mastery motivates people to succeed at an activity. Bandura found that completing a task increases the likelihood of repeating it.

According to the research, pre-baccalaureate marine students' self-efficacy helps them perform the necessary behaviors to meet the program's goals. Self-efficacy may affect a person's ability to plan and execute activities to reach specific performance goals, according to Kremer et al. (2013). People's self-efficacy affects how they handle a task. Perceived competence is a person's confidence in their abilities. Mojaverzi and Tamiz (2012) noted that self-efficacy depends more on belief than talent.

Based on the above, self-efficacy evaluates one's ability to organize and execute activities to reach a particular competency. Perceived competence is a person's confidence in their abilities. In this study, pre-maritime students self-assessed their skills using established criteria. They assessed their skills and knowledge against standards. Thus, curriculum adoption may be accompanied by practical activities and remediation. Their competence assessment may affect their career choices. Self-assessment is a helpful way to evaluate several aspects. This lets them assess their marine skills. It offers them confidence, knowledge, and course correction to improve. Thus, individuals may become more self-directed and aware of their talents and interests. The theory of competence emphasizes institutional changes that foster learner competence growth, whereas self-efficacy emphasizes individual potential.

Competence development theory supports this research. Competence development is stressed as a purposeful and sensible method for fulfilling new or enhanced competence needs owing to environmental or organizational changes. This concept emphasizes schooling and other competence development instruments as instruments for competence-increasing learning in participants. Competence

development can include one or more of the following measures: (a) recruitment, promotion (e.g., career planning), and personnel mobility (internal and external); (b) education or training of personnel, such as using internal or external courses; and (c) planned changes of tasks or work for the organization through different types of measures (e.g., job development, job rotation, team organization) to further informal learning in work (Ellstrom & Kock, 2–3).

Competence development theory provides another solid foundation for the present study. Competence development is stressed as a purposeful and sensible method for fulfilling new or enhanced competence needs owing to environmental or organizational changes. This hypothesis showed that competency may improve over time.

In the current research, De Vera and Noriega (2014) supported competency-related learning for maritime SHS students because industry insiders had suggested that maritime training schools' systems should be changed from "qualification-based to competency-based" to be compliant. Since competencies are clearly described and credit is based on mastery, employers may be able to identify students better (Kelly & Columbus, 2016). Competency-based education may prepare students for careers. This method will assist students in attaining their professional objectives (Curry, 2019). Developing student competencies like a love for marine life, encouraging high interest and concern, making work decisions, and developing active attitudes and creative entrepreneurship in the maritime sector must be prioritized in maritime education (Hidayati et al., 2020).

Given this, personal life events and experiences, physiological and emotional states, external environmental events, and one's and others' behaviors may all affect self-efficacy (Bradley et al., 2017). Support from essential others and the school environment may affect an adolescent's academic achievement, according to Tsang et al. (2012).

This article focused on students' competency evaluations based on their school and program of choice. Sandahl (2016) states that the learning environment may improve or hurt

performance. Success is crucial, particularly for kids, since school is where instructors and peers evaluate and reinforce success and failure.

Conceptual Framework

The Revised Policies, Standards, and Guidelines (PSG) implement competency-based standards and outcomes-based education as outlined in the joint Commission on Higher Education (CHED) and Maritime Industry Authority (MARINA) memorandum circular no. 1, series of 2022. The PSG was created to implement the upgraded primary education curriculum from K to 12 and the New General Education Curriculum (Commission on Higher Education, 2022).

Competency-based education emphasizes lifetime skills. All institutions pursuing competency-based systems agree that the current goal of the K–12 curriculum is to help all students graduate from high school with the academic and lifelong learning skills they need to be leaders in their communities and agents of their success in life, college, and the workplace.

K–12 should prepare students for jobs. Students will have enough time to study while pursuing their hobbies. Thus, non-college graduates will learn work skills. After two more years of high school, they will graduate and be eighteen, the legal age for full-time work.

The competency-based K–12 curriculum is adaptable and learner-centered. Rather than conventional subject matter, it emphasizes complex learning objectives, including knowledge, skills, and attitudes. The pre-baccalaureate marine program's detailed results determine its students' skills.

Theoretical reviews define self-efficacy as confidence. Competence development helps students evaluate their professional preparedness. These two notions make students question their abilities in marine careers.

Self-efficacy is people's belief in their capacity to do specific tasks and develop certain behaviors. Self-efficacy includes competence. Students are asked about their academic performance or competency. It comprises students' confidence in regulating their behavior, influencing their environment, and staying motivated.

Self-efficacy and competency theories underlie this study. Pre-baccalaureate maritime students assessed marine engineering, safety, and transportation. Based on the previous explanation, their feeling of self-efficacy may significantly impact their competency evaluation. Thus, how well people believe they can do maritime sector occupations may influence their career choices. Besides self-efficacy, external and internal variables like school and program affect their self-assessment of skills.

A mixed-methods study was used to explain the phenomenon better. Mixed approaches provide more robust conclusions than single methods. The article began by collecting quantitative data to assess pre-baccalaureate marine students' abilities and identify the elements affecting them (phase 1). Phase 2 included collecting qualitative and descriptive data from carefully chosen respondents to explain the quantitative findings. The quantitative and qualitative data were merged and iteratively examined to better describe the pre-baccalaureate marine programs in senior high school (phase 3). Interviews and observations gave mixed methods a deeper grasp of the subject. Figure 1 shows the research framework schematically.

Scope and Limitation of the Study

The present study examines the competence of 189 senior high school students in grade 12, specifically those enrolled in the pre-baccalaureate maritime specialization in the two secondary schools offering maritime specializations in Negros Occidental for 2021–2022. The level of competence included (a) the introduction to a maritime vocation, (b) marine transportation and marine engineering, and (c) marine safety. Enrollment and program preference categorized SHS respondents.

The research acquired quantitative data using a web-based survey and descriptive data via group interviews. The study's research design examined the data. Quantitative and qualitative data were gathered to understand the issue better. The study's results inspired the LEAD paradigm for SHS pre-baccalaureate marine programs.

The SHS students self-assessed. "Self-enhancement bias" (Gosling et al., 1998) leads individuals to overestimate and appraise their talents incorrectly. Burson et al. (2006) found that self-enhancement bias makes individuals overstate their performance when they do poorly objectively. Self-diminishment bias is common in high achievers, especially during demanding tasks (Burson et al., 2006). The qualitative sample size was another limitation. The respondents' ideal school standards and procedures may not apply to other schools outside the research area.

Methods

Research Design

The research collected quantifiable data for statistical analysis of senior high school students' pre-maritime specialist ability, taking into consideration their school and selected curriculum. Quantitative and qualitative methods were needed to describe the sampled population. Explanatory, sequential, descriptive research was chosen due to the research challenge.

Respondents and Participants of the Study

In the quantitative phase, 189 of 266 SHS students (71%) enrolled in the pre-maritime program in 2021–2022 were sampled. The researcher targeted the target population. However, 29% of SHS students—77—were unavailable or refused to participate in the survey. Table 1 displays the two schools' responses.

Table 1. Distribution of Respondents

Respondents	BSMT	BSMar-E	Total
f %	f %	f %	%
School A	78 75.00	26 25.00	104 100
School B	50 58.82	35 41.18	85 100

The qualitative researcher set explicit inclusion criteria to guarantee that participants could offer data to answer study questions. Researchers' inclusion criteria are the target population's essential qualities. High-quality research requires specifying study participant in-

clusion criteria, according to Patino and Ferreira (2018). Inclusion and exclusion criteria limit subjects to harm, promote data reliability and protect vulnerable persons from being exploited.

Accordingly, the researcher enumerated the following inclusion criteria to qualify participants for the interview and focus group discussion:

1. An administrator of the schools under study who had been directly and actively involved in the planning, designing, supervising, and monitoring of the pre-maritime curriculum in the DepEd central office or MARINA's Maritime Education and Training Standards Supervisor (METSS) for at least three years.
2. A full-time instructor in a pre-maritime program of the schools under study who had been teaching courses related to maritime career, marine transportation, marine engineering, and maritime safety for at least three years.
3. A designated curriculum planner or designer of the schools under study in maritime career, marine transportation, marine engineering, and maritime safety who had been connected for at least three years.
4. An assigned program chair or coordinator of the schools under study who had been monitoring and supervising pre-maritime programs for at least three years.

The researcher preferred purposive sampling in choosing interviewees. The schools' administrators, instructors, curriculum designers, program chairs, and coordinators were the study's primary data sources. The original research examined SHS students' pre-baccalaureate marine specialist abilities. After the first group (SHS students) completed the competency self-assessment, the second group exchanged experiences that deepened their understanding of the study issues and the quantitative results. Their position and direct involvement in the pre-baccalaureate maritime specialization have given them substantial background knowledge and a grasp of the challenges, notably the program's curricular components and teaching approaches. They best represent program participants. Their

responses were triangulated to strengthen the study findings and clarify the research issues. Separate sets of people may study quantitative phase data.

Research Instrument

The Joint DepEd Memorandum, Circular No. 1, Series of 2016 and 1995, which amended STCW, assessed SHS pre-baccalaureate maritime students' competency. The questionnaire has four components. The first segment profiled responders by school and chosen program. The questionnaire contained 15 competency indicators on maritime careers, 23 on marine transportation and engineering, and 15 on maritime safety. Each indication was assessed on a five-point Likert scale, with interpretations and descriptions on the following page.

The results were interpreted as illustrated in the numerical scale that follows:

Numerical Scale	Verbal Interpretation
4.20 – 5.00	Leadership Level
3.40 – 4.19	Skill Level
2.60 – 3.39	Knowledge Level
1.80 – 2.59	Awareness Level
1.00 – 1.79	No Experience

15 Lawshe-trained educational and marine program experts verified the study instrument. Two MTI and three MARINA validators were used. Two MHEI validators and three private staffing businesses from the training and assessment departments were validated. Five doctoral dissertation panelists validated the tool. The instrument's finalization considered their expert judgments on the questions' applicability, difficulty, relevance, and ambiguity. Salkind (2010) defines content validity as how well the test items cover the entire domain. The material must be related to the assessed central concept to avoid research bias. The validators assessed how effectively a measure represents a concept. Each panelist received separate indication lists. Each component was rated as "essential," "helpful but not essential," or "not essential" for the idea. The researcher kept items with content validity ratios of 0.60 or above. After validating the questionnaire, Cronbach's Alpha Coefficient was used to verify its reliability (Fraenkel & Wallen, 2008). Southwestern

College of Maritime, Business, and Technology, Inc. (SCMBT) in Calapan, Oriental Mindoro, piloted the survey on 32 pre-baccalaureate maritime concentration students. The data-gathering device was reliable, with Cronbach's Alpha scores of 0.876 for the introduction to the maritime profession, 0.888 for marine transportation and engineering, and 0.868 for maritime safety.

Data Collection Two successive mixed-method periods gather data. In phase two, interviews and focus groups replaced surveys. Pre-baccalaureate marine specialized schools in Negros Occidental were requested to approve a letter. After clearance, a Google Forms survey was prepared. Survey Google Forms were generated. The gadget has clear instructions. Google's form defines the study's nature and objective. It also describes responders' roles, study risks, and advantages. Parents, guardians, and advisors gave consent to the research. Their privacy and information were protected. After addressing ethical problems, respondents had two weeks to complete the instrument.

Print and arrange Google forms for tabulation and presentation. Statistical software organized, counted, presented, coded, and analyzed survey results. The researcher began the second data-gathering phase after the quantitative phase.

Following approval, the schedule and procedure for data collection were set and arranged with the target participants. The interview was held with one administrator, faculty member, curriculum planner/designer, and program chair/coordinator to gather a range of information.

The conversations were recorded using a mobile phone app and note-taking. The following steps were observed in the conduct of the interview:

1. **Opening an interview.** The researcher introduced himself to the participants. He explained the nature and purpose of the study and the type of information to be elicited from them. He also gave the participants an information sheet to fill out and discussed issues on privacy and confidentiality.
2. **Collecting informed consent.** The researcher gave the participants an informed

consent form to read through and sign before the interview began.

3. **Starting with the basics.** The interview began with questions that sought fundamental background data to help establish rapport and create a comfortable environment for the subject. This involved asking the participants for information such as their name, position or designation, type of assignment, length of service with the institution, etc. This action made it easier for the participants and the researcher to communicate freely during the interview.
4. **Asking open-ended questions.** Questions were posed in an effort to elicit comments and spark discussion among the participants. Open-ended questions provided the participants additional time and room to express more specifics about their experiences as a designee, member of the faculty, or administrator. Before moving on to more difficult questions, the researcher started with those that were simpler to answer. Follow-up questions were asked to clarify vague or ambiguous responses and elicit more detailed or in-depth inquiries. Depending on the participant's reaction and the interview's direction, the researcher occasionally changed the protocol and rearranged the questions.
5. **Wrapping up.** The researcher expressed his thanks and appreciation to the participants and set a schedule for the second interview.

After two weeks, they separated the interviews. Every interview lasted 25–30 minutes. The interviews and focus group minutes were transcribed. The participants checked the replies. The researcher compiled and aggregated qualitative data after finishing the interview replies.

Findings rigor

This investigation also carefully evaluated Shenton's (2014) credibility, transferability, dependability, and confirmability difficulties in data collection, analysis, and interpretation. Member checks, the code-recode technique, gradual replication, thorough explanations,

and data verification and audit were the best ways to ensure the objectivity of conclusions.

As part of the institution, the researcher utilized bracketing to reduce preconceived beliefs and assumptions that may contaminate the investigation. Bracketing reduces unrecognized biases and improves research rigor (Tufford & Newman, 2012). Members' checks and rigorous participant selection ensured the validity of the results. Code recoding and data triangulation ensured reliability. Thick descriptions, data saturation, and continuous involvement with research participants ensured transferability. Data verification was done.

Data Analysis Procedure

Quantitative, qualitative, and mixed analyses occurred. Quantitative research uses descriptive and inferential statistics. Thematic analysis handled qualitative-descriptive data from in-depth interviews. The researcher analyzed quantitative and qualitative data to complete the picture of SHS students' competency. Sub-problem one examined the level of competence of SHS students enrolled in the pre-baccalaureate maritime specialization in the introduction to maritime careers, marine transportation, marine engineering, and maritime safety, grouped by school and preferred program. Means and standard deviations were used.

The mean is the findings' central tendency. The standard deviation measures a dataset's score dispersion (Sarantakos, 1998). All observations may be compared using the mean, which represents the average value. The standard deviation displays the distribution pattern, data point distance, and mean value. Mean and standard deviation provide an unbiased evaluation and comparison of subjective or evaluative data (Collins, 2017).

Sub-problem two used the Mann Whitney U exam to compare the competence of SHS students in the pre-baccalaureate marine specialty by school and desired program.

The Mann-Whitney U test compares two independent groups when observations are independent, and the dependent variable is ordinal or continuous but not normally distributed (Laerd Statistics, 2018). Thus, the researcher carefully studied the data's kind and typology

and used Wilk's test to assess its normality. The researcher used the test of difference to evaluate the data based on his data distribution assumptions. These results may be as essential as determining whether the populations vary or as sophisticated as defining group medians.

The data was interpreted using thematic analysis. The thematic analysis examines statements and groups them into themes that characterize the phenomena of interest. It classifies data and finds patterns. Interpretations illustrate facts and include numerous areas (Boyatzis, 1998). Thematic analysis techniques were as follows: The researcher studied the data. Being familiar with the transcripts, all data was gathered. Key themes were coded or highlighted. Phrases and sentences were labeled. The researcher found patterns after identifying themes. Patterns were identified. The researcher looked for parallelism and links. Finally, pattern-based conversations were produced.

Ethical Considerations

The researcher addressed justice and individual respect to ensure the study's ethical correctness—Social Value. The researcher anticipated this study would significantly impact the marine and educational sectors. Student competency may improve maritime administration. To compete globally, the Philippines must understand students' competency—informed Consent. The study's goal, protocol, and informed consent were clear. Privacy and confidentiality were addressed. Before taking the survey, participants gave informed permission.

Researchers' vulnerability. The researcher and counselors informed participants that they might stop submitting data at any point if they felt uncomfortable.

Transparency. Graduate school academic requirements required this research. The researcher must reveal and communicate the study's significant results to relevant stakeholders without causing any ethical or legal issues.

Maintain safety. The interview followed the Inter-Agency Task Force (IATF) safety regulations regarding face masks and social distancing. All study participants and researchers

were prescribed vaccines. A well-ventilated, open room hosted the interview.

Researcher qualifications. Due to his extensive experience supervising and teaching at MHEIs, MTIs, and Manning agencies, the researcher has helped this maritime business develop, expand, and improve. He educated business partners, seamen, and marine students about the sector.

Data management. The interview notes' physical copies were sealed and not shared. All digital versions were password-protected on a single hard drive. The data will be appropriately destroyed a year following the research.

Results and Discussion

Level of Competence of Senior High School Students in the Pre-baccalaureate Maritime Specialization

The study's first goal is to assess SHS students' pre-baccalaureate maritime specialization skills in introducing maritime careers, marine transportation, engineering, and maritime safety.

Table 2 illustrates respondents' confidence in starting a marine profession. In descending order, students perceived their competence to be at the leadership level in explaining the benefits of a shipping career ($M = 4.37$ $SD = 0.82$), describing the different types of ships ($M = 4.36$ $SD = 0.83$), and discussing the job position in terms of salary, incentives, and scope of work ($M = 4.30$ $SD = 0.82$). They also considered themselves leaders in discussing the overview of maritime-related conventions and their functions ($M = 4.25$, $SD = 0.82$), the category of ships according to the type of cargo carried ($M = 4.25$, $SD = 0.86$), the desirable practices in rendering duties and responsibilities ($M = 4.24$, $SD = 0.85$), the ship's organization by department ($M = 4.23$, $SD = 0.91$), and the undesirable practices ($M = 4.20$, $SD = 0.91$).

However, students perceived skill level competence in discussing other job opportunities in the merchant marine profession ($M = 4.17$, $SD = 0.88$), discussing national maritime legislation ($M = 4.10$, $SD = 0.88$), discussing the ship's nomenclature ($M = 4.08$, $SD = 0.95$), discussing the ship's dimensions ($M = 4.08$, $SD = 0.96$), discussing the charter party agreement ($M = 4.07$, $SD = 0.96$), differentiating the liner

from tramping services ($M = 4.03$, $SD = 0.99$), and discussing the BIMCO/IICS

Students' reported proficiency in marine profession introduction is skill level ($M = 4.18$, $SD = 0.75$). Pre-baccalaureate marine students understood and used the intended results in the maritime business. They may teach marine skills.

K-12 outcomes-based students are pre-baccalaureate marine students. The statistics showed the pupils were competent. The curriculum is focused on exit learning objectives (Davis, 2003). Reorganizing the curriculum, evaluation, and reporting systems to reflect high-order learning and training credits instead of low-order learning and mastery (Tucker, 2004) Other factors may affect their marine competency besides education and evaluation.

The STEM strand's pre-baccalaureate marine specialty is updated. This specialty replaced three STEM strand studies with six maritime-related subjects. Pre-baccalaureate marine Specialization encourages SHS graduates to study marine. This will help train more officer-level mariners (Mariana Academy of Maritime Studies, 2021).

According to the data, maritime education academics are developing good, empirically backed innovations to improve marine graduates' knowledge and abilities. Decatoria (2019) examined marine education as a cutting-edge solution. He proved that maritime training improves pre-baccalaureate maritime (PBM) students' talents and understanding. Lagajino et al. (2016) found that profiles, track awareness, and interpersonal and extrinsic motivation determine their pre-baccalaureate students' academic and career performance. Nazareno et al. (2021) also stated that students' high appreciation for the maritime vocation, work chances, perks, and incentives, including compensation and incentives, drives them to embrace the technicalities of the profession as early as feasible. These objectives also motivate students to learn about ship construction and life at sea. SHS students were well-versed in marine careers and their nature.

Table 3 shows that pre-baccalaureate maritime students had a skill level of competency in introduction to marine transportation and engineering ($M = 4.15$, $SD = 0.80$). They

received mean ratings for leadership skills in introducing marine transportation and engineering as a profession ($M = 4.40$, $SD = 0.75$), explaining the duties and responsibilities of a marine deck officer and marine engineer ($M = 4.34$, $SD = 0.83$), and discussing how a ship navigates the vast ocean using terrestrial ($M = 4.28$, $SD = 0.90$), shipboard communication ($M = 4.22$, $SD = 0.88$), and basic marine mechanical propulsion ($M = 4.21$, $SD = 0.93$), and They were proficient in the remaining maritime transportation and engineering goods.

SHS students' perceived expertise in marine transportation and safety is due to the curriculum's excellent delivery. Teachers' ingenuity and innovation help Negros Occidental's SHS marine program succeed despite a constantly changing curriculum and few learning resources. Interviews suggested the outcomes were due to the instructor. According to Du et al. (2019), students' intrinsic motivation moderated the association between creativity-fostering teacher conduct and creative success. The authors noted that pupils who are receptive to learning are more motivated, creative, and academically successful. Creativity is often a sign of educational success, especially in technical programs. To encourage student creativity, instructors must be creative and original. Innovative learning situations, curriculum localization, and contextualized learning tools are examples. This two-way innovation in teaching and learning will help students succeed in higher education (Terkowsky et al., 2016).

Results showed pupils' marine safety proficiency. Maritime safety (MARSAF) prevents unnecessary loss of life and property at sea. Every vessel leaving the port must undergo a more thorough Mandatory Pre-departure Inspection, which includes checking safety regulations and stopping it from sailing if it doesn't, conducting random emergency readiness evaluations and operational readiness evaluations in ports, conducting routine vessel safety inspections, publishing Notice to Mariners (NOTAM), and other accident prevention measures (Philippine Coast Guard, 2022).

Given this, maritime schools stress marine safety for SHS students interested in nautical careers. The marine industry is worried about

humans. To be productive and efficient, the global marine sector needs well-trained and educated people, according to Cunningham (2015). A sustainable industry will arise from addressing human concerns using practical methods. Secondary marine education and training is an option.

Education, regardless of its severity, is the best way to handle human competency and devotional difficulties. The International Maritime Organization (IMO) has focused on recruiting, retaining, and training competent sailors (IMO, 2013). To foster a successful, strong, and substantial economic sector that attracts talented people. If marine advancement is desired, early education and training are crucial. Cunningham (2015) concluded that secondary maritime education and training are relevant and have been found to be a necessary paradigm shift for a global industry to create awareness, educate people worldwide, produce high-quality professionals, and, most importantly, balance the supply and demand for competent mariners.

School A and B pupils usually have marine skills. The mean showed that students' assessed ability in marine safety introduction differs greatly per school. School A's mean perceived competence is skill level ($M = 4.25$, $SD = 0.08$), whereas School B's is leadership level ($M = 4.16$, $SD = 0.10$). The research shows that both maritime senior high schools enhance their students' professional abilities to operate as seafarers as needed by the STCW 78 agreement, as revised, and that classroom learning is vital. The findings demonstrate that students may enroll in BSMT or BSMar-E at their preferred MHEIs.

The pre-baccalaureate maritime SHS had leadership competency (mean = 4.21, $SD = 0.71$). School A pupils (mean = 4.25, $SD = 0.66$) thought they were leaders compared to their peers. School B pupils (mean = 4.16, $SD = 0.78$) felt competent. The favored programs BSMT and BSMar-E showed leadership-level ability.

Sarinas (2019) found that students in Grades 11 and 12 and BSMT 1 to 3 marine at JBLFMU-Arevalo had strong 21st-century learning capabilities in 2017–2018. The results demonstrated that students used personal and social responsibility, communication, critical

thinking, daily decision-making, problem-solving, and cooperation. In addition to technical talents, they showed teamwork, communication, negotiation, conflict resolution, and management skills (Rajendra, Michael, & Takeshi, 2011).

According to the STCW 78 agreement, both maritime senior high schools developed their pupils' professional abilities to operate as seafarers. Pre-maritime schools must follow the criteria. Marinov, Maglić, & Bukša (2015) claim that most nations that dispatch seafarers to the free market have a rather consistent seafarer competency norm. Academic courses must teach future seafarers' vital information and abilities. The STCW Convention requires Maritime Education and Training (MET) institutes to base their courses on the MET method.

The data also suggests that students might enroll in BSMT or BSMar-E at their preferred MHEIs. Expert sailors are in demand. In this research, pre-baccalaureate maritime students thought they were qualified for college marine courses. Competence is the ability to apply applicable knowledge and abilities to project success (Sankar, 2021).

Test of Difference in the Level of Competence of Pre-Baccalaureate Maritime Senior High School Students when Grouped and Compared According to Variables

The second major objective of the study was to see whether pre-maritime students' assessed competence differed by school and program. Tables 6 and 7 show the results.

Table 6 demonstrates that the evaluated competence levels of pre-baccalaureate marine senior high school students did not vary by school ($p = 0.57$). In particular, students in Schools A and B did not differ in their evaluated level of proficiency in Introduction to Maritime Safety ($p = 0.96$), Marine Transportation and Engineering ($p = 0.76$), and Maritime Safety ($p = 0.926$). The findings showed that Schools A

and B introduced students to safety requirements in the modified Section A-VI/1 of the 1978 requirements for Training, Certification, and watchkeeping. The null hypothesis that pre-maritime students' assessed competence does not vary by school was accepted.

Schools A and B seem to provide equivalent SHS marine specialties. They provided the SHS marine specialty with materials and staff. Instructional management, physical resources, and teacher preparation may affect student learning (Digolo, 2003). These elements of the school environment may affect students' perceived competence and performance (Mayama, 2012).

Lumuli (2009) says kids learn at school. Classrooms, laboratories, libraries, playgrounds, and textbooks make up the learning environment. Suitable learning facilities, including equipment and human resources, boost students' abilities and make learning enjoyable.

High-quality training requires knowledgeable professors, according to Kasem (2015). Organization, administration, and academic assistance are also important. Lynch (2015) believes that good teachers improve schools. Teacher professional development programs may affect a school's effectiveness and students' learning and competency development. To ensure students obtain the required skills, schools must provide challenging and engaging learning programs (Department of Education and Training Beta Website, 2022).

While schools may differ in faculty profiles and learning resources and facilities, the current results suggest analogous norms or criteria for preparing teachers to teach maritime subjects in the SHS and providing students with the necessary tools and facilities. The SHS student's self-assessed competency was similar to the other schools, suggesting that both schools follow their regulations and instructional activities.

Table 1. Test of Difference in Level of Competence of Pre-Baccalaureate Maritime Senior High School Students, when Grouped According to School Enrolled

	School Enrolled In											
	Introduction to Maritime Career			Introduction to Transportation and Engineering			Introduction to Maritime Safety			Over-all		
	Mann-Whitney U			Mann-Whitney U			Mann-Whitney U			Mann-Whitney U		
School	Mean Rank	u	p	Mean Rank	u	p	Mean Rank	u	p	Mean Rank	u	p
School A	95.16	4393	0.99	96.08	4297	0.76	98.94	3996	0.26	97.01	4199	0.57
School B	94.80	400	0.66	93.65	400	0.66	90.08	400	0.26	92.49	400	0.57

Table 7 shows that when pre-baccalaureate marine senior high school students were classified by the desired program, their rated competence did not vary ($u = 3805.00, p = 0.78$). In particular, Introduction to Maritime Transportation and Engineering ($u = 3762.00, p = 0.68$), Introduction to Maritime Career ($u = 3811.50, p = 0.79$), and Introduction to Maritime Safety ($u = 3820.00, p = 0.81$) had p-values over 0.05. The null hypothesis was accepted.

The EU received the Philippine Maritime Industry Authority's (MARINA) report on

conformity with the International Convention on Standards of Training, Certification, and Watchkeeping (STCW) and a commitment to do more to uphold the convention's obligations (MARINA, 2018). Marine career schools must follow worldwide maritime standards. Creating a policy or standard is tedious and bureaucratic. Policies help educational institutions do their jobs properly and responsibly. Guidelines improve workflow. It also ensures almost the same software implementation.

Table 2. Test of Difference in the Level of Competence of Pre-Baccalaureate Maritime Senior High School Students when Grouped According to Preferred Program

	Preferred Program											
	Introduction to Maritime Career			Introduction to Transportation and Engineering			Introduction to Maritime Safety			Over-all		
	Mann-Whitney U			Mann-Whitney U			Mann-Whitney U			Mann-Whitney U		
Preferred program	Mean Rank	u	p	Mean Rank	u	p	Mean Rank	u	p	Mean Rank	u	p
BSMT	94.28	381	0.79	93.89	3762	0.68	94.34	3820	0.81	94.23	3805	0.78
BSMar-E	96.52	350	0.60	97.33	350	0.60	96.38	350	0.60	96.61	350	0.60

Qualitative Analyses and Interpretations

Phase two of the study outlines the implementation of the SHS pre-baccalaureate program in Basic Education. Four main topics emerged from the data acquired during the interview with the participants. These involve building up system norms and support, curriculum implementation, performing assessments, and preserving and extending the drive for excellence. They make up the aspects that offer a very high rating of SHS skills in the assessed areas.

Setting up system norms and support

Adhering to rules and norms. The Department of Education, in conjunction with the STCW Office of the Maritime Industry Authority (MARINA), created the concept and specifications of the improved basic education curriculum guiding the pre-baccalaureate maritime program for SHS. They supplied the groundwork for producing the certification created and organized based on the International Maritime Organization (IMO) course format and is needed by the 1978 Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW). To give prospective seafarers with excellent education and the services they need to satisfy STCW or ILO criteria quickly and effectively, maritime education institutes are regarded crucial training grounds for seafarers.

The joint DepEd Memorandum and STCW Circular No. 1, series of 2016, specify that the MARINA and the DepEd together, or the DepEd singularly, shall adopt and distribute new issuances, advisories, and communications. This includes, but is not limited to, standards, criteria, and indicators for assessing school applications as well as for monitoring and evaluating schools' initial implementation of the SHS Maritime Program (DepEd-MARINA, 2016). It could be deduced from the participants' comments that the schools were correctly educated on the specified rules and policies for the pre-baccalaureate marine program. The DepEd and MARINA handed forth the mandated curriculum detailing the skills to be cultivated among MSHSs. Subsequently, the schools established a planned and implementable curriculum following DepEd and MARINA criteria. They ensured

that the MSHSs learned, developed, and had the core, common, and core capabilities they should have in accordance with industry standards.

In conformity with the DepEd and MARINA guidelines, the schools established it as part of their rules. Compliance with the standards is specified as an optimal way to attain the desired results for the program. From a business standpoint, norms may be considered an extra management tool for a firm. It is a guiding hand for an administration that leads the expansion of the company's economic operations on a safe path (Amann & Lethielleux, 2005). In this sense, standards would operate as a type of compass for firms, leading them toward possibilities that are also legally possible (Arciniegas, 2019).

In this research, the schools built up norms that encouraged administrators to align priorities and execute programs according to the standards. The standards helped the instructors pick relevant material and adopt appropriate procedures for teaching. The schools' policies did not vary from the required criteria of the DepEd and MARINA. They were well aware that non-compliance with the requirements would have major ramifications.

The Philippines must adhere to the STCW's mandatory conditions, according to the Department of Labor and Employment (DOLE) (2012). If not, the EU's blocklisting of Filipino sailors may force it to be removed from the list of conforming governments and have a detrimental effect on its economy. Such blocklisting would limit Filipino sailors from joining boats flying the flag of European Union (EU) members, which would significantly affect their job. According to statistics from the Bangko Sentral ng Pilipinas, Filipino sailors operating aboard vessels carrying the flags of EU countries remitted roughly USD 700 million in 2011. Given this, the harmonization of the educational programs with reasonable standards, as stipulated by the IMO STCW Convention and its Manila Amendments 2010, ensures the survival of maritime educational institutions and their competitiveness in the international market, thus ensuring the competitiveness of the seafarers as well (Castells, Xavier Martinez de Osés, Lapa, & Nikoli, 2017).

Providing instructional materials and facilities the participating schools utilized technology to their advantage to allow high-quality hybrid learning even while the educational environment altered. It was evident that attempts were being made to strengthen their learning system to stay creative and committed to their promise of excellence in maritime education and training.

Nautical schools are particularly developed to provide the finest environment for students focusing on nautical topics. Their investment in their learning facilities and resources suggests that there is a solid system in place to encourage learning. The research of Hidayati (2020) reveals that the aspects connected to curriculum design, training, and education have the most value when signs of facility support are present. Learning resources, such as equipment and facilities, are important for improving maritime-related competencies through education and training. Also, the maritime education and training (MET) sector is altering as a consequence of the growth of digital technologies, including artificial intelligence (AI), augmented reality (AR), and virtual reality (VR). Since physical limits no longer restrict them, MET schools have more resources to be adaptive and inventive in teaching pupils (Loh, 2022).

Monitoring. The schools have a method to keep track of how the program was implemented. The progress of the pupils and the instructors' activities was adequately monitored. Consequently, they had the possibility to collect information and feedback, which they utilized as the foundation for implementing the required curricular modifications. Problems and reasonable concerns were publicly stated and swiftly handled.

The DepEd and MARINA work collaboratively to monitor the SHS maritime specialization in conformance with the principles and procedures specified in the joint Memorandum Circular No. 1, Series of 2016. All public and private schools seeking to teach SHS Maritime Specializations are expected to follow the conditions of this memo circular. The monitoring activity shall take into consideration all relevant provisions under the 1978 STCW Convention Code, as updated, as well as any current

DepEd policies, standards, and recommendations (MARINA, 2016).

Accordingly, the participating schools displayed a monitoring system in implementing the curriculum and competence training for students to guarantee compliance with the pre-defined regulations, guidelines, and standards provided by authorized organizations. The monitoring comprised the curriculum, facilities, and student's growth in the required skills. Feedback was also considered in the process of changing and enhancing the curriculum.

Schools are now obligated to ensure the quality of the services supplied and continually explore strategies to improve. Schools must take part in numerous quality control procedures, such as the monitoring process to acquire data from a consolidated source to analyze performance. Monitoring reveals faults and gives chances for development and advancement. It helps schools learn from their failures and adapt them to practice and policy.

Forging partnerships. The institutes of marine higher education developed partnerships to cooperate and share resources to boost learning. As a consequence of their joint resource sharing, the program was reinforced. Resources were utilized more efficiently. Goals and courses were better matched. Such relationships helped enhance and benefit the schools providing pre-maritime programs, resulting in the successful development of capabilities among the SHS students.

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Strong connections or affiliations between two or more schools or between schools and organizations are referred to as school partnerships. These partnerships, whether official or informal, benefit all educational settings by enabling them to exchange resources, knowledge, and information to enhance student learning outcomes.

Curriculum Implementation

The institutions under study implemented sound practices and procedures in curriculum implementation to guarantee adherence to the policies, standards, and guidelines (PSG) of the Bachelor of Science in Marine Transportation (BSMT) and Bachelor of Science in Marine Engineering (BSMar-E) jointly set by the DepEd and MARINA. Such included guaranteeing proficiency levels, implementing simulator-based learning, inciting greater commitment from marine educators, developing a student-centered atmosphere, utilizing innovative tactics, supporting contextualized teaching and learning, and educating the students' 21st-century abilities. These approaches resulted in the careful supervision of the student's competence training. The students were the major concern in putting the curriculum into effect. The instructor employed innovative and novel techniques to apply concepts, developed a good learning atmosphere, and used actual situations in teaching. A lot of focus was put on teaching 21st-century skills.

Implementation of K-12 programs targeted at generating better-educated pupils with core skills for work and lifelong learning. Because students could master their talents and gain the fundamental competencies necessary to fulfill the demands of the global market, this curriculum facilitated the mutual recognition of Filipino learners and professionals in other countries.

In Maritime, this permits SHS graduates in the designated specialty to sit the test for rating certification. After graduation and assessment, individuals might seek career opportunities in the marine industry. Graduates of SHS may also continue their studies in the marine industry. This will help the country produce more seafarers at the officer level.

Ensuring Competency level. Competencies became key considerations for preparing students with the information, abilities, and attitudes that they would need to effectively manage their own journeys in learning, living, and working as marines. Accordingly, the schools guaranteed that the pre-defined objectives outlining the needed abilities for pre-maritime pupils were achieved.

It has been concluded that the relevance of MET at the secondary level is essential to heighten awareness and reduce the trends and challenges caused by the philosophical and sociological changes experienced in society and the marine sector. The human element must be adequately taught and educated if the global marine sector is to be productive and efficient. In light of this, the International Maritime Organization (IMO) has given the necessity for qualified seafarers to be recruited, kept, and trained major attention (MARINA, 2013).

In this sense, early education and training are crucial to promoting a successful, strong, and substantial industry that attracts the sort of talent required to grow the sector. Some in the industry have deemed secondary marine education and training vital. Various existing and projected issues affecting the industry are addressed in maritime circles as a positive and possibly game-changing approach. Given this, it is viewed as crucial to guarantee proficiency among SHS students (Cunningham, 2015).

Adoption of simulator-based learning. The abilities necessary in the actual world are taught to learners via simulation training. It provides a realistic point-of-care learning environment. In light of this, a large percentage of maritime education and training (MET) was carried out utilizing navigation simulators. As a consequence, trainees may acquire realistic experience before operating an actual vessel.

Simulators have been extensively employed in the marine sector as training aids, and they are now vital instruments for enhancing and increasing sailors' knowledge and skill sets. Maritime simulators are frequently utilized in various countries for training and assessment reasons (Maung, 2019). In this circumstance, it may be considered that simulators are a fantastic tool to display and evaluate seafarers' skills in line with convention.

Instigating higher dedication from maritime teachers the teachers are firmly devoted to guiding the pupils through the marine curriculum. They employed a student-centered teaching environment to engage the kids and help them gain competence in the area. This instructional technique in implementing the pre-baccalaureate marine curriculum benefited the students in acquiring abilities essential for the

program and lifetime skills, such as collaboration, presentation, and decision-making and problem-solving abilities.

Creating a student-centered atmosphere, the instructors employed a student-centered teaching environment to involve learners in gaining competence in the area. This instructional technique in implementing the pre-baccalaureate marine curriculum benefited the students in acquiring abilities essential for the program and lifetime skills, such as collaboration, presentation, and decision-making and problem-solving abilities.

A general expression describing an educational system in which students are autonomous, self-directed learners is "student-centered learning." Students are completely focused on the topic at hand in this vibrant setting, which is fascinating and stimulating. Educators are adopting tactics that foster students' independence, and these strategies have proven to be beneficial in establishing an atmosphere of engagement for all kinds of learners (Goldman, 2017). Another key feature of student-centered learning environments is that students' academic development is based on the proof of mastery or competence of stated criteria. Every learner grows at a different pace, as they all learn differently. Each student may develop toward competency along their own track and at their own pace with the support of a predetermined level of anticipated performance. Student-centered learning is aimed at competency-based progress (Michigan Virtual Learning Research Institute, 2019).

Employing inventive tactics. Professors' and students' academic lives increasingly depend on digital platforms and resources. The interviewers stated that their schools supplied students with online learning tools in this context. This inventive approach of the instructors effectively expanded students' access to education and information while providing them with the mentality and abilities required to build the needed competencies.

Innovative and inventive online teaching strategies may boost student involvement. The contemporary online learning environment, often known as e-learning, demands that faculty permit a secure, nonjudgmental setting. This innovative method creates the space for ideas,

opinions, and personal and professional experiences to keep students mindfully engaged and motivated while dispensing essential course information (Sharoff, 2019). In this research, the instructors presented an educator-facilitated active, student-centered learning process in which students are held accountable for their active engagement and self-directed learning while keeping a facilitator role to advance learning and improve the educational process.

Promoting contextualized teaching and learning Context matters. Students' motivation and engagement could grow when they comprehend the value of their academic knowledge and talents through studying in context. Students may be prepared for a seamless transition from senior high school and higher study to the job by acquiring experience in the working world. Given this, the instructors guaranteed that the student's area of interest—concrete applications in a specific context—was the main focus of teaching and learning. Simply put, they transmitted the curriculum to the kids in context, integrating the concepts into relevant exercises and situations that made sense to the pupils to boost their understanding and make the ideas more accessible.

Context matters. Due to learning in context, students may become more motivated and engaged when they perceive the usefulness of their academic abilities and knowledge. Gaining experience in the workplace may help students be ready for a seamless transition from senior high school and further education to the workforce (Sharabidze & Dolidze, 2021). Using contextual learning approaches, instructors may better prepare their students to handle the difficulties they confront on the job. This is more successful than educating in the theoretical or abstract realm. Teachers may deliver information prepared with a company-specific environment in mind since the contextual learning technique focuses on genuine experience (Labiste, 2019).

Teaching pupils 21st-century skills the talents of the twenty-first century may be employed everywhere to enhance the way learners realize, think, work, and live. The abilities include critical thinking and reasoning, creative thinking, problem-solving, metacognition,

collaboration, communication, and global citizenship. The interviews highlighted the necessity of the indicated abilities for maritime students to get a job and flourish in the future.

The notion of lifelong learning is clear; however, it incorporates a vast variety of activities. While learning is usually required or driven by compliance, a lifetime learner goes much beyond the basic educational requirements to embrace the concepts of lifelong learning (Sogor, 2021). The benefits of constant engagement, active endeavors to learn something new, and professional and corporate operations are not the only places where lifelong learning and active learning pursuits are useful.

The State University of New York's Marine College highlighted efforts as an educational institution to prepare students and faculty for the future by concentrating more closely on the distinctive 21st-century skills and traits essential for the marine industry. Among the tactics employed to achieve this were a solid technical background, opportunities for practical learning, and leadership development. Students majoring in marine may prepare for the future by honing these leadership skills that will benefit society—continuously acquiring 21st-century skills while being engaged and motivated lifelong learners will benefit professional sustainability and adaptability for the benefit of both the individual and industry (Sogor, 2021).

Conducting assessment

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Sustaining and furthering the strive for excellence.

The marine sector requires competent and effective human resource management for continuity and sustainability. While academic degrees are essential in this business field, they are inadequate. A seafarer needs to have the core skills and character qualities that will allow them to carry out their responsibilities efficiently. Working toward this goal, the participants remarked on the necessity to enhance the certification and training of maritime educators and comply with accreditation criteria. Along with curriculum improvement, they listed benchmarking, feedback, and the implementation of curriculum review and innovation as some of their best practices. To better prepare students for employment in the maritime sector, they looked at strategies to strengthen onboard familiarization, improve language abilities, and inculcate a strong sense of self-discipline and financial literacy.

Capacitating teachers. The marine sector is a dynamic industry. It is continually changing and adapting to fit the needs of the business market and enhance its efficiency and competitiveness. It is a big and complicated industry that is continually touched by international

trends and breakthroughs in technology, materials, and fuels. Additionally, the marine company has tight requirements for operations and training. Due to these considerations, maritime instructors must hold the relevant abilities and certifications.

Maritime trainers help in the effective transmission of the talents and knowledge essential for safe operations. Considering this, the respondents acknowledged the observation of severe criteria and procedures in certifying teachers in the pre-baccalaureate BSMT and BSMar-E programs. Additionally, the teachers undergo continual training and retraining to guarantee their effectiveness and relevance in the field.

In MET, it is understood that the vocational system's major goal is to enhance competence based on information gathered over the training time on the ship (Stan & Buzbuchi, 2012). As a consequence, it calls for teachers and trainers who are highly qualified and trained for the role. Semjonovs's research (2015) shows that marine educators trained in-house should be well-versed in the field. For modern teaching, they must possess the appropriate abilities and knowledge (Lauritzen, Andersen, Secher, Olsen, & Ostergaard, 2014).

To strive toward this goal, the schools must have facilities for the continuous training of the teachers. Through continuing education and professional development, teachers may establish or acquire instructional approaches, expand their knowledge, update their skills, and polish their talents (Fresno Pacific University Staff, 2018).

Conducting curricular review and innovation. The participants considered that the process of curriculum evaluation and improvement was a useful growth process for the pre-baccalaureate marine program. The study tackles both internal and external curriculum alignment and delivers evidence-based information on which to make curricular and policy recommendations. It is envisaged that this in-depth examination of the curriculum will serve as a platform for future curricular changes and improvements.

As a consequence of the fast change in society and technology, there is a need for a curric-

ulum revision for the marine program. According to the Philippines Education Reform Act, the quality of Filipino graduates should be assessed in a way comparable to that of their counterparts in regional and worldwide job marketplaces and educational prospects. Therefore, to ensure a smooth transition with the least disruption from the current changes, the Maritime Educational Institutions must evaluate their current educational setup and consider any necessary changes to their general education curriculum, admission policy, and faculty status (Gruspe-Taberdo, 2017).

Benchmarking and feedback Benchmarking and feedback may help a school gauge its progress by comparing its metrics and processes with those of other MHEIs. Using this method may bring various benefits, including greater efficacy and value. Additionally, this will help schools highlight their weak spots and keep pace with other MHEIs in terms of development and accomplishment. The panelists underlined that a school may design a strategy to enhance performance and grasp possibilities by benchmarking and collecting feedback.

Moreover, the schools may also approve the construction of feedback systems—information systems outside of schools that offer them private facts on their performance and serve as a platform for school self-evaluation. Visscher and Coe (2003) underlined that these instructional strategies are now extensively employed internationally. They are driven by a desire to maintain and raise the level of education in schools and are the outcome of a belief in the transforming power of feedback.

Enhancing language proficiency. The STCW 2010 mandates that students possess adequate written and verbal English understanding in order to explain charts, marine distributions, meteorological data, messages pertaining to ship security and operation, and adequate communication skills with other ships and shore stations (Khosiyono, Pardjono, & Priyana, 2021). On this point, the interviewers thought it vital for pupils to develop their language competence.

The respondents believed in the necessity of establishing English proficiency among the SHS students focused on the nautical curriculum. Relative to this, James et al. (2018)

acknowledged English as the language franca of the sea. All maritime-based professionals are obliged to employ the English proficiency standard, which has turned into a critical instrument for maintaining safety on land, at sea, and in any other maritime-connected organization (Sia & Said, 2018). Successful linguistic feedback to seafarers is vital for the marine industry to promote human communication and decrease the hazards brought on by inefficient language usage (Tenieshvili, 2013). A single language everyone on board a vessel can understand and communicate in is vital in an industry with a substantial worldwide presence.

Infusing financial literacy, the respondents also stated that most sailors lack financial literacy, and they advised introducing a course to assist students in becoming more financially educated and having the confidence to make informed financial choices.

It is vital to educate individuals on economic and financial matters and help them acquire the information, talents, attitudes, and values required to make smart choices. People who are sufficiently knowledgeable about financial affairs can adjust quickly to shifting situations and won't run into difficulties when making plans (Ozdemir, Burku, Uyanik, & Gülden, 2021).

There are so many benefits and rewards to working at sea. However, the sad fact of the marine business is that once seafarers' contracts with employers' end, they no longer enjoy the benefits they had been receiving. Even though the maritime industry delivers some of the best compensation to its personnel, the mass of Filipino seafarers—more than 50%—do not enjoy happy, comfortable lives and even end up penniless after retirement owing to a lack of financial preparation (Depasupil, 2023).

Financially literate people grasp core financial notions and may employ such talents in their own lives. Every element of one's life is touched by financial literacy. The sooner children comprehend these notions, the better, even if their families don't place great importance on financial literacy. Financial illiteracy could ultimately result in difficulties like irresponsible spending and excessive debt. These lessons will, in principle, set the younger generation on a road to strong financial health

since it's more difficult to unlearn bad habits than to acquire good ones (Camberato, 2022).

Teaching discipline. The interviewers stressed the need to educate pre-baccalaureate marine student's good discipline. They explained how pupils develop proper actions and unlearn unsuitable ones with the instructors' assistance, guidance, and advice. For them, teaching discipline means creating boundaries, specifying tasks, obligations, and expectations, as well as building a predictable, ordered, and stable existence.

Discipline shapes the students' competencies, as shown by the respondents in the qualitative portion of the research. To answer this demand, Jobert Reyes, chief of the Aurora Provincial Prosecutor's Office, indicated his support for making the ROTC once again a requirement for students in Grades 11 and 12. He claimed that physical training and exercises, in addition to lectures, can successfully teach young minds discipline (De Asis, 2019).

Discipline may affect a seafarer's academic and professional performance. One of the critical requirements of the Philippines is a well-functioning Philippine merchant marine capable of operating as a navy and military auxiliary in times of war and national emergency (RA 1407: Philippine Overseas Shipping Act of 1955). The chairman of Barangay Reserva, Michael Valenzuela, remarked in a Philippine News Agency report that the ROTC program is crucial to the kids' formative years. The ROTC will transform learners into disciplined and law-abiding citizens who preserve the nation's sovereignty against foreign assault and maintain the Constitution (De Asis, 2019). In compliance with Section 11 of R.A. 9993, some maritime senior high schools now employ the services of the Philippine Coast Guard. Section 11 of R.A. 9993 specifies that the PCG shall promote marine community ties through the National Service Training Program (NSTP) and Youth Development. Its Implementing Rules and Regulations specifically stipulate that the PCG must establish the NSTP Curriculum in connection with the PCG's Function and incorporate Risk Reduction and Management Awareness, Environmental Awareness, and Leadership.

Converged Quantitative and Qualitative Analyses and Interpretations

The present circumstances put the nation's maritime sector in jeopardy. Only 20% of graduates from the country's huge privately owned seafarer training sector—which generates 25,000–30,000 graduates annually—make it to the open sea and work aboard foreign ships. There is also the constant EU threat that if maritime schools do not satisfy the set safety criteria, the country's seafarers would be expelled from the EU (Garcia, 2021). Many marine schools around the country would have to shut their doors if the advised corrective measures were not carefully addressed. Countries must reach or exceed the minimal standards of the Convention for seafarer training, certification, and watchkeeping (IMO, 2019). To survive, maritime schools must either shape out or shape up their maritime training to fulfill STCW (Standards of Training, Certification, and Watchkeeping) criteria.

Grounded in the previous scenario, the present research emphasizes the capability of pre-baccalaureate marine. It specifically looked at the students' proficiency levels and the chances of success in their chosen vocations. It also looked deeper into current management and implementation methods for the program, which showed how the SHS students' competence came about. One fact that jumps out is how effectively the instructions are given and how well the essential government entities monitoring them impact students' progress in the pre-baccalaureate marine profession.

The Pre-Baccalaureate Maritime Specialization is a modified version of the Academic Track's Science, Technology, Engineering, and Mathematics (STEM) strand. This program was established to encourage SHS graduates to continue marine education. The country will create more officer-level mariners via this curriculum (Mariana Academy of Maritime Studies, 2021).

The quantitative analyses resolved that the pre-baccalaureate students perceived their competence in the areas of Introduction to Maritime Career ($M = 4.18$, $SD = 0.75$), Introduction to Marine Transportation and Marine Engineering ($M = 4.15$, $SD = 0.80$), and Introduction to Maritime Safety ($M = 4.30$, $SD = 0.75$)

to be at the skill and leadership levels. Interpretively, the SHS students considered they had improved knowledge, skills, attitudes, and work values in accordance with industry standards that would qualify them to pursue a bachelor's degree in marine engineering or marine transportation in college. Moreover, the inferential analysis revealed that no significant difference existed in students' assessed level of competence when classified and compared according to school enrolled in ($p = 0.57$) and desired program ($p = 0.78$).

The attainment of favorable findings in the survey may be accounted for by the schools' best practices in promoting the quest for excellence. To ensure the successful delivery of the pre-baccalaureate maritime program, the schools set up system norms and support, implemented the curriculum as prescribed by the government and its authorized agencies, conducted assessments, and considered efforts to sustain and further the effort to comply with the global standards. The delivery of the pre-baccalaureate marine curriculum in the study's participating schools was assisted by the interconnection of these parts of school educational practice.

Setting up system norms and support created a supportive school culture and learning environment that included visible leadership support in adhering to policies and standards, educating teachers, equipping them with the necessary resources, fostering partnerships, and providing tools and facilities. To effectively attain the program's targeted goals, teachers and students were encouraged by such exceptional practice to give it their all.

In curriculum implementation, the schools guaranteed respect for the principles, standards, and guidelines jointly set by the DepEd and MARINA. They developed explicit principles and processes for applying the program. These included ensuring a certain level of competency, implementing simulator-based learning, encouraging deeper commitment from maritime instructors, fostering a student-centered environment, utilizing innovative strategies, encouraging contextualized teaching and learning, and instilling 21st-century skills in the students. These approaches led to the successful competence training of the SHS

students. The construction of a supportive learning environment and the use of innovative teaching further improved the successful delivery of the curriculum.

The partnership between the DepEd and MARINA to design the maritime specialty in SHS was called for owing to the increased demand for seafarers in the local and worldwide maritime industry (MARINA, 2016). Consultations with various national government agencies and stakeholders were done to establish an effective and enhanced basic education curriculum for the program. Consequently, a contextualized, global, learner-centered, and responsive curriculum for the pre-baccalaureate program was established and put forth for compliance by the schools.

Regarding the conduct of assessment, schools employed reliable formative and summative, conventional, and genuine assessment methodologies. The desired results were accurately assessed using validated equipment and according to the stated mechanics and operating procedures. It allows instructors to assess the abilities that are missing, evaluate students' learning and skills more objectively, provide them with constructive criticism, and alter their teaching tactics in light of the results.

Assessments made it easy for both the teacher and the student to monitor how effectively the learning goals were being completed and identify remedial concerns. According to Tosuncuoglu (2018), evaluation plays a significant role in teaching and learning. It links with the curriculum and educational techniques. As a constant component of education, it guides the student's next steps and activities and helps measure progress and successes according to the curricular goals. For classroom assessments, instructors apply a number of methods and strategies that they then customize to match the needs of different pupils. Without it, it would be impossible for instructors and students to assert whether or not the desired aims or anticipated results were accomplished.

To continue and advance the efforts, the participants considered that the schools were required to strengthen the certification and training of maritime teachers and adhere to accreditation requirements in order to ensure continuity and sustainability. In addition to

curriculum improvement, schools must be able to integrate data from benchmarking, feedback, and curriculum evaluations.

Additionally, the participants highlighted the need to increase onboard familiarization and the significance of the certificate of competence as an addition to the present method of curriculum implementation. On top of these factors, SHS students also need to enhance their language ability, cultivate self-discipline, and gain financial literacy information. These recommended methods indicate improving contextualized learning and building 21st century skills among SHS students.

Through contextualized learning, SHS students may become actively engaged in their education. This helps students make sense of the content they are learning. Contextualized education integrates the acquisition of fundamental skills with academic or vocational information by focusing teaching and learning on practical applications in a specific context that is relevant to the learner.

Concerning establishing 21st-century talents among SHS students, a Forbes writer underlined four important, generally applicable, and transferable competencies across a number of professional domains and vocations. These include critical thinking, collaboration, creativity, and communication abilities (Quast, 2014). Asking questions, maintaining training and certifications current with technological advancements, and encouraging seafarers to use technical knowledge in real-life applications are vital for professional progress at all career levels. However, these behaviors are not and should not be confined to in-person teaching. Mariners may keep their distinctive values by participating in lifelong learning in a changing culture.

The simulacrum that follows reflects the essential principles underlying the students' growth of skill and leadership levels of competence in the pre-baccalaureate curriculum of the schools studied.

This examination of SHS students' competence examined senior high schools' pre-baccalaureate program best practices. Schools with marine programs might use quantitative and qualitative studies to develop programs.

The LEAD paradigm addresses system norms and support, curriculum implementation, evaluation, and maintaining and improving the pre-baccalaureate marine program. Participants desired practices shaped the LEAD framework's four consecutive stages.

Define goals, objectives, and outcomes to start the program. Education's goal is to provide pupils with 21st-century skills. Thus, DepEd and MARINA's laws, standards, and recommendations clearly state the pre-baccalaureate maritime program's educational objectives. Institutional standards and support make the Policies, Standards, and Guidelines (PSG) fully implementable for school system assimilation.

In the Leadership Obstacle Course Model for program implementation, the foundation is "initiation". To execute the program, the school administration must win over instructors, staff, students, and academic community members. School staff must understand the program's reasoning, validity, advantages, and logic to support it. For everyone to understand and accept the rules, laws, and policies, they must be set. This stage evaluates the school's existing and future physical and human resources to maximize cooperation, contribution, and adjustment. A core management role is creating one or more comprehensive plans to balance needs and resources.

The second step, integrating the PSG into school norms and practices, involves adopting them into educational standards. The DepEd and MARINA PSG form the institutional vision, purpose, and operations. The environment, resources, and stakeholders are considered. Planning, organization, and resource allocation may be included to ensure success. Administration, academics, employees, students, and industry partners prioritized PSG compliance. Mezieobi (1993), Bediako (2019). This phase involves simply implementing a mutually agreed-upon strategy, decision, proposal, concept, or policy, according to Mezieobi (1993). Curriculum implementation requires coordinated support for teachers to ensure that the new curriculum and best practices are applied in the classroom.

The third part, acting/carrying out the program, involves school and classroom implementation. The school may monitor, get feedback, and identify program issues in addition to

implementing them. If activities vary from goals, immediate adjustments may be made.

The fourth part, outcomes, compares results to SHS marine specialized program outcomes. Students' knowledge, skills, and values related to educational and practical experiences are assessed. The assessment findings guide practice changes. They are fixing issues. The program's short- and long-term benefits are assessed using reliable methodologies. This face covers content relevance, instructional and training methodologies, appropriateness and responsiveness of educational/training materials and resources, and training quality. Thus, the program's benefits and drawbacks are addressed. This milestone may motivate program delivery quality improvement.

Assessment may help program administrators improve quality and student outcomes (Ward et al., 2018). Program assessment answers basic performance questions and may improve program delivery and implementation. Schools may identify curricular areas that must be updated and altered to satisfy learners' requirements and industry standards.

The LEAD paradigm's arrow from results to foundation shows a cycle. It sees a continuous process, not a tail-end one. This model element defines excellence. The pre-baccalaureate marine program must be regularly watched, verified, analyzed, and updated when new knowledge, technology, worldwide needs, and industry requirements emerge.

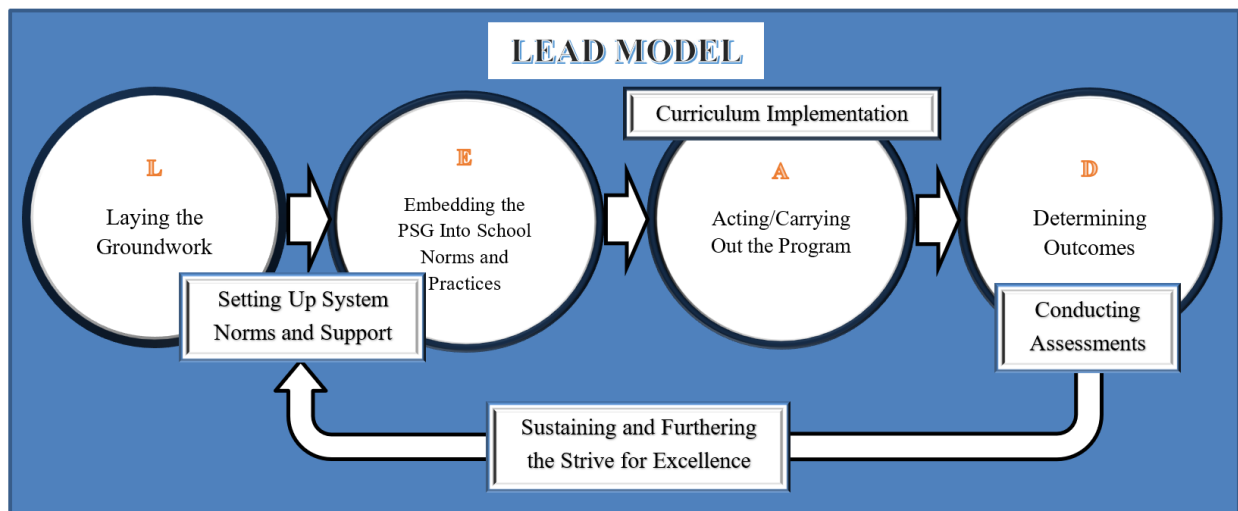


Figure 8. LEAD Model for Program Implementation of Pre-Baccalaureate Maritime Program

Summary

The global shipping business provides an interesting and rewarding career opportunity with a broad international perspective. While sailing is still an interesting and fulfilling vocation, students who are interested in pursuing a career in the maritime business must have the essential skills and resilience to face the obstacles at sea. On this foundation, the sailors' future success rests on their maritime education and training. The current paper focused on determining the level of competence of pre-baccalaureate maritime students in the areas of introduction to maritime careers, introduction to marine transportation and engineering, and

introduction to maritime safety with reference to the school they are enrolled in and their preferred program. It also did a more extensive analysis of the schools' norms, regulations, and practices that explained students' learned skills in the assessed areas. The nature of the study's difficulties prompted the adoption of a sequential mixed-methods approach.

In the quantitative phase (phase one), the researcher employed a validated and reliability-tested instrument for data gathering with 199 SHS students, representing 266 pre-baccalaureate marine students at the two schools studied. The data acquired were submitted to statistical analysis using the mean, standard

deviation, and Mann-Whitney U test. In the qualitative phase, the researcher utilized the interview approach, employing semi-structured questions. The questions were mostly based on the conclusions gathered from the study's first results. The participants for the interview were one Co-Author of the Maritime Specialization K-12 Basic Education Curriculum, an administrator, the principal, a maritime teacher, and the coordinator representing the two schools included in the research. To develop the research rigor, bracketing, member checking, cautious participant selection, code-recode technique, data triangulation, a protracted interview, and data checking were rigorously followed. The researcher also addressed the data in light of existing theories and concepts. The explication process of the qualitative data followed five steps: familiarizing the data, coding, discovering patterns, analyzing patterns, and discussing.

Findings

The significant findings of the study are summarized as follows:

Overall, the pre-baccalaureate maritime students perceived level of competence is at the skill level. More specifically, their competence in introduction to maritime careers and introduction to marine transportation and engineering is at skill level. On the other hand, they reflected leadership skills in the introduction to maritime safety.

There was no significant difference in the pre-baccalaureate maritime students' perceived level of competence when grouped and compared according to the school they were enrolled in and their preferred program.

The schools demonstrated ideal practices along with setting up system norms and support, curriculum implementation, the conduct of assessments, and sustaining and continuing to strive for excellence.

The schools' ideal practices evolved to form a new paradigm for implementing pre-baccalaureate marine programs known as LEAD: laying the groundwork (PSG), Embedding the PSG into the school norms and practices, acting on or carrying out the program, and Determining Outcomes.

Conclusion

Pre-baccalaureate maritime students in schools in Negros Occidental benefited from their institutions adhering to and complying with the policies, standards, and directives established by the DepEd and MARINA in terms of learning and developing skills that would prepare them to pursue maritime careers in college. This assertion is supported by their high level of competence in the introduction to maritime careers, the introduction to marine transportation and engineering, and the introduction to maritime safety. The descriptions and narratives of the school standards and best practices for program execution are consistent with the students' self-assessed competencies. The school they are enrolled in and their preferred program do not significantly affect the students' perceived competencies in the assessed areas. This result shows that SHS schools, regardless of their standing and ability to supply the required logistics, are equally competent in giving their students pre-baccalaureate training for marine careers.

Setting up system norms and support can create a supportive school culture and learning environment. This environment includes visible leadership support in adhering to policies and standards, educating teachers, providing them with the necessary tools and resources, and fostering partnerships. Instructors and students are motivated by such excellent practice to give it their all to attain the program's targeted outcomes effectively. Guaranteeing competency levels, implementing cutting-edge technology, motivating instructors to commit, creating a student-centered environment, utilizing creative strategies, contextualizing learning, and emphasizing developing 21st-century skills among SHS students are all components of effective curriculum implementation.

Moreover, the assessment method can aid in diagnosing issues, gauging the achievement of pre-defined objectives, identifying program implementation's strengths and weaknesses, and planning the next stages. Using several assessment tools and methodologies may help schools and instructors better understand how students are advancing their competencies in preparation for a maritime career.

Finally, striving for excellence demands sustained and continuous efforts from schools. It entails curriculum review and innovation, submission to accreditation, benchmarking, utilization of feedback and evaluation results, and identifying areas where students can improve further. This aspiration will result in SHS students' high esteem and competitive edge in entering the maritime profession.

Recommendation

The study results showed that pre-baccalaureate marine students had a high level of competency, which may be attributed to the best practices of the institutions they are now enrolled in. In this respect, the suggested solutions focus on the areas where schools might make additional improvements to gain a competitive edge.

The DepEd-MARINA officials may review the existing policies, standards, and guidelines governing SHS offering the pre-baccalaureate program to see if they are still relevant or aligned with the global standards. Efforts to review the pre-baccalaureate curriculum for maritime specialization may be instigated to check its relevance and responsiveness to the educational needs of SHS students and the demands of the global maritime industry. They may also look into the capacity of these schools and benevolently assist them in terms of the logistics needed for delivering the program.

Schools that provide pre-baccalaureate marine programs may use reliable evaluation techniques to pinpoint additional areas and components of students' competencies that need to be strengthened. Written and performance-based assessments can be used to get a more thorough, objective, and accurate assessment of their acquired skills.

The administrators and officials may provide effective leadership and a supportive working and learning environment for their teachers, staff, and students. They may adopt budgetary plans and policies that give teachers professional development, student competence training, and benchmarking top priority. Additionally, they may forge strong partnerships with allied schools and other agencies for sharing expertise and resources that would

strengthen the offering of the pre-baccalaureate maritime program for SHS. They may also adopt the LEAD model for program implementation and the enhancement program resulting from this study.

Curriculum planners may re-visit the existing pre-baccalaureate maritime specialization and consider increasing the students' exposure to onboard familiarization as part of the Certificate of Proficiency (COP) requirement, the inclusion of financial literacy subjects, and mandatory ROTC training.

Teachers may continually utilize assessment data to closely monitor students' competency development and compare it with the pre-defined outcomes for immediate intervention or remediation in case they fall short of the standards. They may actively partake in the curriculum review and development process, being the best persons to evaluate the learners' needs, interests, and capabilities.

The curriculum planners and designers and the members of the Standard of Training Certification and Watchkeeping-Research and Development Division may consider the increased exposure for onboard familiarization, the requisite for the certificate of proficiency, and the inclusion of English language proficiency and financial literacy in the improved curriculum for pre-baccalaureate maritime students.

The students may constantly desire to improve their abilities in their chosen program, self-assess their competencies, and voluntarily submit to the school's competence assessment to offer information that would help intensify the efforts to satisfy the program's requirements.

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