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## Research Article

### **Toward Competent Graduates: A Systems – Level Review of PNTC Colleges’ Summative Assessment Framework**

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#### **ABSTRACT**

Maritime Higher Education Institutions maintain strong summative assessment systems to ensure graduates possess competencies required. This study conducted a systems-level review of PNTC Colleges’ summative assessment framework for its Bachelor of Science in Marine Transportation program to determine the extent of alignment with Regulatory Driven Assessment Framework, examine operational practices by faculty and assessors, identify implementation challenges, and develop recommendations for strengthening graduate competencies. A qualitative descriptive design was employed. Document trailing using a protocol with a four-point alignment scale applied to three courses, while semi-structured interviews were conducted with institutional leaders, assessors, faculty, and administration representative. Thematic analysis was used to interpret data. Findings showed that the framework is Substantially Aligned. Approved practical assessments and grading achieved full alignment, minor gaps in the table of specification of formative and summative assessments within a single document and physical and digital archiving of assessment evidence. Operationalization reflects a clear preparation, validation, and approval process, mapping of competencies, simulator-based scenarios that test adaptability, standardized rubrics, pre-and post-assessment calibration, and continuous improvement through item analysis. Key challenges include large class sizes and simulator availability, documentation and grading that reduce time for students, and difficulties in applying uniform competency across learners. The study concludes that PNTC Colleges has developed clear and effective summative assessment system supporting competency verification. Targeted improvements in tool design, record-keeping protocols, validator participation, and technology-enabled documentation are needed to ensure competent graduates. These insights contribute to quality assurance in maritime education and provide model for other institutions undergoing regulatory transitions.

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## **Introduction**

The competence of maritime graduates is determined not just by the curriculum they have completed nor the hours they spend in training, but by the accuracy and reliability of the assessment framework that certifies their readiness (Tei, 2015). For Maritime Higher Education Institutions (MHEIs), having a good Assessment Framework in place influences the performance of the institution. This framework strengthens graduate competency and enhances overall quality of Maritime Education and Training programs. This alignment also facilitates institutional compliance with international regulatory standards, particularly the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978, as amended. Studies across MHEIs repeatedly shows that institutions with fully aligned, and thoroughly enforced assessment frameworks consistently produce graduates who are excelling in licensure examinations, cadets passing shipping company interviews and secure first embarkations onboard and satisfy various internal and external audits (Navarro et al., 2015; Macapaz, 2020; Palatino, 2023; Santos & Reyes, 2024). Despite ongoing revisions to international standards like the Convention on Standards of Training, Certification and Watchkeeping (STCW), as amended, and as well as other standards, persistent challenges in competency-based assessment such as inconsistent application of rubrics, low faculty and student awareness, among others, continue to undermine the quality of Maritime Education and Training (MET) worldwide (Child & Shaw, 2023; Garay-Rondero & Issa-Zadeh, 2025; Sutrisno & Wijaya, 2023). These issues are being seen in the simulator-based exercises, where subjective evaluations often prevail over objective, formative methods, leading to adaptability in seafarer preparedness (Mori, et al 2025).

In the Philippines, such gaps have prompted continuous regulatory reforms to align the Maritime Education and Training (MET) with STCW requirements, through the Regulatory Driven Assessment Framework,

which was updated from the previous series of Joint CHED MARINA Memorandum Circulars and Advisories. The Policies, Standards, and Guidelines (PSGs) and some Annexes of these standards establish the assessment framework as the main institutional mechanism to ensure authentic, and evidence-based verification of STCW-required knowledge, understanding, and proficiency (CHED-MARINA, 2023). In PNTC Colleges, assessment reforms have been introduced as a response to regulatory directives. Currently, the institution has two (2) types of assessments, the Formative Assessment and the Summative Assessment. The Formative Assessment is the parameter that the students were able to meet the required Learning Outcome/s (LO) respectively. The Summative Assessment is an assessment that measures how well the learners meet the required Course Outcome/s (CO) for the course that is being given after all the LO under that CO have meet.

While studies such as Tisoy (2025) have evaluated student competencies and the application of assessment practices in other Philippine MHEIs within the context of the Joint CHED-MARINA Memorandum Circular No. 1, s. 2023, and international research has examined curricular and assessment factors in maritime simulator-based education (Karahalil et al., 2024). However, there were no published comprehensive systems-level review whether the institution’s entire assessment framework and quality assurance practices fully comply with the Regulatory Driven Assessment Framework to ensure graduate competence.

This study conducted a systems-level review of the summative assessment framework of PNTC Colleges to determine the extent of its alignment with the Regulatory Driven Assessment Framework. This focused on the BSMT program through three (3) courses namely Ship Handling and Manoeuvring, Deck Watchkeeping with Bridge Resource Management, and Voyage Planning. This study generated actionable recommendations that strengthen the summative assessment system of PNTC Colleges to ensure that every graduate is

demonstrably competent. Finally, this study contributes to institutional quality, supporting the Philippines’ position as the world’s leading supplier of highly skilled maritime officers. Likewise, this directly supports the United Nations Sustainable Development Goal 4 (Quality Education), specifically Target 4.7, which emphasizes education for sustainable development and global citizenship, including competencies for maritime safety and environmental protection.

## **Materials and Methods**

### *Research Design*

This study used a qualitative descriptive research design as this provided understanding of the extent of alignment of the PNTC Colleges Summative Assessment Framework with the competency-based standards in the Regulatory Driven Assessment Framework, operationalization and its challenges in the competency-based and outcomes-based education. This was done through document review of the extent of alignment of the institution’s summative assessment framework with the regulatory standards and interview of participants.

The variables of this study were the extent of alignment of PNTC Colleges’ Summative Assessment Framework with the competency-based standards in the Regulatory Driven Assessment Framework, the operationalization of competency-based and outcomes-driven assessment by faculty members and assessors, and the challenges encountered by faculty members and assessors in operationalizing competency-based and outcomes-driven assessment.

### *Study Participants and Sampling*

The participants in the study were from PNTC Colleges and the MARINA. The participants from the PNTC Colleges consisted of the following: 1) Eight (8) faculty members teaching the core courses of the Bachelor of Science in Marine Transportation (BSMT) program; 2) Assessment Team member from BSMT; 3) Department Head of BSMT and 4) the Dean of the College of Maritime Education. In addition, there was one (1) participant from the Accreditation Division of STCW Office, MARINA.

Purposive sampling was employed for the faculty members as front liners for the instructions and assessments, based on their experience in teaching and assessing the students for at least one year (started on or before Academic Year 2024 – 2025). The Dean of the College of Maritime Education was included because they have complete knowledge of the overall Assessment Framework of the College. Program Head for BSMT was included being in-charge of program offering and have knowledge of technical specific insights into curriculum implementation and assessment practices. The Assessment Unit Member for BSMT program was also considered for their participation in the preparation and revision phases of the summative assessment. The MARINA representative for the purpose of additional knowledge in inspection and accreditation standards from the Administration perspective.

### *Data Collection Instruments*

This study utilized six (6) researcher-made instruments: one (1) documentary review tool and five (5) sets of semi-structured interview guides. They were specifically designed to conduct systems-level review of PNTC Colleges’ summative assessment framework that determined its alignment with the requirements of the Regulatory Driven Assessment Framework.

For the documentary review and operationalization components, the Document Trailing Protocol in operationalizing competency-based and outcomes-driven assessment, a detailed audit-trailing template was used for the three (3) randomly selected courses from the Bachelor of Science in Marine Transportation (BSMT) program (Appendix D1) to get the extent of alignment of PNTC Colleges’ Summative Assessment Framework with the competency-based standards in the Regulatory Driven Assessment Framework.

To determine the operationalization of competency-based and outcomes-driven assessment by faculty members and assessors, and the challenges encountered by faculty members and assessors in operationalizing competency-based and outcomes-driven assessment, five (5) semi-structured interview

guides were crafted to capture various institutional perspectives while maintaining comparability of technical themes. These are: (1) Interview Guide for the Representative of the Maritime Industry Authority (MARINA) with four (4) technical questions with follow up questions each (2) Interview Guide for the Dean of the College of Maritime Education with six (6) technical questions; (3) Interview Guide for Program Head of BSMT with four (4) technical questions; (4) Interview Guide questionnaire for the Member of the Assessment Unit which was composed of six (6) technical questions; (5) Interview Guide for Faculty Members which composed of four (4) core questions.

#### *Validation of Instruments*

To establish validity of the instruments, these were subjected to content validation. Three research experts were asked to validate all the research instruments: (1) a research and Maritime Education and Training (MET) expert who holds a PhD degree and a Maritime Education and Training Standards Supervisor of the STCW Office of the Maritime Industry Authority (MARINA); (2) a MET and research expert who holds a PhD degree and the current Dean for the College of Maritime Education in the University of Perpetual Help System Laguna; and (3) a MET and research expert, a member of the Technical Committee of the Commission on Higher Education (CHED) and also the Associate Vice President for the Post Graduate Studies under the Centre for Advanced Maritime Studies (CAMS) of the Maritime Academy of Asia and the Pacific (MAAP). The validation sheet was sent together with all the research instruments to the validators.

Content validation was performed and the expert validation sheet determined whether the instruments met the objectives required for this study with the space for their comments and suggestions which. After validation, comments and suggestions were integrated and the Expert Validation Sheet and questionnaires were finalized.

#### *Data Gathering Procedure*

This part discusses the chronological process followed for obtaining data from the participants as well as in the document review.

Before any document review and interviews were conducted in the PNTC Colleges, a letter was sent to the College Dean and the Vice President for Academic Affairs requesting permission to conduct research in the College of Maritime Education (CME).

Most participants opted for a face-to-face interview. However, there were participants who opted for online interview and others chose written interview due to their location, outside Cavite province, and very tight schedule. Participants were provided with the Informed Consent Form either in person or electronically.

All participants were interviewed separately according to their availability and convenience. The interview guide was sent to the participants’ email address, social media account or hard copy for them to have an advance review of the questions. For those who opted for an online interview, the researcher utilized the Zoom meeting application and provided the participants with a meeting link for the scheduled time of the interview. On the other hand, those who opted for a face-to-face interview, the researcher set a meeting with them in a private and quiet room inside PNTC Colleges. Those who opted for the answers to be written, they were given two days to complete the questionnaire and sent their answered questionnaire electronically or personally. With the permission from the participants, the online interviews were recorded using the Zoom application. An audio recorder was used for those face-to-face interviews.

#### *Data Analysis*

Document review data were analyzed using directed content analysis (Hsieh & Shannon, 2005) guided by the pre-defined categories and four-point alignment scale in the Document Trailing Protocol. This approach allowed systematic comparison of institutional practices against the requirements of the Regulatory Driven Assessment Framework while identifying gaps.

Interview data were analyzed using thematic analysis following the six-phase process described by Braun and Clarke (2006): (1) familiarization with the data through repeated reading of transcripts; (2) generation of initial

codes; (3) searching for themes; (4) reviewing themes; (5) defining and naming themes; and (6) producing the report with supporting quotations. Coding was both inductive (data-driven) and deductive (guided by the research questions and the seven-step Systems-Level Review Process). The seven-step process structured the overall analysis as follows: Step 1 was define the regulatory standards for summative assessment in the Regulatory Driven Assessment Framework; Step 2 was map the current PNTC Colleges summative assessment system using the Document Trailing Protocol; Step 3 to establish systems-level indicators and complete alignment scoring; Step 4 to conduct gap analysis against regulatory standards; Step 5 to perform stakeholder interviews and apply thematic analysis; Step 6 was to conduct cause analysis linking findings to participant roles and institutional impact; and Step 7 was to synthesize findings to generate evidence-based recommendations.

Triangulation was achieved by cross-referencing document trailing scores with interview themes and by comparing perspectives across different stakeholder groups (Administrations, institutional leadership, assessment unit, and faculty). Member checking was not performed; however, verbatim quotations were used to ensure transparency and trustworthiness of the thematic findings.

### *Ethical Considerations*

This study strictly complied with the ethical standards in the conduct of academic research. Prior to data collection, approval was secured first from the ethics review committee to ensure that the study complied with established ethical standards. Participants were informed about the objectives and scope of the study, and their voluntary participation was emphasized. A signed Informed Consent Form (Appendix A) was required. They were advised and assured that they could withdraw from this study at any point without any penalty or negative consequences.

Data privacy was implemented in strict compliance with Republic Act No. 10173 (Data Privacy Act of 2012). To keep anonymity of participants, no identifying information was linked to individual responses in any report,

presentation, or publication of the study results.

Interview audio recordings and written answers for transcription and analysis purposes, and other files were stored securely and accessible only to the researcher. The data was kept strictly confidential and used for purposes of the study only. These assurances were clearly communicated and agreed upon by participants through the signed Informed Consent Form prior the data collection.

To ensure the academic integrity of the study, all sources of information were appropriately cited and acknowledged through in-text citations and included in the reference list. The final manuscript was subjected to plagiarism check using Turnitin to ensure that the work is original and free from academic dishonesty. The similarity index record was 17% and AI of 0%.

### **Result and Discussion**

This chapter presents the results gathered through a document review and an interview. They are presented according to the statement of the problem.

#### ***Profile of the Participants***

The profile of the participants includes their age range, position, number of years in Maritime Education and Training, and highest educational attainment as indicated in Table 1. There were 12 interview participants: 11 from PNTC Colleges and 1 from the Maritime Industry Authority (MARINA). To maintain anonymity of their identity, the researcher utilized a code for each participant.

M1 is a seasoned professional with 10–12 years of experience in Maritime Education and Training (MET) and serving as an Inspector/Evaluator in the Accreditation Division of MARINA, inspecting Maritime Training Institutions (MTIs), Assessment Centers (ACs) and Maritime Higher Education Institutions (MHEIs). M1 holds a master’s degree.

D1 is the Dean of College of Maritime Education of PNTC Colleges. He is one of the most experienced participants with over 13 years in MET (since 2011) and has a Master of Science degree. DH1 is the Department Head for BSMT program of the PNTC Colleges; DH1 has 4–6

years of experience in MET. AU1 represented the assessment side of the institution. AU1 is the youngest respondent belonging in the 24–30 age bracket, possessing 4–6 years of experience and holds a bachelor’s degree.

The faculty participants show a significant age range and academic preparation. F1 and F2 are the senior members of the group, all aged 61 and above. F4 and F6 are in the 51–60 age bracket, both relatively new with 0-3 years in

MET and holding master’s units. In addition to these faculty members, F5, F7, and F10 fall within the 41–50 age range; F7 has 4–6 years of experience, while F5 and F10 are newer with 0–3 years experience, and all three are currently pursuing their master’s program. Finally, F9 is the younger faculty member falling between the 31–40 age group and holds a bachelor’s degree and has 0–3 years in the field.

**Table 1**

*Profile of the Participants*

Participant	Age	Position	No. of years in MET	Highest Educational Attainment
M1	31 - 40 years old	Inspector & Evaluator, MARINA	10 - 12 years	Master's Degree
D1		Dean, CME	13 + years	
DH1	31 - 40 years old	Department Head, BSMT	4 - 6 years	Master's Degree
AU1		Assessment Unit MT	4 - 6 years	
F1	41 - 50 years old	Faculty member, CME	7 - 9 years	Master's Units
F2		Faculty member, CME	0 - 3 years	Bachelor's Degree
F4	24 - 30 years old	Faculty member, CME	0 - 3 years	Bachelor's Degree
F5		Faculty member, CME	0 - 3 years	Bachelor's Degree
F6	61 years old	Faculty member, CME	0 - 3 years	Bachelor's Degree
F7	up	Faculty member, CME	4 - 6 years	Master's Units
F9	61 years old	Faculty member, CME	0 - 3 years	Master's Units
F10	up	Faculty member, CME	0 - 3 years	Master's Units
	51 - 60 years old			Master's Units
	41 - 50 years old			Master's Units
	51 - 60 years old			Master's Units
	41 - 50 years old			Bachelor's Degree
	31 - 40 years old			Master's Units
	41 - 50 years old			
<b>Total</b>	12 Participants			

**Extent of Alignment of PNTC Colleges Summative Assessment Framework**

The evaluation of the PNTC Colleges summative assessment framework against the Regulatory Driven Assessment Framework was conducted through a document review using a “Document Trailing Protocol in Operationalizing competency-based and outcomes-driven

assessment” (Systems-Level Audit Trailing) of three (3) randomly selected professional courses in the BSMT program. These courses are Ship Handling and Maneuvering, Deck Watchkeeping with Bridge Resource Management and Voyage Planning. A four-point scale was used to measure the extent of alignment of the three courses’ summative assessment.

The Document Trailing contains the detailed 19-item protocols. However, only five (5) items are applicable for the Summative Assessment namely the Table of Specifications for Psychomotor Assessments, Preparation, Validation, and Approval for Practical Assessments/COAs, Approved Practical Assessments, Evidence of Conduct of Practical Assessments/COAs, and Grading of Summative

Assessment Evidence for Ship Handling and Maneuvering, Deck Watchkeeping with Bridge Resource Management and Voyage Planning. The results of the document trailing are shown in Table 2. All summative assessments across the three courses received a mean score of 3.4 “Substantially Aligned” which means “Policy is documented and implemented, but minor gaps exist in digital/physical archiving.”

**Table 2.**

*Alignment Scores for Summative Assessment of Selected BSMT Courses*

No.	Evidence	SEA 305a	WKD 201a	NAV 307	Interpretation
11	TOS for Psychomotor Assessments	3	3	3	Substantially Aligned
15	Preparation, Validation, and Approval (PVA) for Practical Assessments/COAs	3	3	3	Substantially Aligned
16	Approved Practical Assessments/COAs	4	4	4	Fully Aligned
17	Evidence of Conduct of Practical Assessments/COAs	3	3	3	Substantially Aligned
19	Grading of Summative Assessment Evidence	4	4	4	Fully Aligned
<b>Mean Score</b>		<b>3.40</b>	<b>3.40</b>	<b>3.40</b>	<b>Subs. Aligned</b>

The scale used in Table 2 is based on the Data Analysis, and numbers were based on the 19 – item protocol. Furthermore, the researcher observed the common behaviour on how each of the evidence were created, executed and filed since these evidence were handled only by the BSMT Department of the College of Maritime Education, and this created a similar score across these three (3) courses. The researcher checked the following evidences for the Laboratory Summative Assessment:

*Table of Specifications (TOS) for Psychomotor Assessments*

All the TOS for Psychomotor of these courses were checked or verified. This item received a score of 3 (Substantially Aligned) for all courses which indicated that all Table of Specifications for psychomotor assessments are in place and aligned with the Course Outcomes and Learning Outcome. However, the Practical Exercises and Course Outcomes

Assessments were consolidated within a single TOS document. This arrangement creates minor gaps in clearly distinguishing the purpose and evidence requirements of formative and summative practical tools. Creating separate TOS for Practical Exercises and Practical Assessments/COAs respectively would improve the coherence of the assessment structure, in line with the concept of constructive alignment (Biggs, 1996).

*Preparation, Validation, and Approval (PVA) for PAs/ COAs*

All the PVAs for the PA/COAs were checked and this part was rated 3 (Substantially Aligned) in all courses. It was found that the required PVA was conducted before implementing Summative Assessment. Nevertheless, the validation process was conducted by only one assessor. It should be noted that it does not affect the legitimacy of the instruments themselves, but the wider participation of more

assessors in this process will increase the credibility of summative assessments.

*Approved Practical Assessments/COAs*

All approved PA/COAs used in all three courses achieved a score of 4 (Fully Aligned). These documents have always been available and easy to access within the official Course Packages, College of Maritime Education central files, and the Learning Management System (LMS). All Summative Assessments conducted were made in the TOA format, which included rubrics and comments sections. It is indicative of high institutional control over the final versions of summative assessment tools that can be implemented uniformly and audited externally.

*Evidence of Conduct of Practical Assessments/COAs*

All the physical evidence of all the PAs/COAs recently conducted in the three courses were checked and verified, and this item scored only 3 (Substantially Aligned) across the three courses. The evidence of conduct of Practical Assessment indicates that the faculty ensures that proper records of the conduct of the PA/COA are kept, including completed checklists and rubrics, among others. Nonetheless, small lapses have been noted in the physical storage of such records at the close of each semester. Effective measures should be put in place to enhance the archiving process, which is necessary for the continuity of record keeping for summative assessment purposes (Santos & Reyes, 2024).

*Grading of Summative Assessment Evidence*

All three courses received a score of 4 (Fully Aligned). From specimen samples, it was

proven that all records of Practical Assessments/COAs were graded according to the rubrics in the TOAs and similar grades were recorded in the Class Records allotted for the PA/COA. In addition, it was noted that the Grading System in the Laboratory is only divided into two (2) parts: The Formative Assessment/Practical Exercise and the Summative Assessment, which is more simplified than that of the Lecture. This shows a clear traceability of the assessment process to institutional documentation, which is critical for confirming whether students indeed meet the necessary STCW competencies (Macapaz, 2020).

**Operationalization of Competency-Based and Outcomes-Driven Summative Assessment at PNTC Colleges**

PNTC Colleges summative assessment operationalization is seen to be a key link between Regulatory Driven Assessment Framework and STCW Convention on one hand and classroom/laboratory/simulator training on the other hand. This was evidenced through interview responses obtained from M1, D1, DH1, DH2, AU1, and F1 to F10 and through the physical evidence indicated in the Document Trail-ing Protocol.

Table 3 presents the thematic evidence illustrating how faculty members and assessors at PNTC Colleges operationalize competency-based and outcomes-driven summative assessment in daily practice. These themes demonstrate a quality assurance system grounded in constructive alignment (Biggs, 1996; Biggs & Tang, 2011), Miller’s Pyramid of clinical competence (Miller, 1990), and an emphasis on the “P” (Proficiency) of STCW Knowledge, Understanding, and Proficiency (KUPs).

**Table 3**

*Themes on the Operationalization of Competency-Based and Outcomes-Driven Summative Assessment at PNTC Colleges*

<b>Themes</b>	<b>Data Source (Source and Narratives)</b>
Structured Multi-Stage Preparation, Validation, and Approval (PVA) Process for Assessment Tools	AU1: “First are initial drafting and development by a designated assessor/s by mapping out STCW outcomes through analysis, clear performance criteria, rubrics and Table of Specifications. Second is by internal review and verification by Department Head and/or Dean... Third is pilot testing... Fourth comes formal internal approval... Lastly

authorization for implementation that is still subject for monitoring and possible improvement to maintain STCW compliance.”

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Systematic Alignment of Assessments to STCW KUPs, Program Outcomes, and Course Specifications through Mapping

AU1: Uses STCW Competence Map to give specific KUPs from STCW Tables into the courses, Curriculum Map to show Program Outcomes addressed to specific courses, and Course Specifications to state the competences, KUPs, Performance Criteria, and Course Outcomes.

DH1: Regularly monitor and review assessments within Program Outcomes to ensure full alignment with stated course outcomes, KUPs, and requirements reflected in the Table of Outcomes Assessment / TOS and the assessment

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Design of Authentic, Performance-Based, and Scenario-Driven Assessments to Verify Demonstrated Proficiency

AU1: Select assessment tools (demonstrations, simulator activities, checklists) after analyzing whether activities fall under which Proficiency in the STCW Tables, ensure clear performance criteria and authentic simulation or scenarios that may happen onboard.

F5: Design simulator-based assessments (e.g., Officer of the Watch in congested waters) and introduces controlled complications (reduced visibility, equipment malfunction, complex traffic) to test adaptation and real-time decision-making. “Students who rely on memorization tend to follow procedures rigidly and struggle when conditions change. In contrast, competent students demonstrate situational awareness, sound judgment, and the ability to justify their decisions.”

F7: Design scenarios that require troubleshooting, problem-solving, and team communication based on the Course Outcomes. They distinguish students who merely memorize steps from those who demonstrate critical thinking, explain rationale, adapt to unexpected situations, and show professional confidence.

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Application of Rubrics, Performance Standards, and Standardization for Consistent and Objective Judgment

DH1: All assessments must pass through the Preparation, Validation and Approval process. Assessors are being monitored every assessment to ensure they strictly follow the guidelines stated in the rubrics and in the TOA.

D1: “We standardized assessments. Instructors teaching the same course use the same materials and same assessments. This ensures consistency regardless of which class or instructor the student has.”

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Pre-Assessment Calibration and Continuous Monitoring during Implementation

AU1: Conducts Pre-Assessment Briefing before practical assessments. Uses rubrics in grading with documentation, and Post-Grading Reviews. Monitors assessors to ensure they strictly follow rubric guidelines.

	DH1: Monitors formative and summative assessments “not just through the documents, but also by visual and actual” observation to ensure alignment with STCW competence and KUPs in the Table of Outcomes Assessment.
Post-Assessment Review, Item Analysis, and Continuous Improvement Mechanisms	<p>DH1: Conducts item analysis after every assessment “to check each item if they are bound to retain, revise or replace by another question or gauge.”</p> <p>AU1: Item Analysis results are used to make required modifications. Post-implementation monitoring and continuous review are maintained to ensure ongoing STCW compliance and improvement.</p> <p>Faculty (F5, F7): Use structured debriefing and student reflection after simulator exercises to evaluate KUP achievement and inform future assessment design and feedback.</p>

The Table 3 presents the different themes for the Operationalization of Competency-Based and Outcomes-Driven Summative Assessment at PNTC Colleges which are Structured Multi-Stage Preparation, Validation, and Approval (PVA) Process for Assessment Tools, Systematic Alignment of Assessments to STCW KUPs, Program Outcomes, and Course Specifications through Mapping, Design of Authentic, Performance-Based, and Scenario-Driven Assessments to Verify Demonstrated Proficiency, Application of Rubrics, Performance Standards, and Standardization for Consistent and Objective Judgment, Pre-Assessment Calibration and Continuous Monitoring during Implementation, and the Post-Assessment Review, Item Analysis, and Continuous Improvement Mechanisms

*Structured Multi-Stage Preparation, Validation, and Approval (PVA) Process for Assessment Tools*

This gives emphasis to the institution’s strong assessment lifecycle for all assessment. As detailed by AU1, every tool undergoes sequential stages namely initial drafting and development by designated assessors through STCW outcome mapping, performance criteria, rubrics, and TOS. Next is the internal review and verification by the Department Head and/or Dean, pilot testing as applicable, internal approval, and authorization for

implementation, which this process remains subject to continuous monitoring and improvement. This process helps ensure that alignment between STCW KUPs and course outcomes is considered right from the very early stages of tool development, thus conforming to the constructive alignment approach advocated by Biggs (1996) and giving the procedures required for assessment practice consistency.

*Systematic Alignment of Assessments to STCW KUPs, Program Outcomes, and Course Specifications through Mapping*

Continuous assessment systems were also highlighted by the participants. For instance, AU1 pointed out that the STCW Competence and Course Specifications are employed to turn specified competencies into KUPs and performance criteria as well as course outcomes. Moreover, DH1 and DH2 stressed continuous monitoring at the level of the entire program to make sure that tests in the TOA and TOS are always aligned with the course outcome and KUPs.

*Design of Authentic, Performance-Based, and Scenario-Driven Assessments to Verify Demonstrated Proficiency*

The theme provides insight into how the PNTC Colleges approach the upper “Shows How” level of Miller’s (1990) Pyramid. AU1 stated that the assessment tools and checklists

are chosen based on the analysis of the STCW KUP requirements for Proficiency and provide the performance criteria as well as authentic situations as they would be encountered aboard a ship. F5 demonstrated these using simulators in conducting assessments involving simulated difficulties such as poor visibility and heavy traffic in assessing how students adapt to the situation, make appropriate decisions, and communicate. In similar ways, F7 mentioned situations wherein students had to solve problems and communicate within their teams.

*Application of Rubrics, Performance Standards, and Standardization for Consistent and Objective Judgment*

According to DH1, all tests should have the process of PVA and assessors are observed during the process of administration to ensure compliance with guidelines according to TOA. D1 discussed the standardization at the institutional level, where he said, “Instructors teaching the same course using the same material and the same assessment ensures uniformity regardless of class or instructor chosen by the student.”

*Pre-Assessment Calibration and Continuous Monitoring during Implementation*

This theme ensures reliability between designed tools and actual administration. AU1 described structured briefings conducted in accordance with the TOA, uniform scoring protocols for performance-based work, and post-grading reviews to examine scoring practices. DH1 added that monitoring occurs “not just through the documents, but also by visual and actual” observation to verify ongoing alignment with STCW competencies and KUPs. These proactive measures support the credible assessment of the Proficiency (“P”) dimension of KUPs.

*Post-Assessment Review, Item Analysis, and Continuous Improvement Mechanisms*

This last theme of operationalization sustains long-term compliance and enhancement. DH1 reported conducting item analysis after every assessment “to check each item if they are bound to retain, revise or replace by another question.” AU1 emphasized that item-analysis results drive required modifications, while post-implementation monitoring and continuous review maintain STCW compliance. F5 and F7 further described the use of structured debriefing to evaluate KUP achievement and inform future assessment design and feedback. This evidence-based approach expresses the continuous-improvement of both OBE and CBE while reinforcing the institution’s commitment to producing demonstrably competent graduates.

***Challenges in Operationalization of Competency-Based and Outcomes-Driven Assessment at PNTC Colleges***

While the PNTC Colleges have developed structured processes for operationalizing competency-based and outcomes-driven summative assessment, challenges persist in translating policy and design into consistent practice. Thematic analysis of the interviews with M1, D1, DH1, AU1, and F1 to F10 shows the difficulties encountered by PNTC Colleges staff and even in other MHEIs as per M1.

As shown in Table 4, the thematic analysis of the interview data revealed three major difficulties which impact the application of CBE and outcomes-based assessment by the heads of departments, faculty members, and assessment unit members in PNTC Colleges. The following is a discussion on these difficulties.

**Table 4**

*Themes on the Challenges in Operationalization of Competency-Based and Outcomes-Driven Assessment at PNTC Colleges*

Themes	Data Source (Source and Narratives)
Resource and Logistical Constraints in Practical / Simulator-Based Assessment Delivery	<p>F5: “Among the identified factors, the greatest challenge is the combination of large class sizes and limited simulator availability. Competency-based assessment requires close observation of individual student performance, repeated practice opportunities, and timely targeted feedback, which become difficult to manage under these conditions.”</p> <p>F1 and F6: Large class sizes (even at the maximum of 20 students per laboratory) and recurring simulator technical issues limit individualized observation, repeated practice, and timely feedback. Faculty noted that equipment shortages and simulator downtime further compromise authentic, scenario-based assessment.</p>
Documentation and Grading Burden, and Administrative Overload	<p>F9: “Documentation and Grading, is the most pervasive and enduring challenge. Assessments require meticulous records of student progress, evidence of mastery and compliance with external standards. We often spend more time filling out forms, tracking data, and preparing grades aside from engaging with learners. This administrative overload creates burnout...”</p> <p>F10: “Documentation demands are the greatest challenge, not because the others are minor, but because documentation directly affects how consistently and sustainably competency-based assessment (CBA) is implemented.”</p> <p>F2, F5, AU1: Faculty and Assessment Unit highlighted excessive time spent on post-assessment documentation, and maintaining records of the assessment tools.</p>
Managing Student Diversity, Variability, and the Shift to Competency Mindset	<p>DH1: “Faculty and assessors are challenged when applying uniform standards to all students with different learning paths, fast versus slow learners, and varying cognitive and psychomotor skills.”</p> <p>F9: Differences in student motivation and skill levels; students accustomed to memorization struggle with tasks requiring critical thinking, adaptation to unexpected situations, self-reflection, and independent problem-solving. Limited industrial exposure further hinders authentic application for some learners.</p> <p>F5, F6, F7: The differentiation between actual competence and memorization of procedure is achieved through observation of decision-making in real-time, reasoning for the decisions made, and communication within the team in new challenging situations.</p>

### *Resource and Logistical Constraints in Practical / Simulator-Based Assessment Delivery*

Some faculty members and assessors indicated that large class size and shortage of simulator and laboratory equipment create impediments for conducting assessment. F5 mentioned that due to both large class size and lack of simulators, it is hard to perform individual observation and provide feedback. F1 and F6 indicated that despite class size limitations, the technical problems with simulators impede authentic scenario assessment.

Such conditions prevent verification of learners' competence in performing actions described in Miller's Pyramid as "Shows How" (Miller, 1990). Due to the inability to watch performance or immediately give feedback on it, it is hard to ensure that learners possess necessary STCW KUPs. Problems with available resources for practical assessments are well documented in other literature on the issue (Ghosh et al., 2021; Sutrisno & Wijaya, 2023).

### *Documentation and Grading Burden, and Administrative Overload*

As a participant, some of the administrative tasks includes documentation and grading workload, which were listed as significant barriers. According to F9, documentation was considered the greatest barrier since they spend more time in data collection, grading and document preparations, aside from interacting directly with learners. Addressing the needs related to documentation and grading burden contribute significantly to the consistent application of competency-based assessment, according to F10 and F2.

Although documentation is helpful in the process of quality assurance, the current levels cause problems. The workload results in limited time spent in other assessment practices. These barriers contribute to the diversion of focus from the primary objective of evidence creation (Gervais, 2016; Santos & Reyes, 2024).

### *Managing Student Diversity, Variability, and the Shift to Competency Mindset*

There were problems in terms of implementing competency standards to the different paces and skill levels of students by the BSMT Department. It was revealed that DH1

experienced issues in keeping uniform standards among fast and slow learners with different abilities. Moreover, F9 pointed out that students who are accustomed to memorization have trouble in terms of critical thinking, adaptability, and problem solving independently. F5, F6, and F7 stated that it was difficult to distinguish between competence and memorization when complications were introduced in the simulators to test students' judgment and decision-making skills.

It became apparent that the difficulty led the change to competency-based assessment, in which students need to prove their achievements rather than accumulating seat times (Sturgis & Casey, 2018). Lack of differentiation and constructive feedback give assessors a hard time ensuring that the necessary STCW competencies are achieved by all students.

Overall, these issues were interconnected to some degree. The limited resources lead to an increase in the documentation process while taking less time to handle specific student concerns. The heavy burden of paperwork prevents faculty members from giving personalized feedback. All these issues can undermine the proper implementation of a competency-based evaluation system despite having good policies and procedures in place. These problems should be addressed to ensure adequate validation of the competence of every student.

### **Conclusion**

Based on the findings of this systems-level review of PNTC Colleges Summative Assessment Framework, here are the conclusions:

The Extent of Alignment of Summative Assessment of PNTC Colleges Assessment Framework is "Substantially Aligned" which means that policies and evidence are documented and implemented. However, the TOS for Psychomotor Assessment needs to have a separate TOS for Formative and Summative Assessments respectively. For the Preparation, Validation and Approval (PVA) Form, only one assessor is involved in its preparation and revision which will strengthen its quality if more assessors were involved. In grading system, it also implicates that the laboratory grading system is simpler than the lecture.

In operationalizing Competency-Based and Outcomes-Driven Summative Assessment shows that PNTC Colleges has built a coherent, multistage system that deliberately connects regulatory requirements, STCW KUPs, and institutional quality processes. Tool development begins with explicit mapping of KUPs to rubrics, TOS, and TOAs; these drafts then undergo departmental or decanal review, with pilot testing when needed prior approval. Alignment to CO and LO are maintained through curriculum and competence mapping, while monitoring helps sustain consistency over time. Faculty can design authentic simulator scenarios that introduce realistic complications. Taken together, these practices demonstrate an institutional intention to align teaching, learning, and assessment in ways that prepare graduates for the actual demands of professional maritime practice.

The Challenges in operationalization shows that the faculty members cannot perform their task at its fullest because they were constraints in terms of logistics, resources, documentation and administrative burdens, and managing students' diversity and variability.

Overall, PNTC Colleges appears to have successfully designed a well-aligned summative assessment mechanism based on a strong process that facilitates competency certification. Therefore, the institution is ready to cope with future regulatory demands. To produce competent maritime professionals, PNTC Colleges must address the existing gaps in documentation process, resource management, and assistance for students who require help.

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