

Integration of E-Learning Platforms for Continuing Professional Development in the Philippine Coast Guard Non-Officer Career Courses

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Abstract

This study examined the integration of e-learning platforms for the continuing professional development of Philippine Coast Guard Non-Officers in Career Courses. It assessed the current status of course implementation, respondents' perceptions of e-learning integration, perceived challenges, applicable best practices, and recommended strategies for digitalization. Using a sequential explanatory mixed-methods design, the study gathered quantitative data from 100 PCG Non-Officer respondents and qualitative data from key informant interviews, focus group discussions, and best-practice interviews. Findings showed that Career Courses were rated Satisfactory and Moderately Implemented overall, indicating that the existing system is functional but not yet fully optimized for digital or blended delivery. Technology and infrastructure emerged as the weakest area, particularly in terms of connectivity, hardware, facilities, and technical support. Despite these limitations, respondents expressed strong agreement toward e-learning integration. Qualitative findings identified technological, instructional, operational, and governance-related challenges. Best practices included blended learning, mobile and offline access, LMS-based training management, and interactive or simulation-based learning. The study recommends a phased and systems-based strategy anchored on infrastructure readiness, secure mobile/offline LMS adoption, blended course redesign, digital capacity-building, and policy sustainability mechanisms.

Keywords: E-learning platforms; continuing professional development; Philippine Coast Guard; Non-Officer Career Courses; blended learning; Learning Management System

1. Introduction

Maritime education and training is undergoing significant transformation due to rapid technological advancement and the increasing complexity of maritime operations. Digital technologies, including e-learning platforms, learning management systems, simulation-supported instruction, cloud-based tools, and learning analytics, have created new opportunities for flexible and technology-supported maritime training. These developments allow learners to access theoretical materials beyond the physical classroom while enabling institutions to monitor learner progress and improve training delivery (Hassan & Salem, 2025; Maghoromi, 2023; Autsadee et al., 2023; Rakka, 2022; Colak et al., 2024; Durluk et al., 2023).

In the Philippine Coast Guard, the need for modern and accessible training systems has become more urgent because of the organization's expanding mandate and rapid personnel growth. The PCG's role has extended beyond traditional maritime law enforcement and search-and-rescue functions to include broader responsibilities in maritime security, environmental protection, and national security. This expansion requires a strong system of continuing professional development to ensure that personnel remain competent and responsive to operational demands. This requirement is also supported by Republic Act No. 10912, or the

Continuing Professional Development Act of 2016, and Republic Act No. 9993, or the Philippine Coast Guard Law of 2009.

For PCG Non-Officers, Functional Career Courses serve as an important mechanism for professional development and specialization. These courses include the Maritime Security and Law Enforcement Functional Course, Marine Environmental Protection Functional Course, and Maritime Safety Administration Course. They develop competencies in maritime law enforcement, environmental protection, maritime safety, and administrative functions. However, these courses remain largely dependent on centralized and face-to-face delivery. While face-to-face training is necessary for practical and performance-based competencies, exclusive reliance on centralized instruction creates barriers for personnel assigned to districts, stations, vessels, remote coastal communities, and other operational units across the Philippine archipelago.

Previous studies in maritime and military training show that e-learning and blended learning can improve access, flexibility, scalability, and continuity of professional development, especially for geographically dispersed personnel (Nalupa, 2022; Muring, 2024; Husain, 2025). However, limited research has specifically examined how e-learning platforms may be integrated into Philippine Coast Guard Non-Officer Functional Career Courses. Existing studies often discuss maritime education, military training, digital technologies, or coast guard modernization separately, without directly connecting course implementation, personnel perception, perceived challenges, best practices, and digitalization strategies within one study.

This study therefore examined the integration of e-learning platforms in the continuing professional development of Philippine Coast Guard Non-Officers in Functional Career Courses. Specifically, it assessed the current status of course implementation, respondents' perception of e-learning integration, perceived challenges, applicable best practices, and recommended strategies for digitalization. The study aimed to support the development of a more accessible, flexible, blended, and sustainable professional development system for PCG Non-Officer personnel while ensuring that e-learning complements, rather than replaces, face-to-face practical training.

2. Review of Related Literature

E-learning has become increasingly relevant in maritime education and training because of the need for flexible, scalable, and technology-supported instruction. Maritime institutions are now using digital platforms, cloud-based systems, simulation tools, learning analytics, and other technologies to support competency development and learner monitoring (Hassan & Salem, 2025; Maghoromi, 2023; Autsadee et al., 2023; Rakka, 2022; Durluk et al., 2023; Colak et al., 2024). In coast guard and maritime training contexts, these technologies may improve access to theoretical instruction and help institutions deliver training to personnel assigned in different locations.

Blended learning is considered appropriate for operational and competency-based maritime training because it combines digital instruction with face-to-face practical application. Theoretical components such as laws, policies, procedures, readings, and preparatory discussions may be delivered online, while practical competencies such as drills, equipment handling, inspections, emergency response, and performance-based tasks require supervised face-to-face validation (Conev & Koritarov, 2025; Naqvi et al., 2024). This approach is also consistent with adult learning principles, which emphasize relevant, flexible, experience-based, and problem-centered learning (Knowles, 1980; Knowles et al., 2015).

Mobile and offline access are important features of digital learning systems for maritime and uniformed personnel. Since personnel may be assigned to remote stations, vessels, districts, coastal areas, or other low-connectivity environments, e-learning platforms should allow mobile access, downloadable materials, recorded lectures, and asynchronous activities. These features can help sustain learning despite operational schedules, deployment, or unstable internet connectivity (Türkistanli, 2024; Naqvi et al., 2024).

Learning Management Systems support digital training by organizing modules, assessments, submissions, feedback, training records, and learner progress. In professional and military training settings, LMS-based systems can improve standardization, documentation, monitoring, and competency tracking (Patel, 2025; Campbell, 2022; Alshammary & Alhalafawy, 2023). For PCG Functional Career Courses, an LMS may help reduce training fragmentation and provide a structured system for managing learning across different training units and personnel assignments.

Despite these benefits, digital training also presents challenges. These include unstable connectivity, limited devices, inadequate infrastructure, digital literacy gaps, resistance to technology, data privacy concerns, cybersecurity risks, and quality assurance issues (Sharma, 2022; Masuku, 2021; Diahyleva et al., 2024). In maritime and coast guard training, another major concern is the practical nature of many competencies. While e-learning can support theoretical preparation, simulation, review, and assessment, it cannot fully replace supervised hands-on training for operational and safety-sensitive tasks (Durlík et al., 2023; Hassan & Salem, 2025; Rakka, 2022; Yang & Fan, 2025; Stefan et al., 2023).

3. Methodology

3.1. Research Design

This study employed a mixed-methods sequential explanatory design. The quantitative phase was conducted first through a structured survey to determine the status of implementation of PCG Non-Officer Functional Career Courses and the respondents' perception of e-learning integration. The qualitative phase followed through key informant interviews, focus group discussions, and best-practice interviews to explain and expand the survey findings, particularly on perceived challenges, best practices, and recommended strategies for digitalization (Creswell & Poth, 2018).

3.2. Respondents and Participants

The survey respondents were selected through purposive sampling. They consisted of PCG Non-Officer personnel holding the ranks of Petty Officer Third Class and Petty Officer Second Class who had completed, participated in, or were currently involved in Functional Career Courses, namely the Maritime Security and Law Enforcement Functional Course, Marine Environmental Protection Functional Course, and Maritime Safety and Administration Course. Although the computed target sample size using G*Power was 176, only 130 eligible personnel were accessible. Ten personnel were used for pilot testing and excluded from the final analysis. From the remaining eligible personnel, 100 complete and valid responses were included in the quantitative analysis.

For the qualitative phase, a separate group of participants was selected. This included seven key informant interview participants, four focus group discussion sessions, and two best-practice interview participants. The KII participants included former students of the identified Functional Career Courses and personnel assigned

at headquarters, districts, and aboard ship. The FGD sessions involved course directors, instructors, and former instructors connected with the Functional Career Courses. The best-practice interviews involved one Philippine Navy course director/instructor and one PCG Headquarters/OSEC representative.

3.3. Instruments and Validation

Two researcher-made instruments were used: a structured survey questionnaire and a semi-structured interview guide. The survey questionnaire measured the status of implementation of Functional Career Courses in terms of mode of delivery, technology and infrastructure, learning materials, and personnel and instructor digital readiness or competency. It also measured respondents' perception of e-learning integration. The semi-structured interview guide was used for the KIIs, FGDs, and best-practice interviews to gather data on challenges, best practices, and recommended digitalization strategies.

The instruments underwent face and content validation by three experts: one Philippine Coast Guard officer with training and maritime operations experience, one statistician, and one psychometrician. After validation, the survey questionnaire was pilot-tested with 10 PCG Non-Officer personnel who were excluded from the final survey. The 34-item questionnaire obtained a Cronbach's Alpha coefficient of 0.986, indicating excellent internal consistency.

3.4. Data Gathering Procedure

Data were gathered through Google Forms for the survey phase. Informed consent was included before the survey, and only respondents who voluntarily agreed proceeded with the questionnaire. After the initial analysis of survey results, the KIIs, FGDs, and best-practice interviews were conducted using the semi-structured guide. Informed consent was also obtained from all qualitative participants, and responses were treated with confidentiality.

3.5. Data Analysis

Survey data were analyzed using frequency, percentage, weighted mean, and standard deviation. These were used to describe the profile of respondents, the status of implementation of Functional Career Courses, and respondents' perception of e-learning integration. Qualitative data from the KIIs, FGDs, and best-practice interviews were transcribed, coded, and analyzed using thematic analysis with the aid of MAXQDA. Cold coding was first used to identify initial codes, followed by warm coding to group related codes into themes.

4. Results and Discussion

The findings are presented according to the five research questions of the study: status of implementation of Career Courses, respondents' perception on e-learning integration, perceived challenges, best practices, and recommended strategies for digitalization.

4.1. Status of implementation of Career Courses

The overall implementation of PCG Non-Officer Career Courses was rated Satisfactory and described as Moderately Implemented. This indicates that the current training system is functional but not yet fully optimized for digital or blended delivery. Among the four areas, mode of delivery obtained the highest

weighted mean, while technology and infrastructure obtained the lowest. This suggests that face-to-face instruction remains a relative strength, but the technological foundation needed for e-learning still requires improvement. The standard deviation for technology and infrastructure was also the highest, indicating more varied respondent experiences in relation to connectivity, hardware, facilities, platforms, and technical support.

Table 1. Overall Status of Implementation of Career Courses

Variable	WM	SD	VI	Status
Mode of Delivery	3.23	0.61	S	MI
Technology and Infrastructure	3.04	0.73	S	MI
Learning Materials	3.13	0.64	S	MI

Note. S = Satisfactory; MI = Moderately Implemented.

The findings imply that the PCG already has a functional Career Course system, but it still needs strengthening before full digitalization. The lower rating for technology and infrastructure suggests that e-learning integration should first focus on connectivity, hardware, learning facilities, technical support, updated learning materials, and instructor readiness.

This supports previous studies which emphasize that digital learning implementation requires reliable infrastructure, updated learning materials, instructor readiness, and institutional support (Durlak et al., 2023; Hassan & Salem, 2025; Rakka, 2022).

4.2. Perception on the integration of e-learning platforms

Respondents strongly agreed with the possible integration of e-learning platforms in Career Courses. The overall weighted mean of 3.29 indicates that PCG Non-Officers generally viewed e-learning as useful for improving access, flexibility, training continuity, and professional development. The relatively low standard deviation suggests that respondents shared a generally consistent level of agreement.

Table 2. Overall perception on the integration of e-learning platforms

Variable	WM	SD	VI
Perception on the Integration of E-Learning Platforms	3.29	0.51	SA

Note SA = Strongly Agree.

The findings imply that PCG Non-Officers are generally open to e-learning integration, especially when it improves access, flexibility, training continuity, and professional development. However, this positive perception must be matched with system readiness, including infrastructure, instructional design, mobile and offline access, LMS-based monitoring, and instructor development.

This is consistent with studies showing that digital and blended learning can improve access, flexibility, and continuity of professional development for geographically dispersed and operationally mobile personnel (Husain, 2025; Rodas, 2025; Türkistanlı, 2024; Naqvi et al., 2024). This also reflects Diffusion of Innovations Theory, which explains that adoption is influenced by the perceived advantage and compatibility of an innovation with user needs (Rogers, 2003).

4.3. Perceived challenges in the integration of e-learning platforms

The qualitative findings identified four major challenges in the integration of e-learning platforms: technological and infrastructure constraints, instructional and practical-skill delivery limitations, operational constraints, and human readiness, motivation, and governance concerns. These themes were drawn from key informant interviews and focus group discussions conducted after the survey analysis.

Table 3. Summary of themes on the perceived challenges in the integration of e-learning platforms

Major Theme	Basis of Theme Development	Core Finding
Technological and Infrastructure Constraints	Derived from codes on internet connectivity, signal strength, devices, hardware, platforms, and technical support	E-learning is constrained by unstable internet, weak signal, limited devices, outdated hardware, platform issues, and technical support gaps.
Instructional and Practical-Skill Delivery Limitations	Derived from codes on skills demonstration, hands-on practice, supervision, and performance validation	Practical and operational competencies cannot be fully taught online because they require demonstration, supervision, hands-on practice, and performance validation.
Operational Constraints Affecting Training Access and Continuity	Derived from codes on deployment, emergency response, sea duty, workload, recall, fatigue, and shifting schedules	Deployment, emergency response, unit recall, workload, fatigue, administrative duties, and shifting schedules disrupt training participation and completion.
Human Readiness, Motivation, and Governance Concerns	Derived from codes on deployment, emergency response, sea duty, workload, recall, fatigue, and shifting schedules	E-learning adoption is affected by face-to-face preference, digital literacy gaps, concerns about training quality, platform usability, cybersecurity, and data privacy.

The findings imply that the challenges to e-learning integration are not only technological. They also involve instructional, operational, human readiness, cybersecurity, data privacy, and governance concerns. For this reason, e-learning should support theoretical instruction, review, preparation, assessment, and learning continuity, but should not replace supervised face-to-face training for practical and safety-sensitive competencies.

Similar challenges have been identified in digital training literature, particularly in relation to connectivity, the digital divide, infrastructure readiness, cybersecurity, data privacy, and the difficulty of transferring practical competencies to fully online environments (Sharma, 2022; Masuku, 2021; Diahyleva et al., 2024; Yang & Fan, 2025; Stefan et al., 2023).

4.4. Best practices in digitalizing Career Courses

The study identified four best practices applicable to the digitalization of PCG Career Courses: blended learning, mobile and offline access, LMS-based training management, and interactive or simulation-based learning. These findings were drawn from internal PCG data, Philippine Navy input, and PCG Headquarters/OSEC input.

Table 4. Summary of Themes on Best Practices in Digitalizing Career Courses

Major Theme	Integrated Finding
Blended Learning Model	The best practice identified is a blended model where theoretical lessons are delivered digitally, while practical skills, drills, simulations, equipment handling, and performance-based assessments remain face-to-

	face.
Mobile and Offline Access	Digital training should be mobile-friendly and offline-capable because PCG personnel may be assigned in remote stations, onboard vessels, coastal areas, or locations with unstable internet connectivity.
LMS-Based Training Management	A centralized LMS or similar platform is needed to organize modules, assessments, submissions, learner progress, records, and monitoring across training units.
Interactive and Simulation-Based Learning	Digital learning should not be limited to uploaded files. It should include videos, simulations, scenario-based exercises, quizzes, gamified activities, and instructor-guided interaction to sustain engagement and prepare learners for practical application.

The findings imply that the most appropriate digitalization approach for PCG Career Courses is blended and competency-based. Digital platforms can strengthen theoretical preparation, access, monitoring, and learner engagement, while face-to-face sessions should remain necessary for supervised practical validation.

This is consistent with adult learning principles and maritime education literature, which emphasize flexible, relevant, experiential, and problem-centered learning for professional and operational learners (Knowles, 1980; Knowles et al., 2015; Conev & Koritarov, 2025; Naqvi et al., 2024).

4.5. Recommended strategies for digitalization

The recommended strategies were derived from the integration of the survey results, key informant interviews, focus group discussions, Philippine Navy input, and PCG Headquarters/OSEC input. Five major strategies emerged: infrastructure and access readiness, secure mobile/offline LMS, blended course redesign, digital capacity-building, and policy and sustainability mechanisms.

Table 5. Summary of Themes on Recommended Strategies for Digitalization of Career Courses

Major Theme	Key Strategy
Infrastructure and Access Readiness	Strengthen connectivity, devices, power supply, and digital access points before full implementation.
Secure Mobile/Offline LMS	Adopt a centralized LMS with mobile access, offline capability, tracking, assessment, and cybersecurity features.
Blended Course Redesign	Deliver theory through digital modules while retaining face-to-face validation for practical skills.
Digital Capacity-Building	Train instructors and personnel in LMS use, digital literacy, online teaching, and technical troubleshooting.

The findings imply that digitalization should be implemented through a phased, systems-based, and institutionally supported strategy. The process should begin with infrastructure readiness, followed by secure mobile/offline LMS adoption and blended course redesign, then sustained through digital capacity-building, policy support, cybersecurity safeguards, data privacy protocols, funding, monitoring, evaluation, and regular updating of digital learning materials.

This aligns with Diffusion of Innovations Theory, which emphasizes that new systems are more likely to be adopted when they are useful, compatible, manageable, testable, and supported by observable benefits (Rogers, 2003).

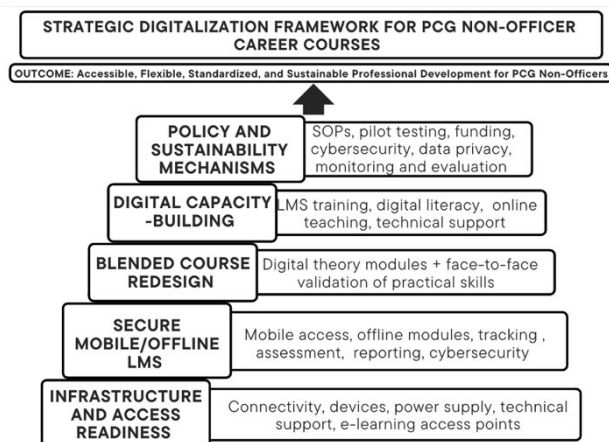


Figure 1 Strategic Digitalization Framework for PCG Non-Officer Career Courses

The framework illustrates the phased relationship among the recommended strategies for digitalizing PCG Non-Officer Career Courses. It begins with infrastructure and access readiness, followed by the adoption of a secure mobile/offline Learning Management System and blended course redesign. The process is sustained through digital capacity-building and institutionalized through policy, funding, cybersecurity, data privacy, monitoring, evaluation, and regular updating of digital learning materials.

5. Conclusion and Recommendations

5.1. Conclusion

The study concludes that the integration of e-learning platforms in Philippine Coast Guard Non-Officer Career Courses is viable, necessary, and responsive to the needs of a geographically dispersed and rapidly expanding workforce. However, e-learning should not replace face-to-face training. Instead, it should serve as a complementary system that improves access to theoretical instruction, supports learning continuity, strengthens monitoring, and prepares learners for practical application.

The current Career Course system provides a working foundation for digitalization, particularly through its existing strengths in face-to-face instruction and basic instructor support. However, it is not yet fully ready for comprehensive digital or blended delivery. Technology and infrastructure, updated learning materials, modular delivery, and instructor digital readiness must be strengthened before full implementation.

A blended and competency-based model is the most appropriate approach for PCG Career Courses. Digital platforms may be used for theoretical lessons, readings, lectures, quizzes, case-based activities, progress tracking, and preparatory learning. However, operational and safety-sensitive competencies such as drills, equipment handling, simulations, field exercises, and performance-based assessments should remain face-to-

face and supervised. This approach ensures that digitalization improves training accessibility without compromising practical competency development.

5.2. Recommendations

Based on the findings, the study recommends that the PCG adopt a phased and systems-based digitalization strategy for Non-Officer Career Courses. First, infrastructure and access readiness should be established by improving connectivity, devices, power supply, technical support, and digital access points.

Second, a secure, mobile-accessible, and offline-capable Learning Management System should be adopted. The LMS should support asynchronous learning, downloadable modules, assessment, learner tracking, reporting, cybersecurity, and data protection.

Third, Career Courses should be redesigned using a blended learning model. Theoretical components should be converted into digital modules, while practical competencies should remain subject to face-to-face validation.

Fourth, digital capacity-building should be implemented for instructors, training personnel, and learners. Training should include LMS use, digital literacy, online teaching, content development, assessment design, troubleshooting, cybersecurity, and data privacy.

Finally, policy and sustainability mechanisms should be institutionalized through formal guidelines, pilot testing, funding, monitoring, evaluation, regular module updating, cybersecurity safeguards, and data privacy protocols. Future studies may examine LMS pilot testing, usability evaluation, cost analysis, cybersecurity assessment, learning outcomes, course completion, CPD compliance, rank progression, and the long-term effect of blended learning on operational readiness.

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