



Optimizing Risk Management Strategies: A Comparative Study of Training Methods in the Philippine Merchant Marine Academy (PMMA)

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Abstract

This study investigates the perceptions of ICI Cadets (fourth year) on risk management training strategies in PMMA's In-House and On-Board Training programs. A comparative research design was employed to evaluate training effectiveness, learning environments, and the challenges cadets face during both modalities. A researcher-made survey was administered to thirty five (35) cadets, revealing key insights. In-House Training was effective in providing theoretical knowledge but had limitations in integrating theory with practice and in terms of instructor expertise. In contrast, On-Board Training was highly rated for its real-world application and collaborative environment. However, cadets faced challenges in understanding complex concepts and dealing with resource constraints during this mode of training. The Mann-Whitney U Test showed no significant differences in cadet perceptions between the two training methods across all dimensions assessed. Based on the findings, the study recommends enhancing simulation training, fostering collaboration with industry professionals, and establishing structured feedback systems to improve training. The results highlight the need for ongoing improvement in training strategies to better prepare cadets for effective risk management in maritime operations, ensuring that they are equipped with both theoretical and practical knowledge for real-world challenges.

Keywords: Risk management strategies, training effectiveness, learning environment, in-house training, on-board training

Introduction

In the ever-evolving maritime industry, risk management has emerged as a crucial component of ensuring the safety and efficiency of operations. The Philippine Merchant Marine Academy (PMMA), a premier maritime institution in the Philippines, plays a vital role in equipping future mariners with the necessary skills and knowledge to manage risks effectively. This study explores various training methods employed by PMMA in optimizing risk management strategies. As global maritime challenges continue to evolve, the need for effective risk management training becomes more evident (Winn, 2018) [25].

Risk management in maritime contexts involves identifying, assessing, and prioritizing risks followed by the application of resources to minimize and control the probability or impact of unforeseen events. Given the critical nature of

maritime operations, effective risk management not only ensures the safety of lives and goods at sea but also mitigates potential environmental impacts (Eriksen & Hannibal, 2020) [9]. Traditionally, maritime training has heavily relied on theoretical classroom instruction. However, with advancements in technology, there is a shift towards more experiential training methodologies such as simulation-based training, which allows cadets to experience real-world scenarios in a controlled environment (Barnett *et al.*, 2019) [4].

This research seeks to compare different training methods at PMMA, analyzing their effectiveness in enhancing risk management skills among cadets. By examining the integration of traditional and innovative training techniques, this study aims to identify the optimal approach to risk management education for maritime professionals. The

findings will not only benefit PMMA but also contribute to the broader discourse on maritime education and training, ultimately aiming to foster a safer maritime industry.

Integrated Literature and Studies

The maritime industry faces unique risk management challenges, requiring an education system that can effectively prepare future professionals for these demands. The Philippine Merchant Marine Academy (PMMA) has been at the forefront of maritime education in the region and serves as a perfect case for examining the effectiveness of various training methods. The literature on maritime risk management underscores the necessity of integrating both traditional and innovative training approaches to achieve comprehensive skill development in cadets (Barnett *et al.*, 2019) [4].

Traditional training methods, characterized by classroom-based theoretical instruction, form the foundation of maritime education. These methods impart essential theoretical knowledge, such as regulatory frameworks and standard operating procedures (Eriksen & Hannibal, 2020) [9]. However, the limitations of theoretical training are evident in its inability to simulate real-life scenarios that cadets may encounter at sea. To address these limitations, many maritime institutions, including PMMA, are increasingly incorporating experiential learning methods such as simulation-based training (SBET) (Winn, 2018) [25]. Simulation-based training has been recognized as a highly effective pedagogical tool in maritime education. It provides cadets with a risk-free environment to experience and respond to realistic maritime scenarios, thereby bridging the HH gap between theory and practice (Barnett *et al.*, 2019) [4]. This method enhances critical thinking and decision-making skills, which are essential for effective risk management. Moreover, as maritime operations become increasingly reliant on advanced technologies, simulation-based training offers the advantage of familiarizing cadets with high-tech equipment and systems (Cunningham & Sinclair, 2021) [7].

Studies have shown that the integration of traditional and innovative training approaches in maritime education can lead to improved risk management capabilities among cadets. For instance, a study by Santos *et al.* (2022) [20] found that cadets who underwent combined theoretical and simulation-based training exhibited higher levels of competence in managing maritime risks compared to those who received only traditional instruction. This hybrid approach ensures that cadets not only understand the theoretical aspects of risk management but are also proficient in applying these concepts in real-world situations.

In conclusion, the literature emphasizes the need for a holistic approach to training in maritime education. By effectively combining traditional theory with innovative simulation-based techniques, institutions like PMMA can optimize risk management strategies and better prepare their cadets for the complexities of modern maritime operations.

Theoretical and Conceptual Framework

The theoretical framework for this study on optimizing risk management strategies through training methods at the Philippine Merchant Marine Academy (PMMA) is rooted in

several key theories: risk management theory, competency theory and experiential learning theory. Each provides a lens through which the effectiveness of training methods can be evaluated and enhanced.

Risk management theory underscores the systemic process of identifying, assessing, and prioritizing risks followed by the coordinated application of resources to minimize, control, and monitor the impact of unexpected events (Aven, 2016) [2]. In the context of maritime education, effective training programs are crucial for reducing operational risks and ensuring maritime safety (Zhou *et al.*, 2015) [26].

Competency theory focuses on the building of core skills and capabilities essential for the refined execution of tasks (Boyatzis, 1982) [6]. Training programs are typically designed to develop competencies that align with industry requirements to enhance the performance and safety outcomes of trainees (Spencer & Spencer, 1993) [21].

Experiential Learning Theory* Proposed by Kolb (1984) [13], experiential learning theory emphasizes learning through experience, which is particularly pertinent in maritime training where real-world simulations and practice scenarios play a critical role in skill acquisition and risk management (Jarvis, 2010) [27]. Integrating these theories into PMMA's curriculum can enhance training effectiveness by fostering a deeper understanding of risk scenarios and improving decision-making skills in high-pressure environments. This study will employ these frameworks to compare existing training methods and propose improvements in aligning them with international best practices.

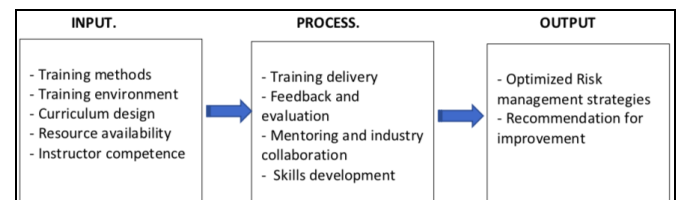


Fig 1: Paradigm of the Study

The framework positions training methods as the foundation, influencing the processes and outcomes. By examining the alignment between input, process, and output variables, the study identifies strategies to optimize risk management training and improve the overall preparedness of PMMA cadets.

Statement of the Problem

This study tend to answer the following questions:

1. What are the perceptions of the 1CI Cadets towards risk management strategies in PMMA training in terms of
 - 1.1 training effectiveness
 - 1.2 learning environment
 - 1.3 challenges faced
2. What are the perceptions of the 1CI Cadets towards risk management strategies in on-board training in terms of
 - 2.1 training effectiveness
 - 2.2 learning environment
 - 2.3 challenges faced
3. Is there a significant differences in perceptions of the 1CI Cadets towards risk management strategies in PMMA and On-Board trainings in terms of

- 3.1 training effectiveness
- 3.2 learning environment
- 3.3 challenges faced
4. What specific programs or initiatives can be recommended to enhance risk management strategies based on the findings of this study?

Definition of Terms

Challenges Faced: This involves identifying any obstacles or difficulties encountered by cadets in the implementation of risk management strategies during their training, whether at PMMA or on-board.

In-house Training: Refers to the training programs conducted at the Philippine Merchant Marine Academy (PMMA). This is where cadets receive instructional and theoretical training.

Learning Environment: Refers to the setting and conditions in which training takes place, including resources, safety, interactions, and overall atmosphere. It evaluates how risk management strategies affect the quality and conduciveness of the learning space.

On-Board Training: This involves practical training aboard ships, where cadets apply their theoretical learnings in real-world maritime situations.

Perceptions of 1Cl Cadets: This refers to the opinions, beliefs, and attitudes of first-class cadets (fourth year students) towards certain strategies or environments. In this context, it pertains to their views on risk management strategies.

Risk Management Strategies: These are plans and actions designed to reduce risks and ensure safety during training. It involves identifying, assessing, and prioritizing risks, followed by coordinated efforts to minimize them.

Significant Differences: This variable looks into whether there are notable distinctions in the perceptions of cadets between PMMA and on-board training in relation to risk management strategies, especially across the dimensions of training effectiveness, learning environment, and challenges faced.

Specific Programs or Initiatives: These refer to recommendations or actions proposed to enhance risk management strategies. They are based on the analysis and findings of the study, aiming to address any gaps or weaknesses identified.

Training Effectiveness: This variable assesses how well the risk management strategies contribute to successfully achieving training objectives and outcomes. It considers the impact of these strategies on the cadets' learning and preparedness.

Methods

Research Design: The study titled "Optimizing Risk Management Strategies: A Comparative Study of Training Methods in the Philippine Merchant Marine Academy (PMMA)" adopts a comparative research design. This type of research focuses on systematically comparing two or more variables or groups to identify similarities, differences, and overall patterns (Trochim, 2020) [24]. In this context, the research compares different training methods at PMMA, specifically focusing on how traditional classroom-based instruction and innovative experiential training techniques such as simulation-based learning contribute to the development of effective risk management skills among cadets.

Participants

The participants of the study were thirty five (35) 1cl cadets (4th year students) from the College of Marine Engineering at the Philippine Merchant Marine Academy. They already had their twelve (12) months shipboard training.

Ethical Considerations

The research was achieved in a fair, truthful and evident manner. The profile of the respondents gathered was treated with confidentiality and for research purpose only. Most of all, all the literature, studies and references were acknowledged and credited all the relevant literature, studies, and references used.

Instrumentation

The study uses a researcher made survey questionnaire. A four point likert scale that leads to optimizing risk management strategies. Part I is about the PMMA in-house training and part II is about the onboard training.

Procedure

The data collection process commenced with the identification and formulation of the study's inputs. After ensuring the validity of the questionnaires, the researcher digitized the survey by encoding it into Google Forms. During the data collection phase, the researcher distributed the survey to the target audience and systematically gathered the responses.

Results and Discussion

1. Perceptions Towards PMMA In-House Training

The following paragraphs discusses the perceptions of 1CL PMMA Cadets towards the risk management strategies during the PMMA In-House Training in terms of teaching effectiveness, learning environment and challenges faced.

1.1 Training Effectiveness

Table 1 below shows the weighted mean, standard deviation and verbal interpretation of 1CL Cadets' perceptions towards the risk management strategies during the PMMA In-House Training in terms of teaching effectiveness.

Table 1: Perceptions Towards Teaching Effectiveness of PMMA In-House Training

Statements	Weighted Mean	SD	Verbal Interpretation
The theoretical knowledge provided during my academic training effectively prepares me for practical applications in risk management.	3.56	0.51	Strongly Agree
The curriculum aligns well with industry standards and requirements for maritime professionals.	3.50	0.51	Strongly Agree
I feel confident in my understanding of risk management concepts after completing my academic courses.	3.44	0.62	Agree
The instructors demonstrate a strong command of the subject matter related to risk management.	3.39	0.61	Agree
The integration of theory and practice in the curriculum enhances my learning experience.	3.44	0.51	Agree
I have access to adequate resources (books, online materials) that support my learning in risk management.	3.50	0.51	Strongly Agree
Overall, I would rate the effectiveness of the academic training program as high.	3.33	0.59	Agree

The results summarized in Table 1 provide valuable insights into the perceptions of ICL Cadets regarding the effectiveness of risk management training during the PMMA In-House Training, particularly in terms of teaching effectiveness. Notably, the statement "The theoretical knowledge provided during my academic training effectively prepares me for practical applications in risk management" received the highest weighted mean score of 3.56 (SD = 0.51), indicating a strong consensus among cadets who "Strongly Agree." This suggests that cadets feel well-prepared to translate theoretical knowledge into practical applications. Furthermore, both the alignment of the curriculum with industry standards and the availability of adequate resources achieved a weighted mean of 3.50 (SD = 0.51), also categorized as "Strongly Agree." These findings indicate that cadets perceive the academic training program as effectively equipping them with the necessary knowledge and resources for real-world application. However, while cadets expressed positive sentiments regarding their confidence in risk management concepts and the integration of theory and practice-both receiving a weighted mean of 3.44 (SD = 0.62 and SD = 0.51, respectively)-these scores suggest that there is still room for improvement in these areas. Additionally, instructors' subject matter expertise was rated with a weighted mean of 3.39 (SD = 0.61), interpreted as "Agree." This rating

indicates a general satisfaction with instructors but also points to potential opportunities for enhancing engagement and instructional strategies to further improve learning outcomes.

Overall, the academic training program's effectiveness was rated at a weighted mean of 3.33 (SD = 0.59), categorized as "Agree." While this reflects a generally positive evaluation, it underscores the need for ongoing improvements aimed at maximizing cadets' confidence and preparedness in risk management. By addressing these areas, the program can better support cadets in developing the skills and confidence necessary for success in their future careers.

Goel *et al.* (2021) ^[10] emphasized that academic training must incorporate practical components to bridge the gap between theory and application, particularly in high-stakes environments like maritime and risk management training.

Martínez *et al.* (2020) ^[16] demonstrated that alignment with industry needs ensures academic training remains relevant and equips students with up-to-date knowledge and resources.

1.2 Learning Environment

Table 2 below shows the weighted mean, standard deviation and verbal interpretation of ICL Cadets' perceptions towards the risk management strategies during the PMMA In-House Training in terms of learning environment.

Table 2: Perceptions Towards Learning Environment of PMMA In-House Training

Statements	Weighted Mean	SD	Verbal Interpretation
The classroom environment fosters active participation and engagement in discussions about risk management.	3.39	0.50	Agree
I feel comfortable approaching instructors with questions or concerns regarding course material.	3.39	0.78	Agree
The facilities and equipment used for training are conducive to effective learning.	3.33	0.59	Agree
Group activities and projects enhance my understanding of risk management concepts.	3.44	0.51	Agree
I receive constructive feedback from instructors that helps improve my understanding of risk management.	3.22	0.73	Agree
The academic schedule allows sufficient time for in-depth exploration of risk management topics.	3.39	0.61	Agree
The overall atmosphere in the classroom promotes collaboration among students.	3.28	0.57	Agree

The results presented in Table 2 illuminate the perceptions of ICL Cadets regarding the learning environment during the PMMA In-House Training, particularly in relation to risk management strategies. Overall, the ratings for various statements fell within the "Agree" category, indicating a generally positive perception of the learning environment. Notably, the highest-rated item, "Group activities and projects enhance my understanding of risk management concepts," achieved a weighted mean of 3.44 (SD = 0.51), suggesting that cadets find collaborative learning to be an effective strategy for grasping complex concepts.

Several other items also reflect cadets' appreciation for an interactive and supportive classroom atmosphere. For instance, both "The classroom environment fosters active participation and engagement" and "I feel comfortable approaching instructors with questions or concerns" received a weighted mean of 3.39 (SD = 0.50 and SD = 0.78, respectively). Additionally, the statement "The academic schedule allows sufficient time for in-depth exploration of risk management topics" garnered the same mean score of 3.39 (SD = 0.61). These results suggest that cadets value an environment that encourages active

participation and open communication with instructors. However, there are areas that warrant attention for improvement. The facilities and equipment used for training received a slightly lower rating of 3.33 (SD = 0.59), indicating potential shortcomings that could hinder an optimal learning experience. Similarly, the item "The overall atmosphere in the classroom promotes collaboration among students" was rated lower still, with a weighted mean of 3.28 (SD = 0.57). This points to a need for initiatives aimed at enhancing teamwork and camaraderie among cadets.

The lowest-rated statement, "I receive constructive feedback from instructors that helps improve my understanding of risk management," scored 3.22 (SD = 0.73). This suggests that while feedback is being provided, its quality or frequency may require enhancement to better support cadets' learning journeys. In summary, while the learning

environment is perceived positively overall, these insights highlight specific areas for refinement that could further optimize the training experience for cadets.

Johnson *et al.* (2018) [12] highlighted that collaborative learning approaches, such as group projects and discussions, improve critical thinking and comprehension of advanced topics.

Goh and Sandars (2020) [11] stressed that outdated or inadequate resources can impede students' ability to fully benefit from training programs.

1.3 Challenges Faced

Table 3 below shows the weighted mean, standard deviation and verbal interpretation of 1CL Cadets' perceptions towards the risk management strategies during the PMMA In-House Training in terms of challenges faced.

Table 3: Perceptions Towards Challenges Faced of PMMA In-House Training

Statements	Weighted Mean	SD	Verbal Interpretation
I have encountered challenges in grasping complex concepts related to risk management during my studies.	3.00	0.69	Agree
The pace of the academic curriculum is too fast for effective learning of critical topics like risk management.	2.94	0.94	Agree
There are insufficient opportunities for practical application of theoretical knowledge within the academic setting.	2.78	0.81	Agree
Communication barriers exist that hinder effective learning during lectures and discussions.	2.78	1.00	Agree
I feel that there is a lack of emphasis on current industry practices in the curriculum.	2.78	0.88	Agree
I have experienced difficulties in balancing academic workload with other responsibilities outside school.	2.89	0.76	Agree
Overall challenges faced during academic training have impacted my learning experience negatively.	2.83	0.86	Agree

The results presented in Table 3 shed light on the challenges faced by 1CL Cadets during the PMMA In-House Training, particularly concerning risk management strategies. The data indicate that cadets experience moderate challenges, with all statements falling within the "Agree" category. The most significant challenge identified was the statement, "I have encountered challenges in grasping complex concepts related to risk management during my studies," which received a weighted mean of 3.00 (SD = 0.69). This finding highlights that understanding complex concepts poses a considerable hurdle for many cadets.

Additional notable challenges include the fast pace of the academic curriculum, which received a weighted mean of 2.94 (SD = 0.94). Some cadets perceive this rapid progression as a barrier to effectively mastering essential topics such as risk management. Furthermore, the practical application of theoretical knowledge was rated as a challenge (WM = 2.78, SD = 0.81), indicating a demand for more hands-on learning opportunities that could bridge the gap between theory and practice. Concerns regarding the curriculum's alignment with current industry practices were similarly rated (WM = 2.78, SD = 0.88), suggesting that cadets feel there is a disconnect between academic instruction and real-world expectations.

Moreover, communication barriers during lectures and discussions (WM = 2.78, SD = 1.00) and the challenge of

balancing academic workload with external responsibilities (WM = 2.89, SD = 0.76) further exacerbate the difficulties faced by cadets. These factors, combined with the overall impact of challenges on their learning experience (WM = 2.83, SD = 0.86), underscore the urgent need for improvements in curriculum pacing, practical integration, and support systems. Addressing these areas will be crucial in mitigating these challenges and enhancing the overall academic experience for cadets as they navigate their training in risk management strategies.

In a 2024 publication, Sweller discusses the implications of Cognitive Load Theory for curriculum design, highlighting how understanding human cognitive architecture can inform effective instructional strategies.

2. Perceptions Towards On-Board Training

The following paragraphs discusses the perceptions of 1CL PMMA Cadets towards the risk management strategies during the PMMA On-Board Training in terms of teaching effectiveness, learning environment and challenges faced.

2.1 Training Effectiveness

Table 4 below shows the weighted mean, standard deviation and verbal interpretation of 1CL Cadets' perceptions towards the risk management strategies during the On-Board Training in terms of teaching effectiveness.

Table 4: Perceptions Towards Teaching Effectiveness of On-Board Training

Statements	Weighted Mean	SD	Verbal Interpretation
The on-board training provided has effectively enhanced my understanding of risk management strategies.	3.67	0.49	Strongly Agree
I feel confident in applying the risk management concepts learned during on-board training in real-life scenarios.	3.67	0.49	Strongly Agree
The training sessions adequately prepare cadets for the challenges faced at sea.	3.61	0.50	Strongly Agree
The instructors demonstrate a high level of expertise in risk management during on-board training.	3.61	0.50	Strongly Agree
I have received sufficient hands-on experience related to risk management during my on-board training.	3.56	0.51	Strongly Agree
The training materials provided are relevant and useful for understanding risk management in maritime operations.	3.56	0.51	Strongly Agree
Overall, I would rate the effectiveness of the on-board training program as high	3.61	0.50	Strongly Agree

The results presented in Table 4 reflect ICL Cadets' perceptions of the effectiveness of risk management strategies during the On-Board Training, revealing a consistently high level of satisfaction among participants. All statements received a "Strongly Agree" verbal interpretation, indicating strong endorsement of the training's impact. Notably, the highest-rated items-"The on-board training provided has effectively enhanced my understanding of risk management strategies" and "I feel confident in applying the risk management concepts learned during on-board training in real-life scenarios"-both achieved a weighted mean of 3.67 (SD = 0.49). These results highlight the training's effectiveness in bridging theoretical knowledge with practical application. Cadets also expressed strong approval for statements such as "The training sessions adequately prepare cadets for the challenges faced at sea" and "The instructors demonstrate a high level of expertise in risk management during on-board training," each receiving a weighted mean of 3.61 (SD = 0.50). This indicates that cadets view both the instructors' expertise and the preparatory nature of the sessions as significant strengths of the program. Additionally, the relevance and usefulness of the training materials, along

with the hands-on experiences provided, were rated with a weighted mean of 3.56 (SD = 0.51), further affirming the comprehensive and practical approach taken in the training. Overall, the statement assessing the overall effectiveness of the on-board training program yielded a weighted mean of 3.61 (SD = 0.50), reinforcing cadets' high levels of satisfaction. These findings underscore the program's success in equipping cadets with the skills and confidence necessary to effectively manage risks in maritime operations, ultimately enhancing their preparedness for real-world challenges at sea. Goh and Sandars (2020) [11] highlighted that practical, real-world experiences are invaluable in preparing individuals for industry-specific challenges. Schmitz *et al.* (2014) [22] concluded that structured maritime training programs effectively instill risk management competencies, equipping trainees for real-world scenarios.

2.2 Learning Environment

Table 5 below shows the weighted mean, standard deviation and verbal interpretation of ICL Cadets' perceptions towards the risk management strategies during the On-Board Training in terms of learning environment.

Table 5: Perceptions Towards Learning Environment of On-Board Training

Statements	Weighted Mean	SD	Verbal Interpretation
The on-board training environment is conducive to learning about risk management strategies.	3.61	0.50	Strongly Agree
There is adequate support from fellow cadets and instructors during training exercises	3.56	0.51	Strongly Agree
I feel comfortable discussing safety concerns and risk management issues with my instructors.	3.56	0.51	Strongly Agree
The facilities and equipment used during training are appropriate for effective learning.	3.50	0.51	Strongly Agree
I am encouraged to ask questions and seek clarification during training sessions.	3.50	0.51	Strongly Agree
The training schedule allows sufficient time for practical application of risk management concepts.	3.56	0.51	Strongly Agree
The overall atmosphere during on-board training promotes teamwork and collaboration.	3.56	0.51	Strongly Agree

The results presented in Table 5 illustrate ICL Cadets' perceptions of the learning environment during On-Board Training, particularly in relation to risk management strategies. Overall, the responses indicate a highly favorable view, with all statements receiving a "Strongly Agree" verbal interpretation. The highest-rated statement, "The on-board training environment is conducive to learning about risk management strategies," achieved a weighted mean of 3.61 (SD = 0.50), underscoring the effectiveness of the learning atmosphere in facilitating cadets' education. Several other statements also received strong support, including "There is adequate support from fellow cadets and instructors during training exercises," "I feel comfortable discussing safety concerns and risk management issues with

my instructors," and "The overall atmosphere during on-board training promotes teamwork and collaboration," all of which garnered a weighted mean of 3.56 (SD = 0.51). These results highlight the significance of interpersonal relationships and collaborative elements within the training environment, which are essential for fostering effective learning. Additionally, statements such as "The facilities and equipment used during training are appropriate for effective learning" and "I am encouraged to ask questions and seek clarification during training sessions" both received a weighted mean of 3.50 (SD = 0.51). While these aspects are rated positively, they are slightly less emphasized compared to the interpersonal dynamics that characterize the training

experience.

In summary, cadets perceive the on-board training environment as highly supportive, collaborative, and conducive to effective learning. With sufficient resources and opportunities for practical engagement, these factors collectively create an optimal setting for mastering risk management strategies in maritime operations. This positive learning environment not only enhances cadets' understanding but also prepares them to tackle real-world challenges effectively.

Research underscores the importance of creating a positive learning environment in professional training, particularly in high-stakes fields like maritime operations. Kolb's experiential learning theory (1984) [13] emphasizes that

environments conducive to learning foster better knowledge retention and application.

The role of instructor support and open communication in professional training is well-documented. Goh and Sandars (2020) [11] emphasized that open dialogue and approachable instructors help learners clarify doubts and feel more engaged, thereby improving learning outcomes.

2.3 Challenges Faced

Table 6 below shows the weighted mean, standard deviation and verbal interpretation of ICL Cadets' perceptions towards the risk management strategies during the On-Board Training in terms of challenges faced.

Table 6: Perceptions Towards Challenges Faced of On-Board Training

Statements	Weighted Mean	SD	Verbal Interpretation
I have encountered challenges in understanding certain aspects of risk management during on-board training.	3.11	0.68	Agree
The pace of the on-board training is too fast for effective learning of complex topics like risk management.	2.72	0.83	Agree
There are insufficient resources available to support my learning in risk management.	2.61	0.92	Agree
I have experienced difficulties in applying theoretical knowledge to practical situations at sea.	2.78	0.94	Agree
Communication barriers exist that hinder effective learning during on-board training.	2.94	0.87	Agree
There is a lack of feedback from instructors regarding my performance in risk management tasks.	2.72	0.96	Agree
Overall challenges faced during on-board training have impacted my learning experience negatively.	2.83	0.92	Agree

The results presented in Table 6 illuminate the challenges faced by ICL Cadets during On-Board Training, particularly in relation to risk management strategies. The statement "I have encountered challenges in understanding certain aspects of risk management during on-board training" received the highest weighted mean of 3.11 (SD = 0.68), indicating that some cadets struggled to grasp specific concepts. This highlights the need for additional support or clarification on complex topics to enhance understanding. Other notable challenges include the perception that "The pace of the on-board training is too fast for effective learning of complex topics like risk management," which received a weighted mean of 2.72 (SD = 0.83). Additionally, the statement "There are insufficient resources available to support my learning in risk management" garnered a weighted mean of 2.61 (SD = 0.92). These findings suggest that both the intensity of the training and limitations in available resources may have hindered cadets' learning experiences.

Further compounding these challenges, cadets reported difficulty in applying theoretical knowledge to practical situations at sea (weighted mean = 2.78, SD = 0.94) and experienced communication barriers during training (weighted mean = 2.94, SD = 0.87). These issues underscore the difficulties cadets face when transitioning from classroom instruction to real-world applications. Moreover, a lack of instructor feedback on performance (weighted mean = 2.72, SD = 0.96) may have contributed to feelings of uncertainty and hindered their ability to improve. Overall, the challenges faced during on-board training, reflected by a weighted mean of 2.83 (SD = 0.92), indicate that while cadets encountered significant difficulties, these challenges were not overwhelmingly severe. Addressing these concerns-such as providing more tailored support, enhancing resource availability, and ensuring timely feedback-could greatly improve the effectiveness of on-

board training and mitigate its impact on the overall learning experience for cadets.

Rajesh *et al.* (2019) [19], who noted that accelerated training schedules often hinder the ability to deeply internalize and apply critical skills. The study emphasizes the need for adequate pacing to allow trainees to master key concepts effectively.

Difficulties in applying theoretical knowledge to real-world situations are supported by studies such as those by Andersson *et al.* (2018) [1]. Their findings reveal that integrating theory with hands-on experiences fosters greater confidence and competence among trainees. They advocate for experiential learning strategies to reinforce theoretical concepts in practical scenarios.

3. Significant differences in PMMA in-house training and on-board training:

Below are the discussions of the results of the significant differences between PMMA In-House Training and On-Board Training in terms of training effectiveness, learning environment and challenges faced.

3.1 Training effectiveness: Table 7 shows the test statistics results on determining the significant difference between PMMA In-House and On-Board Trainings in terms of training effectiveness as perceived by ICL PMMA Cadets using the Mann-Whitney Test.

Table 7: Test Statistics^a

	Teaching Effectiveness
Mann-Whitney U	134.500
Wilcoxon W	305.500
Z	-.926
Asymp. Sig. (2-tailed)	.355
Exact Sig. [2*(1-tailed Sig.)]	.389 ^b
a. Grouping Variable: Type_or_Training	
b. Not corrected for ties.	

The results of the Mann-Whitney U test conducted to examine the difference in the perceptions of 1CL PMMA Cadets towards the risk management strategies in terms of training effectiveness shows that there is no significant difference between the PMMA In-house training and the On-board training, $U = 134.50$, $Z = -0.926$, $p = 0.355$.

Studies such as those by Andersson *et al.* (2018) [1] and Muñoz *et al.* (2021) [17] suggest that both classroom-based and experiential learning environments contribute equally to cadets' preparation for real-world maritime challenges. Andersson *et al.* (2018) [1] highlighted that while in-house training focuses on theoretical grounding, on-board training reinforces these concepts through practical application, creating a balanced learning experience.

According to Park *et al.* (2020) [18], cadets often perceive both forms of training as equally valuable since they address different yet interrelated competencies. Their research indicates that the alignment of theory with practice, regardless of the setting, is critical for effective learning outcomes.

3.2 Learning Environment

Table 8 shows the test statistics results on determining the significant difference between PMMA In-House and On-Board Trainings in terms of learning environment as perceived by 1CL PMMA Cadets using the Mann-Whitney Test.

Table 8: Test Statistics^a

	Learning Environment
Mann-Whitney U	139.000
Wilcoxon W	310.000
Z	-.775
Asymp. Sig. (2-tailed)	.439
Exact Sig. [2*(1-tailed Sig.)]	.481 ^b
a. Grouping Variable: Type_or_Training	
b. Not corrected for ties.	

The results of the Mann-Whitney U test conducted to examine the difference in the perceptions of 1CL PMMA Cadets towards the risk management strategies in terms of learning environment shows that there is no significant difference between the PMMA In-house training and the On-board training, $U = 139.00$, $Z = -0.775$, $p = 0.439$.

Studies like those by Andersson *et al.* (2018) [1] and Liu *et al.* (2020) [15] suggest that both classroom-based and on-site training environments provide equally supportive learning conditions when structured effectively.

Andersson *et al.* (2018) [1] noted that well-designed learning environments-whether in a classroom or a field setting-promote engagement and teamwork, crucial for comprehensive maritime training.

3.3 Challenges Faced

Table 9 shows the test statistics results on determining the significant difference between PMMA In-House and On-Board Trainings in terms of challenges faced as perceived by 1CL PMMA Cadets using the Mann-Whitney Test.

Table 9: Test Statistics^a

	Challenges Faced
Mann-Whitney U	153.000
Wilcoxon W	324.000
Z	-.287
Asymp. Sig. (2-tailed)	.774
Exact Sig. [2*(1-tailed Sig.)]	.791 ^b

a. Grouping Variable: Type_or_Training

b. Not corrected for ties.

The results of the Mann-Whitney U test conducted to examine the difference in the perceptions of 1CL PMMA Cadets towards the risk management strategies in terms of learning environment shows that there is no significant difference between the PMMA In-house training and the On-board training, $U = 153.00$, $Z = -0.287$, $p = 0.774$.

A study by Demirel (2022) [8] explored cadets' perspectives on MET and found that both institutional education and sea training are integral to the overall training process, with cadets recognizing the value of both settings in their professional development.

Additionally, research by Mori and Nakawatase (2021) [14] examined the theoretical foundations of on-the-job training and apprenticeship in the maritime industry, highlighting that both in-house and on-board training approaches are informed by similar learning theories, such as situated learning and cognitive apprenticeship. This theoretical overlap may contribute to the comparable perceptions observed among cadets regarding risk management strategies in both training environments.

4. Proposed Programs to Enhance Risk Management Systems for PMMA Trainings

To improve the risk management systems in PMMA trainings, both in-house and on-board, the following targeted programs can be implemented.

A. Enhanced Risk Management Simulation Training

Program Title: Advanced Risk Management Simulations for Cadets.

Objective: Equip cadets with practical skills in handling complex maritime risk scenarios through immersive simulations.

Implementation

1. Install advanced simulation tools replicating real-world maritime risks, including fire control, navigation in severe weather, and cargo management emergencies.
2. Conduct structured simulation sessions during both in-house and on-board training.
3. Use scenario-based learning where cadets practice decision-making under simulated crisis conditions.

Outcome: Improved decision-making and application of theoretical knowledge in practical risk management situations.

B. Development of Comprehensive Risk Management Modules

Program Title: Integrated Risk Management Curriculum Update

Objective: Ensure cadets receive the most relevant and updated knowledge on maritime risk management practices.

Implementation

1. Collaborate with maritime industry experts to design curriculum modules focused on current risk management trends.
2. Include lessons on regulatory compliance, environmental risks, and digital tools for risk assessment.
3. Incorporate case studies of recent maritime incidents to highlight lessons learned.

Outcome: Cadets will have a deeper understanding of modern risk management challenges and strategies.

C. Real-Time Feedback System for Risk Management Training

Program Title: Instructor-Led Feedback and Performance Monitoring

Objective: Enhance learning outcomes by providing real-time feedback on cadets' risk management performance.

Implementation

1. Establish a standardized feedback system where instructors evaluate cadets' performance during drills and simulations.
2. Provide detailed reports on strengths and areas for improvement.
3. Use feedback sessions to clarify misconceptions and reinforce best practices.

Outcome: Continuous improvement in cadet performance through personalized guidance.

D. Collaborative Training with Industry Experts

Program Title: Industry Partnership for Risk Management Excellence

Objective: Leverage the expertise of maritime companies to align PMMA training with real-world risk management requirements.

Implementation

1. Organize guest lectures and workshops with maritime safety officers and risk management specialists.
2. Facilitate joint training sessions with maritime companies using real-world scenarios.
3. Include industry representatives in curriculum review panels to ensure alignment with professional standards.

Outcome: Cadets will gain insights into practical applications of risk management strategies, bridging the gap between training and professional practice.

E. Regular Assessment of Risk Management Proficiency

Program Title: Risk Management Competency Evaluation Program

Objective: Monitor and evaluate cadets' understanding and application of risk management concepts throughout their training.

Implementation

1. Develop periodic assessments, such as quizzes, case analysis, and practical evaluations, focused on risk management skills.
2. Use simulation-based exams to test cadets' response to emergency scenarios.
3. Implement a scoring system to track individual progress and identify areas for improvement.

Outcome: Structured evaluation of cadets' risk management capabilities, ensuring readiness for real-world challenges.

F. Allocation of Resources for Risk Management Tools

Program Title: Modernizing Risk Management Training Resources

Objective: Provide cadets with access to state-of-the-art tools and resources for effective risk management training.

Implementation

1. Invest in updated training manuals and digital resources that reflect current maritime safety regulations and best practices.
2. Upgrade simulation labs with new technologies for more realistic training experiences.
3. Provide cadets access to risk management software used in the maritime industry.

Outcome: Enhanced training facilities that support comprehensive learning experiences.

G. Mentorship and Peer Collaboration Program

Program Title: Risk Management Mentorship Initiative.

Objective: Pair cadets with experienced mentors and encourage collaborative learning among peers to foster a deeper understanding of risk management systems.

Implementation

1. Assign each cadet a mentor (experienced maritime professional) for guidance on risk management strategies.
2. Create peer groups for collaborative problem-solving during simulations and practical exercises.
3. Organize regular mentorship meetings to discuss challenges and solutions in risk management.

Outcome: A support network that enhances cadets' learning and application of risk management principles.

H. Digital Risk Management Training System

Program Title: Maritime Risk Management e-Learning Platform

Objective: Use digital tools to enhance cadets' access to risk management training.

Implementation

1. Develop an online platform offering modules, videos, and interactive content on risk management.
2. Include self-assessment quizzes to allow cadets to monitor their understanding.
3. Provide access to incident reports, regulatory updates, and webinars from maritime safety organizations.

Outcome: Cadets will have continuous learning opportunities, improving their theoretical and practical understanding of risk management.

I. Interdisciplinary Risk Management Training

Program Title: Holistic Risk Management Skills Development

Objective: Combine technical skills with essential soft skills for comprehensive risk management training.

Implementation

1. Integrate training on communication, leadership, and teamwork within the risk management curriculum.
2. Conduct workshops on stress management and decision-making under pressure.
3. Use team-based activities to build collaboration and problem-solving abilities.

Outcome: Cadets will develop a balanced skill set, making them more effective in managing risks in maritime operations.

Research by Baldauf *et al.* (2018) ^[3] highlights the effectiveness of simulation-based training in enhancing decision-making and crisis management skills among maritime cadets. Simulations bridge the gap between theory and practice, fostering confidence in handling real-life emergencies.

Integrating industry trends and regulatory updates in training curricula improves cadets' readiness, as noted by Basnet and Chaudhary (2020) ^[5]. Including case studies helps highlight real-world lessons, making training more relevant.

Conclusion

The following conclusion were drawn from the result.

1. In-house training at PMMA was effective in preparing cadets with theoretical knowledge (WM = 3.56) but needs improvement in integrating theory and practice (WM = 3.44) and instructor expertise (WM = 3.39), with an overall rating of WM = 3.33 ("Agree"). The learning environment was strong in group activities (WM = 3.44) and classroom participation (WM = 3.39) but faced challenges with facilities (WM = 3.33) and feedback quality (WM = 3.22). Key difficulties included understanding complex concepts (WM = 3.00) and fast curriculum pacing (WM = 2.94), with overall challenges rated at WM = 2.83.
2. The on-board training was generally well-received, with high ratings for the real-world application of risk

management (WM = 3.67) and the overall training experience (WM = 3.61). Strengths included supportive collaboration (WM = 3.56) and a conducive learning atmosphere (WM = 3.61). However, challenges arose in understanding complex risk concepts (WM = 3.11) and resource limitations (WM = 2.61), with an overall challenge rating of 2.83, indicating moderate difficulties.

3. The comparison between in-house and on-board training revealed no significant differences in training effectiveness, learning environment, or challenges faced. Statistical analysis using the Mann-Whitney U Test showed p-values of 0.355 for training effectiveness, 0.439 for the learning environment, and 0.774 for the challenges faced, indicating that the two training methods were similar in these areas.
4. To enhance risk management training, proposed programs include realistic simulation training, a comprehensive curriculum update with industry expert collaboration, and real-time feedback systems. Collaborative training with experts, regular proficiency assessments, and upgraded resources like tools and digital labs are also recommended. Additionally, mentorship programs, digital training systems for continuous learning, and interdisciplinary training combining technical and soft skills are suggested to support holistic development.

Recommendation

1. Create more opportunities for cadets to apply classroom knowledge to real-world risk management scenarios. Incorporate hands-on activities, such as case studies focused on risk mitigation and practical exercises simulating risk-heavy situations.
2. Provide specialized training for instructors to deepen their expertise in risk management. This will enable them to effectively guide cadets in understanding and applying both theoretical and practical aspects of managing risks.
3. Improve facilities to include tools and spaces tailored to risk management simulations. Ensure that feedback on cadet performance in risk-related activities is structured, detailed, and delivered promptly to help cadets identify and address weaknesses.
4. Simplify complex risk concepts encountered during on-board training and address resource limitations by providing adequate tools, materials, and support systems. Focus on building practical skills through real-life risk scenarios.
5. Collaborate closely with industry professionals to integrate risk management insights into training through guest lectures, workshops, and joint activities. This approach ensures cadets gain exposure to up-to-date practices and expert perspectives on handling risks.
6. Continuously upgrade training resources, including digital simulations and advanced tools, to allow cadets to practice managing various risk scenarios in a controlled environment.
7. Conduct periodic assessments specifically focused on risk management skills. Use simulations and real-time scenarios to evaluate cadet performance and provide targeted feedback for improvement.

8. Combine technical risk management training with soft skills development, such as decision-making, communication, and teamwork. This holistic approach prepares cadets to handle risks effectively in diverse operational contexts.

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