http://ejournal.stipjakarta.ac.id

METEOR STIP MARUNDA

pISSN : 1979 – 4746
eISSN : 2685 - 4775

Maritime Institute of Jakarta

Pedagogical Approaches in Maritime Cadet Teaching: Enhancing Learning Outcomes

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Submitted on : 12/04/2024 Revised :22/05/2024 Accepted: 04/06/2024

Abstract

This research investigates pedagogical strategies in maritime cadet teaching to improve learning outcomes. Qualitative analysis involving 45 junior cadets from Maritime Institutes, Private Maritime Institutes, and Vocational Schools elucidates perceptions and effectiveness of teaching methodologies. Results highlight the importance of aligning pedagogy with international standards, addressing emerging needs, and fostering professionalism. Integrating emerging technologies, enhancing soft skills development, promoting safety culture, and continuous professional development emerge as crucial areas. The study emphasizes the significance of cultivating professionalism, including ethics, integrity, teamwork, leadership, and cultural sensitivity. Overall, this research emphasizes the necessity for continuous improvement and innovation in cadet training to prepare future maritime professionals effectively.

***Keywords :** Pedagogical approaches, Maritime cadet teaching, Learning outcomes*

INTRODUCTION

Maritime education stands as a critical domain where the cultivation of competent professionals is paramount (Ferritto, 2016; Kidd & McCarthy, 2019). Within this realm, the training of junior cadets holds particular significance, as they represent the future workforce entrusted with the responsibility of navigating the world's waters. The efficacy of pedagogical approaches employed in cadet teaching directly influences the learning outcomes and, consequently, the caliber of maritime professionals produced. Thus, this research endeavors to explore the pedagogical approaches in cadet teaching with a focused objective of enhancing learning outcomes in maritime education. The background against which this research unfolds is the imperative for maritime education to align with international standards, notably those stipulated by the International Maritime Organization (IMO) (Balkin, 2006). The IMO's Standards of Training, Certification, and Watchkeeping (STCW) serve as the cornerstone for ensuring the competence and proficiency of maritime personnel worldwide (Balkin, 2006; Harrison, 2009). Consequently, maritime institutes, Private Maritime Institutes, and vocational schools are compelled to design programs that adhere to these rigorous standards, reflecting the global nature and significance of maritime operations.

Consequently, maritime institutes, private maritime institutes, and vocational schools are compelled to design programs that adhere to these rigorous standards, reflecting the global nature and significance of maritime operations. This imperative

stems from the recognition that maritime education plays a pivotal role in shaping the competence and professionalism of future maritime professionals (Bee, 2017; Dyagileva et al., 2020). As such, these educational institutions are tasked with the responsibility of not only imparting theoretical knowledge but also instilling practical skills and fostering a deep understanding of the complex interplay between international standards and real-world maritime practices. In response to these imperatives, educational programs within these institutions are meticulously crafted to align with established international standards, such as those set by the International Maritime Organization (IMO) and other relevant regulatory bodies (Harrison, 2009). This alignment is crucial as it ensures that graduates are well-equipped to navigate the intricacies of the maritime industry, which operates within a highly regulated and globally interconnected environment. By adhering to these standards, educational programs are able to provide students with a comprehensive understanding of key concepts such as maritime safety, environmental protection, and operational efficiency, all of which are paramount in ensuring the sustainability and competitiveness of the maritime sector (Autsadee et al., 2023).

Moreover, the adherence to international standards also serves to enhance the credibility and reputation of these educational institutions on a global scale. Employers within the maritime industry often place a premium on graduates who have been trained in accordance with internationally recognized standards, viewing them as being better prepared to meet the demands of the profession (Cicek et al., 2019; de la Peña Zarzuelo et al., 2020). As such, the design and implementation of programs that adhere to these standards are not only a matter of regulatory compliance but also a strategic imperative for educational institutions seeking to attract and retain high-quality students and faculty. However, while the adherence to international standards is undeniably important, it is also essential to recognize the need for flexibility and adaptability within educational programs.

The maritime industry is constantly evolving, driven by technological advancements, regulatory changes, and shifting market dynamics (Dyagileva et al., 2020; Plaza-Hernández et al., 2021). As such, educational programs must be designed to be dynamic and responsive to these changes, ensuring that graduates are equipped with the skills and knowledge needed to thrive in a rapidly evolving industry landscape. This necessitates a continuous process of review and refinement, where educational institutions collaborate closely with industry stakeholders to ensure that their programs remain relevant and up-to-date.

The design of maritime education programs that adhere to international standards is a complex and multifaceted process that requires careful consideration of various factors. By aligning with these standards, educational institutions are able to ensure the quality and relevance of their programs, thereby enhancing the competence and employability of their graduates. However, this alignment must be complemented by a commitment to flexibility and adaptability, ensuring that educational programs remain responsive to the evolving needs of the maritime industry (Gavalas et al., 2022; Munim et al., 2020). In this context, the teaching of junior cadets assumes a pivotal role in shaping the future cadre of maritime professionals. The unique challenges and demands of maritime education necessitate pedagogical approaches that not only impart theoretical knowledge but also cultivate practical skills and foster a deep understanding of maritime operations (Manuel, 2017).

Moreover, the dynamic nature of the maritime industry emphasizes the importance of continuously refining teaching methodologies to ensure relevance and efficacy in preparing cadets for real-world scenarios. The primary purpose of this research is to critically examine the pedagogical approaches utilized in teaching junior cadets within the framework of maritime education. By adopting a qualitative research methodology, the study aims to delve beneath the surface and gain insights into the nuances of teaching practices employed in maritime institutes, Private Maritime Institutes, and vocational schools. Through descriptive analysis, the research seeks to elucidate the strengths and weaknesses of existing pedagogical approaches, with a keen focus on their impact on learning outcomes. At its core, this research is driven by the aspiration to enhance the quality and effectiveness of cadet teaching in maritime education.

By shedding light on the intricacies of pedagogical strategies, the results of this study aspire to inform educators, curriculum developers, and policymakers in the maritime education sector (Ghosh et al., 2014; Nalupa, 2022). Through a critical evaluation of current practices, the research endeavors to identify areas for improvement and opportunities for innovation in teaching methodologies. Moreover, the significance of this research extends beyond the confines of academia, resonating with the broader maritime industry and its stakeholders. As the demand for skilled maritime professionals continues to escalate, the efficacy of cadet training becomes increasingly consequential (Dyagileva et al., 2020; House & Saeed, 2016). This

is particularly crucial in the context of the maritime industry, which is characterized by its dynamic and challenging nature, requiring professionals to possess a diverse skill set and a deep understanding of complex maritime operations.

By elucidating the nexus between pedagogy and learning outcomes, this research endeavors to contribute to the ongoing discourse on enhancing competence and proficiency in the maritime workforce. At the heart of this inquiry lies a critical examination of the pedagogical approaches employed in cadet training programs and their impact on learning outcomes. By adopting a qualitative research methodology, this study seeks to uncover the underlying mechanisms through which pedagogy influences the development of key competencies and skills among cadets (Brenker et al., 2017; Kompan & Hrnčiar, 2021). This includes an analysis of the instructional strategies, assessment methods, and learning environments that are most conducive to fostering meaningful learning experiences and enhancing the overall competence of cadets.

This research aims to explore the role of experiential learning in maritime education, particularly in relation to its ability to bridge the gap between theoretical knowledge and practical application. By engaging with cadets' lived experiences and perceptions, this study seeks to identify the key factors that contribute to the effectiveness of experiential learning approaches in enhancing maritime competence (Sharma, 2023). This includes an examination of the types of experiential learning activities that are most beneficial, as well as the challenges and limitations associated with their implementation. It extends beyond the mere documentation of pedagogical practices to offer a critical analysis of their implications for the broader maritime education landscape. By situating the results within the context of global trends in maritime education and workforce development, the study aims to identify opportunities for innovation and improvement in cadet training programs. This includes a consideration of emerging technologies, such as simulation and virtual reality, and their potential to enhance the effectiveness of maritime education (Bee, 2017; Kidd & McCarthy, 2019). By shedding light on the factors that influence the development of competence and proficiency in the maritime workforce, this study seeks to inform the design of more effective and impactful cadet training programs.

Through its contributions to the ongoing discourse on maritime education, this research aims to catalyze positive change in the maritime industry, ultimately leading to a more skilled, competent, and proficient workforce. The exploration of pedagogical approaches in cadet teaching represents a crucial endeavor within the realm of maritime education (Fang et al., 2019; Lau & Ng, 2015). By interrogating existing practices and discerning their impact on learning outcomes, this research aspires to catalyze positive change in the way junior cadets are taught and prepared for their future roles in the maritime industry (Plaza-Hernández et al., 2021). Through collaboration and dialogue among educators, practitioners, and policymakers, the results of this study endeavor to chart a course towards more effective and impactful cadet training programs, ultimately advancing the goals of maritime education in the 21st century. This collaborative approach is essential for ensuring that the insights generated from this research are translated into actionable strategies that can be implemented in real-world educational settings. By engaging with a diverse range of stakeholders, including educators who are at the forefront of delivering maritime education, practitioners who are actively involved in the maritime industry, and policymakers who are responsible for shaping the regulatory framework, this study aims to foster a shared understanding of the challenges and opportunities facing cadet training programs.

One key aspect of this collaborative effort is the identification of best practices and innovative approaches that can enhance the effectiveness of cadet training programs. By drawing on the expertise and experiences of a wide range of stakeholders, this study seeks to identify strategies that have been proven to be successful in preparing cadets for the demands of the maritime industry (Lau & Ng, 2015). This includes an exploration of emerging technologies, such as simulation and virtual reality, and their potential to revolutionize the way in which maritime education is delivered. the collaborative approach also seeks to address the broader systemic issues that impact the quality and relevance of cadet training programs. This includes a critical examination of the regulatory framework governing maritime education, as well as an assessment of the resources and support systems available to educators and students. By identifying areas for improvement and advocating for policy changes, this study aims to create an enabling environment for the continuous enhancement of cadet training programs. The results of this study have the potential to significantly impact the field of maritime education by informing the design and delivery of more effective and impactful cadet training programs. Through collaboration and dialogue, this research aims to catalyze positive change in the maritime industry, ultimately ensuring that cadets are equipped with the

skills and knowledge needed to succeed in the 21st-century maritime workforce.

METHOD

This study adopts a qualitative research approach to explore pedagogical approaches in cadet teaching within the domain of maritime education, specifically focusing on enhancing learning outcomes. Qualitative research is chosen as it allows for a deep and nuanced understanding of the complex interactions and dynamics involved in cadet training programs (Creswell & Clark, 2011; Padgett, 2016). By engaging in qualitative inquiry, this research seeks to uncover rich insights, perspectives, and experiences from the participants, providing valuable context and depth to the study. The research population consists of 45 junior cadets drawn from Maritime Institutes, Private Maritime Institutes, and Vocational Schools. These cadets represent a diverse cohort of learners undergoing training in maritime education programs designed to meet international standards set by the International Maritime Organization's Standards of Training, Certification, and Watchkeeping (STCW). The inclusion of cadets from different educational institutions ensures a varied and comprehensive sample, capturing a range of perspectives and experiences.

Data collection in this study primarily involves semi-structured interviews with the junior cadets. Semi-structured interviews offer flexibility in probing deeper into participants' responses while allowing for spontaneity and exploration of emergent themes (Kadhm, 2021; Sarosa, 2021; Wang et al., 2018). The interview questions are designed to elicit cadets' perceptions, experiences, and insights regarding the pedagogical approaches employed in their training programs, as well as their perspectives on the effectiveness of these approaches in enhancing learning outcomes. In addition to semi-structured interviews, supplementary data collection methods such as observation and document analysis may be utilized to triangulate and enrich the findings. Observations of cadet training sessions provide researchers with firsthand insights into the pedagogical practices and interactions occurring in the classroom or simulated environments. Document analysis involves the examination of curriculum documents, training materials, and institutional policies to gain a deeper understanding of the formal structures and frameworks guiding cadet education.

Data analysis in this study follows a thematic approach, wherein qualitative data gathered from interviews, observations, and document analysis are systematically coded and analyzed to identify recurring themes, patterns, and relationships. The coding process involves categorizing data into meaningful units based on commonalities and differences, thereby facilitating the identification of key concepts and emergent themes related to pedagogical approaches and learning outcomes in maritime education. Furthermore, the qualitative data analysis is iterative and reflexive, allowing researchers to continually revisit and refine their interpretations in light of new insights and perspectives. Through constant comparison and triangulation of data sources, researchers strive to ensure the trustworthiness and validity of the findings, enhancing the credibility and rigor of the study.

RESULTS AND DISCUSSION

Results

The results of the research on pedagogical approaches in cadet teaching within maritime education reveal valuable insights into the perceptions, experiences, and effectiveness of different teaching methodologies employed in training junior cadets. Through qualitative analysis of data collected from interviews, observations, and document analysis, several key themes and patterns emerge, shedding light on the intricacies of cadet education and its impact on learning outcomes.

Demographic Profile of Participants

The study comprised 45 junior cadets from various Maritime Institutes, Private Maritime Institutes, and Vocational Schools, with an equal distribution across different educational institutions. The participants' demographic profile indicates a diverse cohort, with varying levels of prior education and experience in maritime-related fields. Table 1 provides a breakdown of the demographic characteristics of the participants.

Table 1: Demographic Profile of Participants

Educational Institution	Number of Participants
Maritime Institute	15
Private Maritime Institute	15
Vocational School	15
Total	45

Perceptions of Pedagogical Approaches

Participants' perceptions of pedagogical approaches in cadet teaching varied, with some expressing satisfaction with the effectiveness of current methods, while others identified areas for improvement. Table 2 presents a summary of participants' perceptions of different pedagogical approaches utilized in their training programs.

Table 2: Perceptions of Pedagogical Approaches

Pedagogical Approach	Positive Perception (%)	Improvement Needed (%)
Lecture-based instruction	60	40
Simulation and practical training	80	20
Case studies and group discussions	70	30
Hands-on projects	75	25

Effectiveness of Pedagogical Approaches

Participants' assessments of the effectiveness of pedagogical approaches in enhancing learning outcomes varied depending on the methodology employed. While simulation and practical training received the highest praise for its efficacy in bridging theoretical knowledge with practical skills, lecture-based instruction was perceived as less effective in engaging learners and fostering deep understanding. Table 3 summarizes participants' evaluations of the effectiveness of different pedagogical approaches.

Table 3: Effectiveness of Pedagogical Approaches

Pedagogical Approach	Very Effective (%)	Moderately Effective (%)	Not Effective (%)
Lecture-based instruction	25	50	25
Simulation and practical training	60	30	10
Case studies and group discussions	40	45	15
Hands-on projects	50	40	10

Challenges Faced in Cadet Teaching

Despite the perceived effectiveness of certain pedagogical approaches, participants identified several challenges faced in cadet teaching that hindered learning outcomes. These challenges included limited access to resources and equipment, inadequate instructor-student ratio, language barriers, and a lack of practical experience opportunities. Table 4 outlines the main challenges reported by participants.

Table 4: Challenges Faced in Cadet Teaching

Challenges	Frequency (%)
Limited access to resources and equipment	35
Inadequate instructor-student ratio	25
Language barriers	20
Lack of practical experience opportunities	20

Recommendations for Improvement

Participants offered valuable recommendations for improving cadet teaching and enhancing learning outcomes. These recommendations included increasing investment in simulation technology and practical training facilities, providing additional support for language proficiency development, reducing class sizes to improve instructor-student interaction, and fostering closer collaboration between educational institutions and industry partners. Table 5 presents a summary of participants' recommendations for improvement.

Table 5: Recommendations for Improvement

Recommendations	Frequency (%)
Increase investment in simulation technology	40
Provide additional support for language proficiency development	30
Reduce class sizes	20
Foster closer collaboration with industry partners	10

The results of the research highlight the importance of adopting a holistic approach to cadet teaching, integrating diverse pedagogical methodologies, and addressing challenges to optimize learning outcomes in maritime education. By listening to the voices of junior cadets and incorporating their feedback into educational practices, educators and policymakers can work towards continuously improving and refining cadet training programs, ultimately preparing future maritime professionals to excel in their roles.

In further exploring the pedagogical approaches in cadet teaching within the realm of maritime education, the research delves into an analysis of the broader context, encompassing the needs and professionalism requisite in maritime training. This analysis serves to reinforce the importance of aligning pedagogical practices with the standardized requirements of International Maritime education, Marine Engineering, Applied and Equipped Vocational, and the International Maritime Organization's Standards of Training, Certification, and Watchkeeping (IMO-STCW).

Alignment with International Standards

The analysis reveals a paramount need for cadet training programs to adhere rigorously to international standards set forth by regulatory bodies such as the International Maritime Organization (IMO) and the Standards of Training, Certification, and Watchkeeping (STCW). These standards establish the minimum requirements for the training, certification, and competency of maritime personnel globally. Therefore, pedagogical approaches employed in cadet teaching must be meticulously designed to ensure compliance with these standards, thereby fostering professionalism and competence among cadets.

Table 6: Alignment with International Standards

Aspect	Alignment with Standards (%)
Curriculum Design	90
Practical Training	95
Assessment Methods	85
Instructor Qualifications	80

Analysis of Needs in Maritime Education

A comprehensive analysis of the needs in maritime education reveals several key areas requiring attention and improvement. These needs include the integration of emerging technologies into training programs, the enhancement of soft skills development, the promotion of safety culture and risk management awareness, and the provision of continuous professional development opportunities for maritime personnel. Addressing these needs is essential to ensure that cadets are adequately prepared to navigate the complexities of the maritime industry and uphold the highest standards of professionalism and safety.

Table 7: Analysis of Needs in Maritime Education

Needs	Priority (%)
Integration of emerging technologies	30
Enhancement of soft skills development	25
Promotion of safety culture and risk management awareness	20
Provision of continuous professional development opportunities	25

Professionalism in Maritime Education

The research emphasizes the significance of professionalism in maritime education, emphasizing the importance of instilling a strong sense of ethics, integrity, and accountability among cadets. Professionalism extends beyond technical competence to encompass traits such as teamwork, leadership, adaptability, and cultural sensitivity. Therefore, cadet training programs must prioritize the cultivation of these professional attributes to ensure that future maritime professionals uphold the highest standards of conduct and excellence in their roles.

Table 8: Attributes of Professionalism

Attributes	Importance (%)
Technical Competence	30
Ethics and Integrity	25
Teamwork and Collaboration	20
Leadership and Adaptability	15
Cultural Sensitivity	10

Empowerment through Standardization

Standardization plays a crucial role in empowering cadets and maritime professionals by providing a clear framework and benchmark for education, training, and certification. By adhering to standardized curricula, assessment methods, and instructor qualifications, educational institutions can ensure consistency and quality in cadet teaching, thereby equipping cadets with the requisite knowledge, skills, and competencies to excel in their maritime careers.

In conclusion, the analysis of research, needs, and professionalism in maritime education serves to contextualize and reinforce the significance of pedagogical approaches in cadet teaching. By aligning with international standards, addressing emerging needs, and fostering professionalism, cadet training programs can effectively prepare future maritime professionals to meet the demands of the industry and uphold the highest standards of competence, safety, and professionalism prescribed by the IMO-STCW and other regulatory bodies.

Discussion

The results presented above offer valuable insights into the pedagogical approaches in cadet teaching within maritime education, as well as an analysis of the broader context encompassing the needs and professionalism requisite in maritime training. In this discussion, we delve deeper into the implications of these findings, drawing connections between pedagogical practices, international standards, emerging needs, and professionalism in the maritime industry.

Integration of Pedagogical Approaches and International Standards

One of the central themes that emerge from the results is the importance of aligning pedagogical approaches with international standards, particularly those set forth by the International Maritime Organization (IMO) and the Standards of Training, Certification, and Watchkeeping (STCW) (Chirea-Ungureanu, 2021; Christodoulou-Varotsi & Pentsov, 2008). The high degree of alignment observed in curriculum design and practical training emphasizes the commitment of educational institutions to ensuring that cadet training programs adhere to rigorous standards of competency and proficiency. By incorporating internationally recognized frameworks and guidelines into their pedagogical practices, educators can instill a strong foundation of knowledge and skills among cadets, preparing them to meet the challenges and demands of the maritime industry (de la Peña Zarzuelo et al., 2020). However, the results also reveal areas where alignment with international standards falls short, particularly in the qualifications of instructors. While the majority of instructors possess the requisite technical expertise, there is room for improvement in ensuring that they meet the specified qualifications and standards for teaching in maritime

education programs. Addressing this discrepancy requires concerted efforts from educational institutions to provide professional development opportunities for instructors, ensuring that they remain abreast of the latest industry developments and best practices in cadet teaching.

Meeting Emerging Needs in Maritime Education

The analysis of needs in maritime education highlights several key areas requiring attention and improvement to better prepare cadets for the challenges of the maritime industry. The increasing integration of emerging technologies into training programs emerges as a priority, reflecting the rapidly evolving nature of maritime operations and the growing reliance on digital tools and systems (Holland & Holland, 2014). Educational institutions must adapt their curricula and teaching methodologies to incorporate cutting-edge technologies such as simulation, virtual reality, and e-learning platforms, thereby equipping cadets with the digital literacy and technical skills essential for success in the modern maritime workplace. Furthermore, the results emphasize the importance of enhancing soft skills development, particularly in areas such as communication, leadership, and cultural sensitivity. As maritime operations become increasingly globalized and multicultural, the ability to collaborate effectively with diverse teams and navigate cross-cultural differences becomes indispensable (Mallam et al., 2019).

Cadet training programs must therefore incorporate opportunities for experiential learning, teamwork, and cultural immersion to foster the development of these essential soft skills among cadets. Additionally, promoting a safety culture and risk management awareness emerges as a critical need in maritime education, reflecting the industry's ongoing efforts to improve safety standards and mitigate operational risks. Educational institutions play a pivotal role in instilling a strong commitment to safety among cadets, providing training in emergency procedures, hazard identification, and risk assessment (Mandaraka-Sheppard, 2014; Utne et al., 2017). By integrating safety awareness into every aspect of cadet training, from classroom instruction to practical exercises, educators can cultivate a culture of safety consciousness that permeates throughout the maritime workforce.

Fostering Professionalism in Maritime Education

The discussion of professionalism in maritime education emphasizes the importance of instilling a strong sense of ethics, integrity, and accountability among cadets (Bee, 2017; Dyagileva et al., 2020). While technical competence remains essential, professionalism encompasses a broader set of attributes including teamwork, leadership, adaptability, and cultural sensitivity. By prioritizing the cultivation of these professional attributes, cadet training programs can prepare future maritime professionals to navigate the complexities of the industry with confidence and integrity (Zhang et al., 2014). Moreover, adherence to standardized frameworks and benchmarks empowers cadets and maritime professionals by providing a clear roadmap for education, training, and certification. Standardization ensures consistency and quality in cadet teaching, enabling educational institutions to meet the stringent requirements set forth by regulatory bodies such as the IMO-STCW. By aligning with international standards, cadet training programs can enhance their credibility and relevance, thereby facilitating smoother transitions from academia to industry and promoting greater confidence and trust among employers and stakeholders.

Implications for Practice and Policy

The results and discussion presented in this research have several implications for practice and policy in maritime education (Mandaraka-Sheppard, 2014; Rochwulaningsih et al., 2019). Educational institutions must prioritize alignment with international standards, integrating emerging technologies, addressing emerging needs, and fostering professionalism among cadets. This requires a concerted effort from educators, administrators, policymakers, and industry stakeholders to collaborate and innovate in cadet teaching and training (Neve et al., 2020). By working together to address the evolving needs of the maritime industry, educational institutions can ensure that cadets are equipped with the knowledge, skills, and competencies needed to excel in their maritime careers and contribute to the safety, sustainability, and prosperity of the maritime industry as a whole.

CONCLUSION

This research has provided valuable insights into the pedagogical approaches in cadet teaching within maritime education, as well as an analysis of the broader context encompassing the needs and professionalism requisite in maritime training. By exploring the perceptions, experiences, and effectiveness of different teaching methodologies, this study has shed light on the intricacies of cadet education and its impact on learning outcomes. The results emphasize the importance of aligning pedagogical practices with international standards, particularly those set forth by the International Maritime Organization (IMO) and the Standards of Training, Certification, and Watchkeeping (STCW).

Educational institutions must prioritize adherence to these rigorous standards, ensuring that cadet training programs meet the requirements for competency and proficiency prescribed by regulatory bodies. By incorporating internationally recognized frameworks and guidelines into their pedagogical practices, educators can equip cadets with the knowledge, skills, and competencies needed to excel in their maritime careers. This research emphasizes the importance of continuous improvement and innovation in cadet teaching and training, driven by a commitment to excellence, professionalism, and adherence to international standards. By addressing the evolving needs of the maritime industry and fostering a culture of lifelong learning and development, educational institutions can play a pivotal role in shaping the future cadre of maritime professionals and contributing to the safety, sustainability, and prosperity of the maritime industry as a whole.

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