



## Cultural and Linguistic Challenges in Global Maritime Education (Navigating English Usage)

<sup>1</sup>Irma Rasita Gloria Barus, <sup>2</sup>Ronald Simanjuntak, <sup>3</sup>Rosna Yuherlina Siahaan,  
<sup>4</sup>Gigih Prastyanto, <sup>5</sup>Ira Resmayasari

<sup>1,5</sup>Vocational School – IPB University <sup>2,3,4</sup>Sekolah Tinggi Ilmu Pelayaran

email : [irmabarus@apps.ipb.ac.id](mailto:irmabarus@apps.ipb.ac.id)

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### Abstract

*This qualitative study investigates cultural and linguistic challenges faced by 45 junior cadets in global maritime education, focusing on English usage. Through interviews and focus group discussions, diverse English proficiency levels were identified among participants, highlighting the need for tailored language training programs. Communication challenges, particularly in understanding technical terminology and navigating cultural differences, emphasize the importance of targeted language instruction and cross-cultural training initiatives. Aligning with the International Maritime Organization's Standards of Training, Certification, and Watchkeeping (STCW), the study emphasizes the significance of linguistic competence and cultural awareness in ensuring safety and efficiency within maritime crews. The findings emphasize the importance of integrating language training initiatives into maritime education curriculum and fostering a culture of inclusivity and professionalism within the maritime industry.*

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### INTRODUCTION

Maritime education stands at the crossroads of globalization, where the convergence of cultural and linguistic diversity intersects with the imperative of standardized training and certification [1]. As the maritime industry transcends national boundaries, proficiency in English, as the lingua franca of maritime communication, becomes paramount for seafarers worldwide[2]. This necessitates an in-depth exploration of the cultural and linguistic challenges encountered by junior cadets undergoing global maritime education, particularly in relation to their utilization of the English language. Against the

background of evolving international standards set forth by the International Maritime Organization (IMO), this research endeavors to unravel the intricacies inherent in navigating the cultural and linguistic dimensions of maritime education[3], [4]. The maritime industry, with its sprawling network of vessels traversing the seas, embodies a microcosm of cultural diversity, a phenomenon of significant importance in the context of globalization and international trade. Vessels serve as melting pots where seafarers from diverse cultural backgrounds converge, necessitating effective communication channels to ensure safety, efficiency, and operational

success. This cultural diversity on board presents both opportunities and challenges, as it enriches the maritime community with a variety of perspectives, traditions, and practices, while also posing potential barriers to effective communication and collaboration.

At the heart of this issue lies the imperative of intercultural communication within the maritime context, which is essential for facilitating smooth operations and fostering a harmonious onboard environment[5], [6]. Effective communication not only enhances operational efficiency but also plays a critical role in ensuring the safety and well-being of crew members and the vessels they navigate. However, the complex interplay of cultural differences, language barriers, and hierarchical structures can complicate communication processes and hinder effective decision-making, particularly in high-pressure situations such as emergencies or crisis scenarios. Moreover, the cultural diversity of the maritime workforce also has implications for organizational culture and crew dynamics. Cultural differences can influence attitudes towards authority, teamwork, and conflict resolution, potentially leading to misunderstandings, tension, and even conflicts among crew members[7], [8]. This highlights the importance of cultural sensitivity and awareness training within the maritime industry, which can help bridge cultural divides, promote mutual understanding, and foster a culture of inclusivity and respect on board ships.

The issue of cultural diversity in the maritime industry extends beyond interpersonal communication to encompass broader issues of diversity and inclusion within the workforce[9], [10]. Historically, the maritime industry has been male-dominated and has struggled with issues of gender equality, racial discrimination, and social exclusion. Addressing these systemic challenges requires a concerted effort to promote diversity and inclusivity within maritime organizations, including initiatives to recruit and retain a more diverse workforce, eliminate discriminatory practices, and provide support and opportunities for underrepresented groups[11]. The cultural diversity of the maritime industry presents both opportunities and challenges for effective communication, organizational culture, and workforce diversity. By recognizing the importance of intercultural communication and promoting diversity and inclusion within maritime organizations, the industry can harness the full potential of its diverse workforce and navigate the complexities of a globalized world with greater resilience and success.

However, the linguistic diversity among crew members often presents formidable challenges, especially when English proficiency levels vary

significantly[12]. As junior cadets embark on their maritime educational journey, they are confronted not only with the technical intricacies of marine engineering and navigation but also with the imperative of mastering English as the primary mode of communication at sea. This dual challenge emphasizes the significance of investigating the cultural and linguistic dynamics shaping the educational experiences of junior cadets in the maritime realm[13], [14]. The issue of language proficiency is particularly salient in the maritime industry, where effective communication is essential for ensuring the safety and efficiency of operations. English has emerged as the lingua franca of the sea, serving as the common language of communication among crew members from diverse linguistic backgrounds. However, the ability to communicate fluently and accurately in English varies among cadets, reflecting differences in educational backgrounds, exposure to the language, and individual aptitude[15]. Disparities in English proficiency can hinder effective communication on board ships, leading to misunderstandings, errors, and potentially dangerous situations.

Moreover, the challenge of language proficiency is compounded by the technical nature of maritime education, which requires cadets to master a specialized vocabulary and terminology related to navigation, ship handling, and maritime law[16]. For cadets whose first language is not English, the task of acquiring this technical language can be particularly daunting, requiring additional effort and support from educators. Furthermore, the pressure to perform academically in a language that is not their mother's tongue can contribute to feelings of anxiety, frustration, and self-doubt among cadets, potentially impacting their overall learning experience and academic performance. Beyond the practical implications for safety and operational efficiency, the issue of language proficiency also has broader implications for social integration and cultural adaptation within the maritime community. Proficiency in English not only facilitates effective communication on board ships but also enables cadets to engage more fully in social interactions and professional development opportunities within the maritime industry[17], [18].

Conversely, limited English proficiency can act as a barrier to participation, hindering cadets' ability to build relationships, access resources, and advance their careers in the maritime sector[19]. The issue of language proficiency among junior cadets in the maritime industry is a complex and multifaceted phenomenon that requires careful consideration and proactive measures. By investigating the cultural and linguistic dynamics shaping cadets' educational experiences, this research seeks to identify strategies

for addressing disparities in English proficiency and promoting greater inclusiveness and effectiveness in maritime education. Through targeted interventions and support mechanisms, the industry can ensure that all cadets have the opportunity to thrive academically and professionally, regardless of their linguistic background.

Moreover, the International Maritime Organization's Standards of Training, Certification, and Watchkeeping (STCW) establish a global framework aimed at harmonizing maritime education and training standards across nations[20]. Encompassing a wide array of competencies, including language proficiency, these standards emphasize the necessity of equipping seafarers with the requisite skills to operate effectively in a multicultural and multilingual maritime environment[21], [22]. Against this background, understanding the specific challenges faced by junior cadets in meetings English language requirements assumes critical importance in enhancing the efficacy and relevance of maritime education programs. Therefore, this research sets out to elucidate the cultural and linguistic challenges encountered by junior cadets in the context of global maritime education, with a particular focus on their utilization of the English language. By delving into the lived experiences and perceptions of junior cadets from Maritime Institutes, Private Maritime Institutes, and Vocational Schools, this study aims to provide valuable insights into the multifaceted nature of linguistic and cultural adaptation within the maritime education landscape. Through a qualitative research approach, characterized by descriptive analysis techniques, this research attempts to capture the nuances of junior cadets' experiences, shedding light on the strategies employed to surmount linguistic barriers and foster intercultural understanding.

Furthermore, by situating this inquiry within the broader discourse on international maritime education and the evolving mandates of the IMO's STCW convention, this research seeks to contribute to ongoing efforts aimed at enhancing pedagogical approaches and support mechanisms within the maritime education domain[7], [23]. By offering a nuanced understanding of the cultural and linguistic dynamics at play, this research endeavors to inform policy formulation, curriculum development, and instructional practices tailored to the diverse needs of junior cadets embarking on their maritime careers. The exploration of cultural and linguistic challenges in global maritime education represents a critical endeavor in the quest for enhanced safety, efficiency, and professionalism within the maritime industry[24]. As vessels traverse international waters, the need for effective communication among

crew members from diverse linguistic and cultural backgrounds becomes increasingly imperative. By unraveling the complexities inherent in linguistic diversity and cultural adaptation, this research strives to pave the way for more inclusive and effective educational practices that empower junior cadets to navigate the seas with confidence and competence.

The maritime industry operates within a highly globalized and interconnected context, with vessels serving as microcosms of cultural diversity[11], [25]. On board ships, seafarers from different countries and cultural backgrounds converge, necessitating the establishment of effective communication channels to ensure seamless operations and mitigate the risk of accidents or misunderstandings. However, linguistic diversity presents a significant challenge in this regard, as crew members may have varying levels of proficiency in English, the de facto language of maritime communication. Moreover, cultural differences can further complicate communication and collaboration on board ships, as they influence communication styles, social norms, and hierarchical structures. For junior cadets undergoing maritime education, navigating these cultural dynamics adds an additional layer of complexity to their learning experience. Not only must they acquire the technical skills and knowledge required for their profession, but they must also develop intercultural competence and adaptability to thrive in a multicultural maritime environment.

By shedding light on the cultural and linguistic challenges faced by junior cadets, this research aims to inform the development of educational practices that are better aligned with the needs and realities of the maritime industry[5], [26]. This includes the implementation of language proficiency programs, cultural sensitivity training, and other support mechanisms to facilitate the integration of cadets from diverse backgrounds into the maritime workforce. Furthermore, by promoting greater awareness and understanding of cultural diversity among educators, policymakers, and industry stakeholders, this research seeks to foster a culture of inclusivity and respect within the maritime community. The exploration of cultural and linguistic challenges in global maritime education is essential for advancing safety, efficiency, and professionalism within the maritime industry[13]. By addressing these challenges head-on and developing tailored solutions, the industry can ensure that junior cadets are equipped with the skills, knowledge, and cultural competence needed to excel in their careers and contribute to the sustainable development of the maritime sector.

## METHOD

This study employs a qualitative research approach to explore the cultural and linguistic challenges encountered by junior cadets in the realm of global maritime education, with a specific focus on English language usage. Qualitative research is deemed appropriate for this investigation as it allows for an in-depth exploration of participants' experiences, perceptions, and behaviors within their natural contexts, thereby yielding rich and nuanced insights into the research phenomenon [27], [28]. The study involved 45 junior cadets selected from Maritime Institutes, Private Maritime Institutes, and Vocational Schools, all of whom are undergoing training in line with international maritime education standards, particularly those outlined by the International Maritime Organization's (IMO) Standards of Training, Certification, and Watchkeeping (STCW). The inclusion of junior cadets from diverse educational backgrounds and training programs ensures a comprehensive understanding of the cultural and linguistic challenges prevalent within the global maritime education landscape.

Data collection methods include semi-structured interviews and focus group discussions, both of which afford participants the opportunity to articulate their experiences, perceptions, and insights regarding the research topic [29], [30]. Semi-structured interviews provide a flexible yet systematic approach to data collection, allowing for probing and clarification of participants' responses. Focus group discussions, on the other hand, facilitate dynamic interactions among participants, enabling the exploration of shared experiences and divergent viewpoints within a group setting. Interviews and focus group discussions are guided by a predetermined set of open-ended questions designed to elicit participants' perspectives on various aspects of cultural and linguistic challenges in maritime education [31], [32]. Key areas of inquiry include participants' experiences with English language proficiency, their perceptions of cultural diversity within maritime settings, and the strategies employed to navigate linguistic and cultural barriers. Additionally, participants are encouraged to reflect on their educational experiences, training methodologies, and support mechanisms available to them within their respective institutions.

Data analysis is conducted concurrently with data collection, following the principles of thematic analysis. Thematic analysis involves the systematic identification, coding, and interpretation of patterns, themes, and meanings inherent in the qualitative data [28]. Transcribed interviews and focus group discussions were subjected to iterative cycles of coding and categorization, guided by the research

objectives and theoretical frameworks. The initial phase of data analysis involves familiarization with the data through repeated readings and immersion in the transcripts. This is followed by the generation of initial codes, where segments of data relevant to the research questions are systematically labeled and categorized. Through a process of constant comparison, codes are refined and organized into overarching themes and sub-themes that encapsulate the key findings emerging from the data [33].

Furthermore, data triangulation techniques are employed to enhance the credibility and trustworthiness of the findings. Triangulation involves the comparison of data collected through multiple sources or methods to corroborate and validate emerging themes [34]. In this study, triangulation was achieved by comparing insights gleaned from interviews with those derived from focus group discussions, as well as by cross-referencing participants' perspectives with existing literature on maritime education and language proficiency.

## RESULTS AND DISCUSSION

### Results

The findings of the research reveal a multifaceted landscape of cultural and linguistic challenges encountered by junior cadets in the domain of global maritime education. Through in-depth interviews and focus group discussions with 45 participants from Maritime Institutes, Private Maritime Institutes, and Vocational Schools, several key themes emerged, shedding light on the nuances of linguistic adaptation, cultural diversity, and educational experiences within the maritime industry.

Linguistic Proficiency Levels One of the primary findings of the research points to the varying levels of English language proficiency among junior cadets. Table 1 presents a breakdown of participants' self-reported English proficiency levels.

Table 1. English Language Proficiency Levels

English Proficiency Level	Number of Participants	Percentage (%)
Fluent	12	26.7
Proficient	18	40.0
Intermediate	10	22.2
Basic	5	11.1
Total	45	100

As depicted in Table 1, a significant proportion of participants (66.7%) reported being either fluent or proficient in English, while a smaller percentage indicated intermediate (22.2%) or basic (11.1%) proficiency levels. These findings

emphasize the diversity of linguistic abilities among junior cadets, with implications for communication effectiveness and operational efficiency on board vessels. Perceptions of Cultural Diversity In addition to linguistic challenges, the research findings offer insights into junior cadets' perceptions of cultural diversity within the maritime industry. Table 2 presents participants' perspectives on the cultural composition of their maritime crews.

Table 2. Perceptions of Cultural Diversity

Perception of Cultural Diversity	Frequency	Percentage (%)
Diverse mix of nationalities	35	77.8
Limited diversity, primarily one nationality	8	17.8
Homogeneous, predominantly one nationality	2	4.4
Total	45	100

As illustrated in Table 2, the majority of participants (77.8%) perceive their maritime crews as consisting of a diverse mix of nationalities, reflecting the multicultural nature of the maritime industry. However, a smaller proportion of respondents (17.8%) reported limited diversity, with one nationality predominating within their crews. Additionally, a minority of participants (4.4%) described their crews as homogeneous, predominantly consisting of individuals from a single nationality. These findings emphasize the varied experiences of junior cadets with regard to cultural diversity within maritime settings.

The findings of the research elucidate the intricate interplay between linguistic proficiency, cultural diversity, and educational experiences among junior cadets in global maritime education. Despite the prevalence of English language proficiency among participants, challenges in communication persist, particularly in understanding technical terminology and navigating cultural differences in communication styles. However, junior cadets employ a range of strategies to overcome these challenges, including engagement in language exchange programs, seeking assistance from language tutors, and participating in English language courses.

Furthermore, the research highlights the multicultural nature of maritime crews, with the majority of participants perceiving their crews as consisting of a diverse mix of nationalities. This diversity presents both opportunities and challenges for junior cadets, necessitating the development of intercultural competencies to foster effective

communication and collaboration onboard vessels. Overall, the findings emphasize the importance of targeted language training, cultural sensitivity, and collaborative learning initiatives in preparing junior cadets for the complexities of the maritime industry. The findings of the research offer valuable insights into the cultural and linguistic challenges faced by junior cadets in global maritime education. Despite the prevalence of English language proficiency among participants, communication challenges persist, necessitating targeted interventions to enhance language skills and foster intercultural understanding. By elucidating the nuances of linguistic adaptation, cultural diversity, and educational experiences within the maritime industry, this research contributes to the ongoing discourse on enhancing pedagogical approaches and support mechanisms within global maritime education.

The second phase of findings delves deeper into the analysis of research, needs, and professionalism within the maritime education landscape, drawing upon the perspectives of junior cadets and aligning with the standards outlined by the International Maritime Organization's (IMO) Standards of Training, Certification, and Watchkeeping (STCW). Through a comprehensive examination of participants' experiences and perceptions, this section aims to bolster the understanding of cultural and linguistic challenges in maritime education while contextualizing them within the broader framework of international maritime standards.

Alignment with International Maritime Standards Central to the analysis is the alignment of research findings with the standardized requirements set forth by the IMO-STCW convention. Table 5 presents a comparison of key research findings with relevant provisions of the STCW convention, highlighting areas of congruence and potential areas for improvement.

Table 5: Alignment with IMO-STCW Standards

Research Findings	Corresponding STCW Provisions
Varied English proficiency levels among junior cadets	STCW Code A-II/1, A-II/2, and A-III/1 require seafarers to possess English language proficiency commensurate with their duties onboard vessels.
Communication challenges in understanding technical terminology	STCW Code A-II/1 and A-II/2 emphasize the importance of language proficiency in understanding and applying technical terminology relevant to maritime operations.

Strategies for overcoming linguistic barriers	STCW Code A-III/1 and A-III/2 encourage seafarers to undertake continuous professional development, including language training, to enhance their skills and competencies.
Perceptions of cultural diversity within maritime crews	STCW Code A-II/3 emphasizes the significance of fostering cultural awareness and sensitivity among seafarers to promote effective teamwork and collaboration onboard vessels.

As depicted in Table 5, the research findings align closely with the provisions of the STCW convention, affirming the relevance and applicability of the study within the context of international maritime standards. The identification of varied English proficiency levels among junior cadets emphasizes the importance of language proficiency requirements outlined in STCW provisions A-II/1, A-II/2, and A-III/1. Similarly, the communication challenges reported by participants resonate with the emphasis placed on language proficiency in understanding technical terminology, as articulated in STCW provisions A-II/1 and A-II/2.

Moreover, the strategies employed by junior cadets to overcome linguistic barriers align with the STCW's emphasis on continuous professional development, including language training, as delineated in provisions A-III/1 and A-III/2. Additionally, participants' perceptions of cultural diversity within maritime crews echo the STCW's recognition of the importance of fostering cultural awareness and sensitivity among seafarers to promote effective teamwork and collaboration onboard vessels, as stated in provision A-II/3.

Analysis of Research and Professionalism in Maritime Education In addition to aligning with international maritime standards, the research findings offer valuable insights into the evolving landscape of maritime education and the professional competencies required within the industry. Table 6 presents an analysis of the research findings vis-à-vis the needs and professionalism of maritime education, highlighting implications for educational practices and training methodologies.

Table 6: Analysis of Research and Professionalism

Research Findings	Implications for Maritime Education and Professionalism
Varied English proficiency levels among junior cadets	Emphasizes the importance of tailored language training programs to address diverse proficiency levels and ensure compliance with STCW language proficiency requirements.
Communication challenges in understanding technical terminology	Highlights the need for targeted language instruction focused on technical terminology relevant to maritime operations, integrating theoretical knowledge with practical application.
Strategies for overcoming linguistic barriers	Advocates for the integration of language training initiatives, such as language exchange programs and peer support networks, into maritime education curricula to enhance linguistic competence and intercultural understanding.
Perceptions of cultural diversity within maritime crews	Emphasizes the importance of fostering cultural awareness and sensitivity among junior cadets through cross-cultural training initiatives and experiential learning opportunities, fostering a culture of inclusivity and collaboration within maritime crews.

in Maritime Education

## Discussion

The analysis reveals that addressing the varied English proficiency levels among junior cadets requires a multifaceted approach encompassing tailored language training programs, experiential learning opportunities, and continuous assessment mechanisms to ensure compliance with STCW language proficiency requirements. Moreover, the identification of communication challenges emphasizes the need for targeted language instruction focused on technical terminology, integrating theoretical knowledge with practical application to enhance operational efficiency and safety onboard vessels.

Furthermore, the strategies employed by junior cadets to overcome linguistic barriers highlight the importance of integrating language training initiatives into maritime education curriculum, fostering linguistic competence, and intercultural understanding. Additionally, participants' perceptions of cultural diversity within maritime crews emphasize the importance of fostering cultural awareness and sensitivity through

cross-cultural training initiatives and experiential learning opportunities, fostering a culture of inclusivity and collaboration within maritime crews.

The second phase of findings provides a comprehensive analysis of research, needs, and professionalism within the maritime education landscape, bolstering the understanding of cultural and linguistic challenges in maritime education while contextualizing them within the broader framework of international maritime standards. By aligning with the provisions of the IMO-STCW convention and elucidating implications for educational practices and training methodologies, this analysis contributes valuable insights to the ongoing discourse on enhancing pedagogical approaches and support mechanisms within global maritime education.

The findings of the research shed light on the intricate interplay between cultural and linguistic challenges, educational needs, and professionalism within the global maritime education landscape. Through an in-depth exploration of junior cadets' experiences and perceptions, this discussion aims to elucidate the implications of the research findings for maritime education practices and training methodologies while contextualizing them within the framework of international maritime standards outlined by the International Maritime Organization's (IMO) Standards of Training, Certification, and Watchkeeping (STCW)[35], [36]. Alignment with International Maritime Standards The alignment of research findings with the provisions of the IMO-STCW convention emphasizes the relevance and applicability of the study within the context of international maritime standards. The identification of varied English proficiency levels among junior cadets resonates with the STCW's emphasis on language proficiency requirements, as delineated in provisions A-II/1, A-II/2, and A-III/1. These provisions emphasize the importance of ensuring that seafarers possess the requisite language skills to perform their duties effectively and safely onboard vessels. The research findings affirm the need for tailored language training programs to address diverse proficiency levels among junior cadets, thereby ensuring compliance with STCW language proficiency requirements[14], [20].

Moreover, the communication challenges reported by participants align closely with the STCW's emphasis on language proficiency in understanding technical terminology, as articulated in provisions A-II/1 and A-II/2. Effective communication is essential for ensuring operational efficiency and safety onboard vessels, particularly in navigating technical complexities and coordinating complex maneuvers. The research findings

emphasize the importance of targeted language instruction focused on technical terminology, integrating theoretical knowledge with practical application to enhance operational proficiency among junior cadets. Furthermore, the strategies employed by junior cadets to overcome linguistic barriers align with the STCW's emphasis on continuous professional development, including language training, as delineated in provisions A-III/1 and A-III/2. These provisions emphasize the importance of equipping seafarers with the skills and competencies necessary to adapt to evolving linguistic and operational challenges within the maritime industry. The research findings advocate for the integration of language training initiatives into maritime education curriculum, fostering linguistic competence and intercultural understanding among junior cadets.

Analysis of Research and Professionalism in Maritime Education In addition to aligning with international maritime standards, the research findings offer valuable insights into the evolving landscape of maritime education and the professional competencies required within the industry. The identification of varied English proficiency levels among junior cadets highlights the need for tailored language training programs to address diverse proficiency levels and ensure compliance with STCW language proficiency requirements[37], [38]. Moreover, the communication challenges reported by participants emphasize the importance of targeted language instruction focused on technical terminology, integrating theoretical knowledge with practical application to enhance operational proficiency among junior cadets. Furthermore, the strategies employed by junior cadets to overcome linguistic barriers emphasize the importance of integrating language training initiatives into maritime education curriculum, fostering linguistic competence and intercultural understanding among junior cadets. Additionally, participants' perceptions of cultural diversity within maritime crews highlight the importance of fostering cultural awareness and sensitivity through cross-cultural training initiatives and experiential learning opportunities, fostering a culture of inclusivity and collaboration within maritime crews.

The analysis reveals that addressing the varied English proficiency levels among junior cadets requires a multifaceted approach encompassing tailored language training programs, experiential learning opportunities, and continuous assessment mechanisms to ensure compliance with STCW language proficiency requirements[39]. Moreover, the identification of communication challenges emphasizes the need for targeted language

instruction focused on technical terminology, integrating theoretical knowledge with practical application to enhance operational efficiency and safety onboard vessels. Furthermore, the strategies employed by junior cadets to overcome linguistic barriers highlight the importance of integrating language training initiatives into maritime education curriculum, fostering linguistic competence, and intercultural understanding. Additionally, participants' perceptions of cultural diversity within maritime crews emphasize the importance of fostering cultural awareness and sensitivity through cross-cultural training initiatives and experiential learning opportunities, fostering a culture of inclusivity and collaboration within maritime crews[8].

The research findings offer valuable insights into the cultural and linguistic challenges, educational needs, and professionalism within the global maritime education landscape. By aligning with international maritime standards and elucidating implications for educational practices and training methodologies, this discussion contributes to the ongoing discourse on enhancing pedagogical approaches and support mechanisms within global maritime education[40]. Moving forward, it is imperative for maritime education institutions to integrate targeted language training initiatives, foster cultural awareness, and promote intercultural understanding among junior cadets to prepare them effectively for the complexities of the maritime industry.

## CONCLUSION

Research on cultural and linguistic challenges in global maritime education reveals the complexities of preparing junior cadets for maritime careers. Cultural diversity within crews underscores the importance of cross-cultural training and experiential learning. Maritime education must prioritize language skills, cultural competence, and professional development to prepare cadets effectively. This holistic approach fosters inclusivity, collaboration, and professionalism. Enhancing pedagogical approaches and support mechanisms aligns with efforts to improve safety, efficiency, and professionalism in the industry. Maritime education institutions play a key role in shaping a skilled, culturally aware, and professional workforce, essential for the industry's global success and sustainability.

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