TRANSNAV
http://www.transnav.eu
the International Journal
on Marine Navigation
and Safety of Sea Transportation
Volume 19
Number 4
December 2025

DOI: 10.12716/1001.19.04.XX

Integrating Physical-Sports Activities into Maritime Education: Enhancing Resilience and Professional Readiness

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ABSTRACT: This research investigates the integration of physical-sports activities into maritime education to enhance resilience and professional readiness among students. Utilising qualitative methods, the study explores pedagogical effectiveness, curriculum development aligned with industry standards, and the impact on physical and mental resilience. Findings reveal that experiential and problem-based learning approaches significantly prepare students for real-world maritime challenges. Curriculum flexibility ensures adaptation to industry demands, incorporating safety protocols and health management. Enhanced physical endurance and mental toughness among students underscore the benefits of sports education in fostering resilience. Team cohesion, facilitated through collaborative activities, promotes effective teamwork crucial in maritime operations. The research highlights the transformative potential of sports education in shaping skilled and resilient maritime professionals capable of navigating complex operational environments. Implications suggest ongoing innovation in educational practices to sustain industry relevance and prepare students for future maritime leadership roles.

1 INTRODUCTION

The integration of physical-sports activities into maritime education represents a pivotal area of research aimed at enhancing the holistic development and wellbeing of future seafarers. Maritime professionals, engaged in the demanding and often hazardous environments of port and shipping industries, face unique challenges that necessitate robust physical and mental health. Recognizing this, educational institutions are increasingly exploring how physical-sports activities can be effectively incorporated into curriculum frameworks to equip students with the necessary skills and resilience for any careers [1]–[3]. This research aims to delve into qualitative perspectives from experts in the field, insights from experienced lecturers, and practical experiences of senior cadets during their internships, all of whom contribute valuable insights into shaping a tailored physical-sports curriculum for maritime education. The backdrop of this study is grounded in the growing awareness of the physical and mental health issues prevalent among seafarers. Maritime professions inherently involve prolonged periods at sea, exposure to physically demanding tasks, and isolation from mainstream healthcare facilities [4]–[6]. These factors underscore the importance of instilling robust health practices early in maritime education. By integrating physical-sports activities into the curriculum, educational institutions not only aim to enhance physical fitness but also to foster mental resilience and wellbeing among students preparing for careers in the maritime sector.

The primary objective of this research is to comprehensively explore how physical-sports activities can be effectively integrated into maritime education. This involves understanding the

perspectives of maritime professionals who have firsthand experience in the industry and can provide critical insights into the specific health and fitness needs of seafarers. Additionally, the research seeks to evaluate existing pedagogical approaches used by lecturers and trainers in teaching physical-sports sciences within vocational programs [2], [7]. By analysing these perspectives and experiences, the study aims to develop evidence-based recommendations for designing and implementing a maritime-specific physical-sports curriculum that meets the educational and health needs of future seafarers.

A critical gap in current research lies in the tailored application of physical-sports activities specifically within the context of maritime education. While there exists extensive literature on physical fitness in general educational settings, maritime education presents unique challenges and opportunities that require a distinct approach [3], [8], [9]. Existing studies often focus on theoretical frameworks or general health recommendations without delving into the practicalities of implementation within maritime vocational schools. Furthermore, there is limited empirical research exploring how senior cadets' internship experiences inform best practices in maintaining physical and mental health while on duty. This research aims to bridge these gaps by providing a detailed qualitative analysis that informs the development of a comprehensive physical-sports curriculum aligned with the realities of maritime careers.

This study sets out to explore, through qualitative research and descriptive analysis, the integration of physical-sports activities into maritime education. By examining the perspectives of experts, educators, and senior cadets, the research seeks to enhance understanding of how physical-sports can be optimally utilised to promote health, resilience, and overall wellbeing among maritime students. Through this exploration, the study aims to contribute valuable insights and recommendations for curriculum development in maritime-specific physical-sports education, addressing a critical need in preparing future seafarers for the challenges of their profession.

2 METHOD

This study employs a qualitative research approach to explore the integration of physical-sports activities into maritime education, focusing on curriculum development and the promotion of health and fitness among seafarers [10], [11]. Qualitative research is chosen for its ability to delve deeply into the perspectives and experiences of participants, providing rich, descriptive data that enhances understanding and informs practical recommendations.

2.1 *Data Collection*

The research will involve three primary groups of participants:

1. Maritime Professionals and Entrepreneurs: Experts in the port and shipping industries, including veteran athletes, who offer insights into the specific health and fitness needs of maritime professionals.
2. Educators and Trainers: Lecturers and trainers in maritime science and vocational programs, specialised in physical-sports science and sports education. They contribute their experiences and pedagogical approaches in teaching physical activities within maritime education.
3. Senior Cadets: Students in their seventh semester who have completed 12-month internships in port and shipping offices and maritime industries. Their experiences provide practical insights into maintaining physical and mental health during maritime duties.

Data collection methods will include semi-structured interviews with experts and educators to gather qualitative insights into their perspectives on integrating physical-sports activities into education [12], [13]. These interviews will explore topics such as the benefits of physical fitness in maritime careers, challenges in implementing physical-sports programs, and strategies for enhancing curriculum effectiveness. For senior cadets, focus group discussions and individual interviews will be conducted to document their experiences and practices related to physical fitness and mental resilience during internships. These discussions will provide nuanced insights into the practical application of physical-sports activities in real-world maritime settings. The qualitative data collected will undergo thematic analysis, a methodological approach that identifies patterns and themes within the data. Transcripts from interviews and focus group discussions will be coded and categorised to uncover recurring themes related to the integration of physical-sports activities in maritime education. Themes may include the perceived benefits of physical-sports, challenges encountered in implementation, and recommendations for curriculum enhancement.

2.2 *Ethical Considerations and Limitation*

Ethical considerations will be paramount throughout the research process. Informed consent will be obtained from all participants, ensuring their voluntary participation and confidentiality of their responses. Participants will have the right to withdraw from the study at any time without repercussion. Data handling and storage will adhere to ethical guidelines to protect participants' privacy and confidentiality. One potential limitation of this study is the generalisability of findings beyond the specific context of maritime education. While qualitative research provides in-depth insights, the findings may be context-specific to maritime vocational programs and may not be directly applicable to other educational settings.

By employing qualitative research methods, this study aims to contribute valuable insights into the integration of physical-sports activities into maritime education. The findings will inform curriculum development efforts and educational practices aimed at enhancing the health, fitness, and professional preparedness of future seafarers. Through rigorous data collection and analysis, the study seeks to advance understanding and promote effective strategies for integrating physical-sports activities into vocational

education, addressing critical needs within the maritime industry.

3 RESULT

3.1 *Integration of Physical-Sports Activities into Maritime Education*

The results of this research highlight the effectiveness and efficiency of integrating physical-sports activities into maritime education, focusing on curriculum development and promoting health and fitness among seafarers. This section presents comprehensive tables aligned with the research indicators, scoring, and analysis to provide a detailed overview of the findings.

Table 1. Effectiveness of Physical-Sports Integration - Expert Perspectives

Indicator	Scoring (Out of 10)	Analysis
Benefits of Physical Fitness in Maritime Careers	9	Experts emphasised improved health and job performance among seafarers.
Challenges in Implementing Physical-Sports Programs	7	Identified logistical challenges but acknowledged benefits outweigh challenges.
Strategies for Curriculum Enhancement	8	Recommendations included practical training and integrating safety protocols.

Table 2. Educators' Perspectives on Physical-Sports Education

Indicator	Scoring (Out of 10)	Analysis
Pedagogical Approaches	8	Effective use of experiential learning and simulation exercises.
Curriculum Integration	9	Integration focused on real-world maritime scenarios.
Student Engagement	8	High engagement levels observed in physical-sports classes.

Table 3. Senior Cadets' Experiences and Practices

Indicator	Scoring (Out of 10)	Analysis
Physical Fitness Maintenance	9	Cadets reported improved physical endurance and mental resilience.
Challenges in Maintaining Health at Sea	7	Issues included limited exercise opportunities during long voyages.
Recommendations for Curriculum Enhancement	8	Suggested integrating stress management techniques into training.

The research findings indicate a high degree of effectiveness in integrating physical-sports activities into maritime education across various indicators. Experts in the port and shipping industries, surveyed for their perspectives, consistently rated the benefits of physical fitness for seafarers at 9 out of 10. They highlighted improved health outcomes and enhanced job performance as significant advantages resulting from physical-sports integration. Despite acknowledging challenges such as logistical constraints in implementing physical-sports programs (scored at 7), experts unanimously agreed that the benefits outweighed these challenges, advocating for strategic enhancements in curriculum design (scored at 8).

Educators and trainers specialised in maritime science similarly endorsed the integration of physical-sports education. They rated pedagogical approaches at 8, citing the effectiveness of experiential learning and simulation exercises in preparing students for real-world maritime scenarios. Curriculum integration received a score of 9, reflecting efforts to align physical-sports activities with industry standards and safety protocols. Moreover, high levels of student engagement (scored at 8) were observed, indicating a strong interest and participation in physical-sports classes among maritime students.

Senior cadets, based on their internship experiences, reported significant improvements in physical fitness maintenance (scored at 9), attributing enhanced physical endurance and mental resilience to regular participation in physical-sports activities. Challenges identified included limited opportunities for exercise during long voyages (scored at 7), underscoring the need for adaptive strategies in maritime physical-sports education. Cadets recommended integrating stress management techniques into curriculum enhancements (scored at 8) to better prepare future seafarers for the physical and mental demands of their profession.

3.2 *Enhancing Sports Education and Curriculum in Maritime Context*

Building upon the foundational results of integrating physical-sports activities into maritime education, this section delves deeper into the specific aspects of sports education, curriculum development, and the impact on physical and mental resilience among maritime students. Comprehensive tables are provided to illustrate the findings across various indicators.

Table 4. Pedagogical Approaches in Sports Education

Indicator	Scoring (Out of 10)	Analysis
Experiential Learning	9	Emphasised hands-on training and simulation exercises.
Problem-Based Learning	8	Effective in fostering critical thinking and decision-making skills.
Integration with Maritime Simulations	9	Aligning physical activities with real-world maritime scenarios.

Table 5. Curriculum Development in Sports Education

Indicator	Scoring (Out of 10)	Analysis
Alignment with Industry Standards	9	Integration of safety protocols and industry-specific skills.
Flexibility and Adaptability	8	Ability to adjust curriculum based on evolving industry needs.
Inclusion of Health and Safety Modules	9	Incorporation of first aid, emergency response, and health management.

Table 6. Physical and Mental Resilience

Indicator	Scoring (Out of 10)	Analysis
Physical Endurance	9	Improved stamina and physical performance observed.
Mental Toughness	8	Enhanced ability to cope with stress and adversity.
Team Cohesion	8	Strengthened collaboration and support among peers.

The results highlight the robustness of sports education and curriculum development within maritime contexts, focusing on experiential learning, curriculum alignment, and the fostering of physical and mental resilience among students. Pedagogical approaches in sports education, rated highly at 9 out of 10 for experiential learning, underscore the effectiveness of hands-on training and simulation exercises in preparing students for the dynamic challenges of maritime professions. Problem-based learning strategies, scoring 8, are recognised for their role in enhancing critical thinking and decision-making skills essential for navigating complex maritime scenarios. Integration with maritime simulations, rated at 9, ensures that physical activities are contextualised within real-world settings, providing students with practical skills and situational awareness.

Curriculum development in sports education further supports these findings, emphasising alignment with industry standards (scored 9). The integration of safety protocols and industry-specific skills ensures that students are well-prepared to meet the rigorous demands of maritime operations. The curriculum's flexibility and adaptability (scored 8) allow for adjustments to meet evolving industry needs, ensuring relevance and currency in educational content. Additionally, the inclusion of health and safety modules (scored 9) addresses crucial aspects such as first aid, emergency response, and health management, equipping students with essential knowledge and skills to promote wellbeing and safety aboard ships.

In terms of physical and mental resilience, the research demonstrates significant improvements among students participating in sports education. Physical endurance, rated at 9, reflects enhanced stamina and overall physical performance resulting from regular engagement in physical-sports activities. Mental toughness, scored 8, highlights students' improved ability to cope with stress and adversity, essential qualities in high-pressure maritime environments. Team cohesion, also scored 8, underscores the strengthened collaboration and support networks among peers, fostering a cohesive and resilient maritime community.

The comprehensive tables and analysis affirm the positive outcomes of sports education and curriculum development in maritime contexts. By integrating experiential learning, aligning curriculum with industry standards, and fostering physical and mental resilience, educational institutions can effectively prepare future seafarers for successful careers in the maritime industry. These findings underscore the importance of tailored sports education in promoting holistic development and professional readiness among maritime students, ensuring they possess the skills and resilience to thrive in diverse and challenging maritime environments. Moving forward, continued emphasis on innovative pedagogical approaches and curriculum enhancements will be crucial in advancing sports education within maritime vocational programs worldwide.

4 DISCUSSION

The discussion focuses on synthesising the research findings related to the integration of physical-sports activities into maritime education, highlighting key insights, implications, and future directions. This section analyses the effectiveness of sports education, curriculum development, and their impact on physical and mental resilience among maritime students.

4.1 *Effectiveness of Sports Education*

The findings underscore the effectiveness of integrating physical-sports activities into maritime education through various pedagogical approaches. Experiential learning, rated highly at 9 out of 10, emerges as a cornerstone in preparing students for the practical challenges of maritime professions. By engaging in hands-on training and simulation exercises, students gain valuable insights into real-world scenarios, honing their skills in navigation, safety protocols, and emergency response [14]. This approach not only enhances technical competencies but also cultivates a deeper understanding of maritime operations, fostering a more robust professional readiness among students.

Problem-based learning (PBL) also plays a significant role, scoring 8 in effectiveness. PBL methodologies encourage critical thinking and decision-making skills by presenting students with complex maritime scenarios. Through collaborative problem-solving, students develop adaptive strategies and innovative solutions, essential qualities for navigating unpredictable maritime environments. Integrating these pedagogical strategies with maritime simulations further enriches the learning experience, providing a bridge between theoretical knowledge and practical application. This integration ensures that students not only grasp theoretical concepts but also apply them effectively in simulated and real-world settings.

4.2 *Curriculum Development and Industry Alignment*

Curriculum development in sports education demonstrates a strong alignment with industry standards, scoring 9 on effectiveness. The inclusion of safety protocols, industry-specific skills, and health management modules ensures that students are well-prepared to meet the rigorous demands of maritime professions. This alignment not only enhances educational relevance but also bridges the gap between classroom learning and industry expectations. The flexibility and adaptability of the curriculum, rated at 8, enable educators to respond swiftly to emerging trends and technological advancements in the maritime sector. By regularly updating course content and integrating new developments, educational institutions can maintain curriculum relevance and equip students with up-to-date skills and knowledge [15]. The incorporation of health and safety modules, scored at 9, underscores the commitment to student wellbeing and operational safety aboard ships. Modules covering first aid, emergency response, and health management empower students with critical lifesaving skills, ensuring they can respond effectively to medical emergencies and mitigate risks in maritime

environments. These modules are essential not only for regulatory compliance but also for promoting a culture of safety and wellbeing among maritime professionals.

4.3 *Physical and Mental Resilience Among Students*

The research findings highlight significant improvements in physical and mental resilience among students participating in sports education. Physical endurance, rated at 9, reflects enhanced stamina and overall fitness levels resulting from regular engagement in physical-sports activities. The rigorous training regimen prepares students to withstand the physical demands of maritime duties, including long hours and physically demanding tasks. Moreover, improved mental toughness, scored 8, equips students with the psychological resilience to cope with stress, isolation, and the inherent challenges of maritime life. This resilience is crucial for maintaining mental wellbeing and ensuring sustained performance during extended voyages and challenging operational conditions.

Team cohesion, also rated at 8, emerges as a critical outcome of sports education within maritime contexts. Collaborative physical-sports activities foster camaraderie, teamwork, and mutual support among students. These interpersonal skills are invaluable in promoting effective communication, cooperation, and conflict resolution aboard ships, where teamwork is essential for operational success and crew safety. By cultivating a cohesive team dynamic through sports education, educational institutions contribute to the development of future maritime leaders who can thrive in dynamic and multicultural maritime environments.

4.4 *Implications for Maritime Education and Future Directions*

The findings of this research have several implications for the future of maritime education and training. First, integrating physical-sports activities into curriculum design enhances the overall educational experience by combining theoretical knowledge with practical skills development. This holistic approach prepares students not only for technical proficiency but also for the physical and mental demands of maritime professions. Second, the emphasis on industry alignment and curriculum flexibility ensures that educational programs remain relevant and responsive to evolving industry needs and regulatory requirements.

Furthermore, the promotion of physical and mental resilience through sports education contributes to the wellbeing and performance of maritime professionals. By prioritising health management and safety training, educational institutions uphold standards of excellence in maritime education, fostering a culture of safety, professionalism, and continuous improvement within the industry [16], [17]. These initiatives not only enhance individual student outcomes but also contribute to broader industry goals of sustainability, efficiency, and safety in maritime operations.

Looking ahead, future research could explore the long-term impact of sports education on career trajectories, job satisfaction, and retention rates among maritime professionals. Additionally, studies focusing on innovative technologies and digital solutions in sports education could further enhance learning outcomes and prepare students for the digital transformation of the maritime industry [18], [19]. By continuing to innovate and adapt educational practices, stakeholders can ensure that maritime education remains a cornerstone of global maritime excellence, equipping the next generation of seafarers with the skills, resilience, and leadership capabilities to navigate the challenges and opportunities of a rapidly evolving maritime landscape. The integration of physical-sports activities into maritime education demonstrates significant benefits across pedagogical effectiveness, curriculum development, and student resilience. By leveraging experiential learning, aligning with industry standards, and fostering physical and mental wellbeing, educational institutions can cultivate a skilled and resilient workforce capable of meeting the complex demands of global maritime operations. These findings underscore the transformative potential of sports education in shaping the future of maritime professionals and advancing industry standards of excellence and safety.

5 CONCLUSION

The research underscores the transformative impact of integrating physical-sports activities into maritime education. The findings highlight the effectiveness of pedagogical approaches such as experiential learning and problem-based learning in preparing students for real-world challenges in maritime professions. Curriculum development aligned with industry standards ensures that students acquire essential skills in safety protocols, health management, and industry-specific competencies, enhancing their readiness for diverse maritime roles. Moreover, the research demonstrates significant improvements in physical and mental resilience among students engaged in sports education. Enhanced physical endurance and mental toughness equip future maritime professionals with the stamina and resilience needed to thrive in demanding operational environments. The cultivation of team cohesion through collaborative sports activities further strengthens interpersonal skills essential for effective teamwork aboard ships. Looking forward, the implications suggest that continued emphasis on sports education can contribute to the holistic development of maritime professionals, fostering a culture of safety, professionalism, and innovation within the industry. Future research should explore the long-term career outcomes and broader socio-economic impacts of integrating sports education into maritime curricula, aiming to further enhance educational practices and industry standards. By advancing these initiatives, stakeholders can ensure that maritime education remains at the forefront of preparing skilled and resilient professionals capable of navigating the complexities of global maritime operations effectively.

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