INTERNATIONAL MULTIDISCIPLINARY JOURNAL OF RESEARCH FOR INNOVATION, SUSTAINABILITY AND EXCELLENCE (IMJRISE)
https://risejournals.org/index.php/imjrise
ISSN Online: 3028-032X | ISSN Print: 3028-0370
Volume 1, Issue no. 9 (2024)

Teaching Strategies and Educational Framework Elements among Maritime Educators

DOI 10.5281/zenodo.13691681

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Abstract:

The study primarily utilizes a descriptive mixed methods approach combining a comprehensive literature review and quantitative methods to quantify and rank the preference of criteria among teaching strategies through Analytic Hierarchy Process (AHP) and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) models. Through purposive census sampling 26 maritime educators participated in assessing the decision criteria such as learning objectives, learner characteristics, content characteristics, and technological resources. Results indicate that learning objectives and learner characteristics hold the highest priority weights, emphasizing the importance of skill development and understanding student learning styles. Practical training emerges as the most preferred teaching strategy when considering all the criteria in facilitating direct application of theoretical knowledge in real-world or simulated environments. Simulations, case studies, and group work also demonstrate significant value in fostering critical thinking, problem-solving skills, and collaborative learning among students. The study concludes that aligning these teaching strategies with prioritized criteria, such as emphasizing practical training and addressing diverse learner characteristics enhances educational outcomes. It is recommended that maritime educational institutions integrate these prioritized strategies into their curriculum development to improve student engagement and skill acquisition, thereby preparing students more effectively for real-world maritime challenges.

Keywords: Teaching Strategies, Maritime Education, AHP, TOPSIS, Practical Training

Introduction

Maritime Education plays a vital role in preparing individuals for maritime careers in the global shipping industry ensuring that future seafarers, marine transportation, marine engineering students, and other related professionals are well equipped with necessary knowledge and skills (Cicek et al., 2019; Mallam et al., 2019; Emad et al., 2022). The quality of maritime education is heavily influenced by the teaching strategies employed by educators making the selection of effective teaching methods a critical component in the educational process (Demirel, 2020; Balcita & Palaoag, 2020; Jhamil & Bhuiyan, 2021). However, the dynamic nature of the maritime industry characterized by rapid technological advancements and evolving regulatory frameworks (De la Peña et al., 2020; Prabowo et al., 2021), necessitates continuous evaluation and adaptation of these teaching strategies (2018; Parsons et al., 2018; Mitchelle & Sutherland, 2020).

Chico (2018) emphasized that the demands of the 21st century require educators to adapt and equip themselves with essential traits and skills to navigate these changes and bridge the gap. Maritime educators play a crucial role in shaping the lives and careers of their students.

Seafarers are skilled professionals who serve as marine officers onboard ships. Transitioning to teaching in maritime schools as full-time instructors represents a significant change in their roles and lifestyles (Estimo, 2020; Philippine Overseas Employment Agency, 2016; Joint CHED-MARINA Memorandum Circular No. 1, 2019). Although seafarers are not graduates of teacher education programs they are the ones who truly understand the essential knowledge and skills required in the maritime industry (Simmons & McLean, 2020). The quality of teaching and learning is challenged by today's constantly evolving world, making it a primary concern for maritime institutions in the Philippines to enhance the quality of maritime education and maintain international standards. To address this, the quality of maritime faculty must be given utmost priority, especially when choosing teaching strategies in maritime education.

This study aims to fill the gap identified in the literature by developing a sophisticated and systematic method for selecting effective teaching strategies in maritime education. Utilizing Multi-Criteria Decision-Making (MCDM) methods, specifically the Analytic Hierarchy Process (AHP) and Technique for Order of Preference by Similarity

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to Ideal Solution (TOPSIS), this research will evaluate and rank various criteria such as Educational Objectives, Learner Characteristics, Content Characteristics, and Technological Resources. The goal is to provide maritime educational institutions with a robust framework for improving teaching strategies, thereby enhancing educational outcomes and better preparing students for the challenges of the maritime industry.

Research Questions

1. Which main criterion is considered the most important in teaching maritime education as determined by the Analytic Hierarchy Process (AHP)?
2. Which sub-criterion is considered the most important in teaching maritime education as determined by the Analytic Hierarchy Process (AHP)?
3. Which teaching strategies have the highest weighted score when considering all criteria among maritime educators, as evaluated using the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS)?

Literature Review

The educational framework for maritime studies emphasizes several key dimensions to ensure comprehensive learning. The Educational Objectives dimension focuses on skill development and critical thinking, aiming to equip learners with practical abilities and the capacity to analyze, evaluate, and synthesize information (Alsaleh, 2020). Within this dimension, Knowledge Acquisition ensures students understand and remember essential maritime information (Brown & Palincsar, 2018), while Skill Development helps them practice and improve their maritime skills (James et al., 2014; Kourieos, 2015; Chiong, 2023). Critical Thinking encourages students to solve problems effectively (Pithers & Soden, 2000; Enciso et al., 2017), and Professional Attitude promotes behaviors and ethics appropriate for the maritime profession (Havold, 2000; Hu, 2017; Rayos & Borbon, 2022).

Learner Characteristics take into account diverse learning styles, background knowledge, and motivation. Recognizing and accommodating different learning styles (Pashler, 2008; Landrum & McDuffie, 2010) is crucial, as is considering students' prior knowledge in maritime subjects (Pallis & Ng, 2011; Cunningham, 2015; Lau & Ng, 2015). Additionally, understanding students' preferred learning styles (Jacobson, 2001; Pashler et al., 2008), their enthusiasm for learning maritime subjects (Cunningham, 2015; Laguador, 2019; Melovic et al., 2022), and the diversity of their backgrounds (Du Plessis & Bisschoff, 2007; Gordon et al., 2010; Cole et al., 2011) are essential for effective teaching.

Content Characteristics focus on creating effective, practical learning materials that help students understand and apply their knowledge (McLaughlin et al., 2005; Khalil & Elkhider, 2016). This includes considering the complexity of the maritime content (De Agua et al., 2020; Gaspar, 2013; Patriarca & Bergstrom, 2017), the scope of the topics covered (Farrell, 1998; Panayides & Song, 2013; Gissi & de Vivero, 2016), the relevance of the content to real-world scenarios (Reiher & Hahn, 2021; Alvarez et al., 2021), and the level of interactivity and hands-on learning involved (Alkhatib, 2018; Campbell & Blair, 2018; Loveys & Riggs, 2019).

Lastly, the Technological Resources dimension emphasizes the importance of tools and platforms that support digital learning (Pinto & Leite, 2020; Dudar et al., 2021; Josue et al., 2023). This includes ensuring the availability of necessary technology (Begg et al., 2006; Ahmed & Sabyasachi, 2014), its usability for both teachers and students (Kakasevski et al., 2008; Ivanovik et al., 2013), the integration of technology with traditional teaching methods (Singer & Maher, 2007; Harris, 2009; Bhasin, 2012), and the reliability of the technology, ensuring minimal downtime and technical issues (Souza et al., 2020).

Research Method

The study employs a descriptive mixed-methods approach. Initially, a qualitative phase involves a literature review to identify key teaching strategy criteria, providing in-depth insights into educators' preferences in maritime education. This lays the foundation for understanding current practices and gaps. Descriptive research focuses on present conditions (Vaismoradi et al., 2013). The quantitative phase uses Multi-Criteria Decision-Making (MCDM) methods, such as the Analytic Hierarchy Process (AHP) and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), to rank the importance of various criteria. Data were gathered through a questionnaire, validated by a panel of experts, and pilot-tested for reliability. The study's respondents were 26 maritime faculty members from the University of the Visayas, where total enumeration sampling was used to ensure comprehensive and accurate data collection.

Findings and Discussion

RQ1. Which main criterion is considered the most important in teaching maritime education as determined by the Analytic Hierarchy Process (AHP)?

The maritime faculty in this study prioritizes Learning Objectives as the primary criterion when choosing teaching strategies, with a weight of 0.3320. This reflects the emphasis on ensuring students acquire the necessary knowledge, skills, and competencies critical for the maritime industry, such as navigation, seamanship, maritime law, and safety protocols. Learning objectives guide the development of instructional materials, assessments,

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and practical training, aligning with industry standards (Chauvin et al., 2013; de la Peña et al., 2020; Meyers & Nulty, 2009).

The second-highest criterion is Learner Characteristics (0.2420), followed by Technological Resources (0.2139) and Content Characteristics (0.2122). While content and technological resources are important, they are considered secondary to meeting learning objectives and understanding student needs. This approach ensures a focus on developing essential maritime skills and knowledge, crucial for operational safety and proficiency (Macdonald et al., 2022; Kalnina & Priednieks, 2017; Hetherington et al., 2006; Kourieos, 2015; Pan et al., 2019).

RQ2. Which sub-criterion is considered the most important in teaching maritime education as determined by the Analytic Hierarchy Process (AHP)?

The maritime faculty prioritizes Skill Development as the most important criterion with a weight value of 0.1023. This highlights the importance educators place on equipping students with practical skills such as navigation, ship handling, maritime safety, and emergency response. Critical Thinking is ranked second with a weight of 0.0939, emphasizing the need for analytical skills, decision-making, and problem-solving in maritime operations. The least important sub-criteria are Relevance under Content Characteristics (0.0464) and Availability under Technological Resources, reflecting a lower emphasis on these factors compared to skill development and critical thinking.

RQ3. Which teaching strategies have the highest weighted score when considering all criteria among maritime educators, as evaluated using the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS)?

The results of this study show that Practical Training scores the maximum c_i of 0.7669 among the preferred teaching strategies. This indicates that practical training has excelled in other teaching strategies in terms of all decision criteria such as learner objectives, learner characteristics, content characteristics, and technological resources. This indicates that in maritime education, hands-on, experiential learning is considered the most effective method(Abeysiriwardhane et al.,2021;Singuit2023;Manuel,2017). Practical training allows students to directly apply their theoretical knowledge in real-life or simulated environments, making it invaluable for mastering the necessary skills and competencies required in the maritime industry(Mallam,2019;Jamil,2021;Dewan et al.,2023). The emphasis on practical training reflects the industry's demand for highly skilled professionals who can perform tasks proficiently and safely(Oksavik et al.,2021;Manuel ,2017;Chen et al.,2018). Therefore, Practical Training is determined as the most preferred teaching strategy in the study. Numerous studies emphasize the importance of hands-on experience and real-world application in effectively preparing maritime professionals for their roles. For instance, The research study conducted by Jamil & Bhuiyan (2011) the study reveal that practical training bridges the gap between theoretical knowledge and actual maritime operations, enhancing students' competence and confidence .Heilporn et al. (2021) emphasize the need for interactive and practical teaching methods to enhance student engagement and learning outcomes. Kim et al. (2023) argue that experiential learning methods are crucial for the practical nature of maritime education. By prioritizing practical training, maritime institutions can ensure that their graduates are better equipped to handle the complexities and challenges of the maritime industry. This approach not only improves safety and efficiency on board ships but also aligns with international maritime standards and regulations that increasingly emphasize practical skills and competency-based training. Furthermore, Simulation, Case Studies, Group work, and Lecture are placed in the second, third, fourth, fifth ranking with the c_i of 0.7198, 0.6948, 0.6805, and 0.0900, respectively. Simulations offer a safe and controlled environment where students can practice handling various scenarios they might encounter at sea(Hanzu et al.,2008;Mallam,2019). This method allows for extensive practice without the risks associated with actual maritime operations. The slightly lower ranking compared to practical training could be due to the difference in realism and direct hands-on experience that practical training provides.

Discussion

The maritime faculty at the University of the Visayas places the highest priority on Learning Objectives among the main criteria underscoring their crucial role in the decision-making process. This focus suggests that maritime educators emphasize the importance of clear learning objectives to ensure their teaching strategies align with the desired educational outcomes. This view is supported by research that underscores the significance of well-defined objectives in guiding effective instruction and enhancing student achievement (Anderson & Krathwohl, 2001; Sewagegn, 2020). Following this, Learner Characteristics are considered next in importance highlighting the need to adapt teaching methods to the specific needs and abilities of students. A practice aligned with Vygotsky's (1978) Zone of Proximal Development and Tomlinson's (2001) differentiated instruction models (Ginja & Chen, 2020). Technological Resources, though important, are considered secondary to educational goals and learner needs, consistent with this research indicating that technology is most effective when it supports pedagogical objectives (Ahmed & Opoku, 2022). Finally, while Content Characteristics are valued, they are seen as less critical than the other factors, aligning with Tanak(2020) perspective that content knowledge is most impactful when integrated with pedagogical expertise and an understanding of learners. Additionally, Skill development has the highest weights among the sub criteria followed by critical thinking, knowledge acquisition, and Learning Styles respectively.

Furthermore, Practical Training is considered as the preferred teaching strategies when considering all the criteria in teaching in maritime education followed by Simulation, Case Studies, Group Work and Lecture respectively. This underscores the critical importance of hands-on, experiential learning in maritime education, where practical skills and real-world applications are essential for student competence and confidence.

According to Dr. Morales the President of Mitsui OSK Lines (MOL)-Magsaysay Maritime Academy (MMMA) there is a critical need to update the curricula of the Philippines' 83 Maritime Higher Education Institutions to include training on green fuels and AI. This recommendation aligns with the study's findings which highlight the importance of practical training and skill development for meeting industry demands. Incorporating these advancements into the curriculum is vital for improving the quality of maritime education (Sison, 2024).

This findings supports the study of (Wiig et al., 2021), which revealed that in maritime education it is important to have a practical training in which it improves the learners' readiness for real-life maritime operations by providing a risk-free environment to practice and refine their skills. A Similar result from the study of Selberg (2017), which revealed that practical training including the use of simulators bridges the gap between theoretical knowledge and practical application making it an indispensable part of maritime education and training (MET).

Conclusion

In conclusion, this study provides a comprehensive evaluation of the key criteria and sub-criteria that should be prioritized in maritime education, as identified through an extensive literature review and empirical analysis. The findings revealed that Learning Objectives emerged as the most important main criterion in teaching maritime education, as determined by the Analytic Hierarchy Process (AHP). This underscores the crucial role that clear, well-defined objectives play in guiding effective instruction and ensuring that students acquire the necessary competencies for their maritime careers.

Among the sub-criteria, Practical Training was identified as the most significant, highlighting the emphasis on experiential learning and its essential role in bridging the gap between theoretical knowledge and real-world application. This finding is reinforced by the recognition that maritime educators, many of whom may not have formal education training, nonetheless prioritize hands-on strategies to effectively prepare students for the demands of the maritime industry.

Using the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), Practical Training was also found to be the teaching strategy with the highest weighted score when considering all criteria. This emphasizes the need for maritime education programs to integrate practical, experience-based learning opportunities to enhance students' critical thinking, problem-solving, and teamwork abilities.

Based on these findings, it is recommended that maritime education institutions continue to prioritize practical training and experiential learning approaches. Incorporating methods such as simulations, case studies, and group projects will further strengthen the alignment between learning objectives and industry requirements. Additionally, ensuring that technological resources are accessible, reliable, and effectively integrated into the curriculum will support interactive and engaging teaching methods. Maritime educators should also consider diversifying their teaching strategies to accommodate various learning styles, thereby enhancing overall student engagement and motivation. By focusing on these areas, maritime education can better equip students to navigate the complexities of the maritime profession, ultimately leading to the development of more competent and versatile maritime professionals.

Limitation and Further Research

The limitation of this study is its small sample size consisting of only 26 maritime faculty members from the University of the Visayas-Main Campus in Cebu City. Given the limited number of maritime educators, the study's findings may not be widely generalizable to other Maritime Higher Education Institutions (MHEIs) or to broader maritime education contexts. Furthermore, as the study relies on self-assessment for evaluating teaching strategies there is a risk of subjective bias in the responses.

Future research could address these limitations by including a larger and more diverse sample of maritime faculty from multiple institutions across different regions. This approach would enhance the generalizability of the findings. Additionally, incorporating methods such as observational data or peer assessments could provide a more objective evaluation of teaching strategies in helping to mitigate potential biases associated with self-reported data.

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