PROBLEMS IN TEACHING FUTURE NAVIGATORS COLREGS IN ENGLISH CLASSES AND THEIR SOLUTIONS

Abstract. This article deals with the substantial challenges faced in teaching the International Regulations for Preventing Collisions at Sea (COLREGs) to future navigators, with a particular focus on English language classes. Since 1994, Ukraine has been an active member of the International Maritime Organization (IMO), rigorously adhering to international maritime safety regulations. The Ministry of Infrastructure, along with other governmental bodies, ensures the compliance and implementation of these regulations, particularly through the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW). Despite these stringent measures, human error continues to be a significant contributor to maritime accidents, frequently arising from misunderstandings, confusion, and misinterpretations of COLREGs.

To address these issues, the author developed and tested three methodological recommendations over a period of four years. These recommendations are designed to enhance the comprehension of COLREGs through a detailed analysis of the lexical material presented in the regulations.

The innovative methodologies proposed in this article emphasize the importance of thorough lexical analysis. Each rule within the COLREGs is meticulously examined to identify and discuss key lexical units in class. This approach ensures that cadets fully understand the terminology and language used in the regulations. The cadets are then engaged in various exercises to reinforce their understanding. These exercises include watching instructional videos, participating in role-playing games, and conducting situational analyzes for each rule. Additionally, the use of visual aids such as cards illustrating rules on lights and signs is incorporated to provide a clear visual representation of the concepts.

Furthermore, the integration of simulators into the curriculum offers cadets practical, hands-on experience that complements their theoretical knowledge. This dual approach not only reinforces the cadets' understanding of the rules but also prepares them for real-world maritime scenarios. The use of simulators allows cadets to practice and apply the rules in a controlled environment, thereby enhancing their
competence and confidence in navigating complex maritime situations. This enhanced comprehension is essential for reducing the incidence of maritime collisions and ensuring the safety of navigation.

**Keywords:** COLREGs, Maritime education, Nautical training, Human error, Maritime safety, Simulation training.

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ПРОБЛЕМИ ПРИ НАВЧАННІ МАЙБУТНІХ СУДНОВОДІЙ МППЗС НА ЗАНЯТТЯХ З АНГЛІЙСЬКОЮ МОВИ ТА СПОСОБИ ЇХ ВИРІШЕННЯ

**Анотація.** Ця стаття розглядає суттєві виклики, з якими стикаються під час викладання Міжнародних правил запобігання зіткненням суден у морі (COLREGs) для майбутніх судноводій, зокрема на заняттях з англійської мови. З 1994 року Україна є активним членом Міжнародної морської організації (ІМО), неухильно дотримуючись міжнародних правил безпеки на морі. Міністерство інфраструктури разом з іншими державними органами забезпечує дотримання та виконання цих правил, зокрема через Міжнародну конвенцію про підготовку, дипломування та несення вахти моряків (STCW). Незважаючи на ці суворі заходи, людська помилка продовжує бути значним чинником морських аварій, що часто виникають через непорозуміння, плутанину та неправильне тлумачення COLREGs.

Для вирішення цих питань автором було розроблено та випробувано протягом чотирьох років три методичні рекомендації. Ці рекомендації спрямовані на покращення розуміння COLREGs через детальний аналіз лексичного матеріалу, представлених в Правилах.

Інноваційні методики, запропоновані в цій статті, підкреслюють важливість ретельного лексичного аналізу. Коліне правило в COLREGs ретельно обговорюється, щоб визначити ключові лексичні одиниці. Такий підхід забезпечує повне розуміння здобувачами вищої освіти термінології та мови, яка використовується в Правилах. Потім курсанти залучаються до різних вправ для зміцнення свого розуміння. Ці вправи включають перегляд навчальних відео, участь у рольових іграх і проведення ситуаційного аналізу для кожного Правила. Крім того, використання візуальних посібників, таких як картки, що ілюструють правила щодо вогнів і знаків, включено для забезпечення чіткого візуального представлення концепцій.
Інтеграція тренажерів у навчальну програму пропонує студентам практичний досвід, який доповнює їхні теоретичні знання. Цей подвійний підхід не тільки зміцнює розуміння курсантами правил, але й готує їх до реальних морських сценаріїв. Використання тренажерів дозволяє здобувачам освіти відпрацьовувати та застосовувати Правила в контролюваному середовищі, тим самим підвищуючи їхню компетентність та впевненість у навігації в складних морських ситуаціях. Це покращене розуміння має важливе значення для зменшення кількості зіткнень на морі та забезпечення безпеки судноплавства.

Ключові слова: МППЗС, морська освіта, морська підготовка, людська помилка, морська безпека, симуляційне навчання.

Formulation of the problem. Ukraine, a signatory to international maritime safety conventions under the auspices of the International Maritime Organization (IMO) since 1994, rigorously adheres to global maritime safety regulations. The Ministry of Foreign Affairs, the Ministry of Justice, the Ministry of Infrastructure, and the State Service for Maritime and River Transport collectively facilitate Ukraine's active participation in the IMO framework. The Ministry of Infrastructure is entrusted with the overarching responsibility for the governance and administration of seafarer training and certification, as delineated by the Merchant Shipping Code of Ukraine.

The cornerstone document governing the international standards for maritime professional training is the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers (STCW), inclusive of the Manila Amendments of 2010. The Ministry of Education and Science of Ukraine (MESU) is tasked with the rigorous implementation of the STCW Convention's stipulations within the nation's maritime educational institutions.

Among the important IMO conventions relating to maritime safety and security and ship/port interface, special attention is given to the Convention on the International Regulations for Preventing Collisions at Sea (COLREG), 1972 [1].

Human error is a significant factor in maritime accidents. Various studies and statistics indicate that a large proportion of ship collisions are due to human factors. In the course of teaching COLREGs to higher education students speciality 271 Maritime and Inland Waterway Transport, specialization "Navigation and Ship Management," a range of problems and complexities emerge.

Analysis of recent research and publications. The problem of teaching COLREGs is the subject of many works by foreign researchers (Reyes Poo Argüelles, Jesús A. García Maza, Felipe Mateos Martín, Michele Martelli, Srdan Zuskin, Raphael Zaccone, Igor Rudan, Miho Kristić, Srdan Žuškin, Jong-Kwan Kim, Park Deukjin, Dalibor Ivanisevic, Ana Gundić and Mohovic Djani, Djani Mohovic, Robert Mohovic, Mate Barić, Reyes Poo Argüelles, Jesús A. García Maza,
Felipe Mateos Martín, Dalibor Ivanišević, Ana Gundić, Dani Mohović and others. The authors state that the main cause of ship collisions and groundings is human error. The most important reason is misunderstanding, confusion and misinterpretation of the COLREG rules. Scientists are looking for ways to solve this problem. The interest of scientists in the problem of teaching the rules of the COLREGs indicates the search for the most effective forms and methods of training competent specialists capable of performing their professional duties at a high level.

The purpose of this article is to examine the multifaceted challenges encountered in the teaching of COLREGs to prospective navigators within the framework of English language classes and to propose potential solutions for addressing these aforementioned issues.

Presenting main material. Human error is a significant cause of ship collisions, often stemming from the misunderstanding, misinterpretation, or lack of knowledge regarding the International Regulations for Preventing Collisions at Sea (COLREGs). These regulations are essential for safe navigation, but their complexity can lead to confusion. For instance, officers may misinterpret right-of-way rules or fail to correctly identify navigation lights and signals. Such errors can result in improper maneuvers, increasing the risk of collisions. Continuous training and clear understanding of COLREGs are crucial for preventing these accidents.

Many researchers consider human factors to be a primary cause of ship collisions, particularly emphasizing the lack of understanding and knowledge of the COLREGs. Misinterpretation and inadequate comprehension of these rules often lead to navigational errors, increasing the risk of accidents. Studies highlight that even experienced mariners can struggle with the complexities of COLREGs, underlining the necessity for ongoing training and education to ensure a clear and thorough understanding of these critical regulations.

Reyes Poo Argüelles, Jesús A. García Maza and Felipe Mateos Martín in their research indicate that human error is responsible for approximately 75-96% of marine accidents [2]. A comprehensive review of statistical data on ship accidents underscores that human error persists as a predominant cause, significantly influencing navigation decisions and safety management. Furthermore, the integration of human factors into ship collision risk models has been a central focus for enhancing maritime safety.

Statistics consistently indicate that the majority of these collisions are precipitated by human error, primarily due to violations of the COLREGs and insufficient communication between vessels. Additionally, there are specific scenarios where the application of COLREGs may be ambiguous. In such instances, and in the absence of effective communication between the involved ships, adherence to the Rules might still result in a collision.

Michele Martelli, Srdan Zuskin, Raphael Zaccone and Igor Rudan examine the human factor and insufficient understanding of COLREGs as primary causes of
vessel collisions. They argue that utilizing a decision support system based on AIS data and integrated with sensors can significantly reduce the number of collisions by providing timely recommendations to Watch Officers in compliance with COLREGs [3].

Miho Kristić and Srdan Žuškin investigate the quantification of expert knowledge in describing linguistic variables in the COLREGs, focusing on the imprecision in terms like "Very Large Ship." They argue that fuzzy sets can effectively interpret such imprecise terms, making them understandable for both human and autonomous navigators. Their research includes a survey of 220 navigational experts and presents a model for applying linguistic variables, potentially aiding decision support or control systems on conventional and autonomous ships [4].

Jong-Kwan Kim and Park Deukjin from Pukyong National University examined the interpretation of sailing rules in the context of COLREGs. They found that navigators and automated collision-avoidance algorithms often had different interpretations of collision situations, especially in head-on and crossing (HC) situations and crossing and overtaking (OC) situations. Navigators were uncertain about applying the sailing rules in specific scenarios, such as vessels approaching from certain angles. This study highlights the need for a clearer understanding and consistent interpretation of COLREGs to enhance maritime safety [5].

Dalibor Ivanisevic, Ana Gundić and Mohovic Djaní highlight that a significant portion of sea collisions (at least 56%) result from non-compliance with COLREGs, citing studies such as one from 2000 by Smierzchalski and Michalewicz and another from 2015 by Uğurlu et al. These collisions often occur due to neglecting Rules 5 (Look-out), 7 (Risk of collision), 6 (Safe speed), 34 (Maneuvering and warning signals), 8 (Action to avoid collision), 14 (Head-on situation), 19 (Conduct of vessels in restricted visibility), and 35 (Sound signals in restricted visibility). They pose questions about the reasons behind these difficulties and whether the educational system's structure, especially for students with practical shipboard experience, influences COLREGs comprehension.

The research results indicate a disparity in understanding COLREGs between students who have taken the course without navigation experience and those with 6 months to one year of navigation experience. Surprisingly, practical experience on board ships, especially from countries practicing the "sandwich system," does not seem to influence students' knowledge or comprehension of COLREGs. Students with practical experience generally do not demonstrate better understanding of the rules compared to those without experience. Additionally, both groups of students encounter difficulties in understanding similar rules, such as Rule 6, Rule 10, Rule 13, Rule 14, Rule 17, Rule 18, and Rule 19. These findings raise concerns about the adequacy of the rules' clarity and suggest that certain rules need better articulation to facilitate understanding.
Moreover, one cannot but agree with researchers on the issue that the translation of COLREGs from English into students' native languages is crucial to avoid misinterpretations due to inadequate translations. Both students and teachers emphasize the effectiveness of self-directed e-learning methods, although there is a need for improved e-learning programs. The authors recommend utilizing navigation simulators to enhance COLREGs learning, suggesting an increase in simulator familiarization hours to ensure proper understanding and application [6].

The study by Djani Mohovic, Robert Mohovic, and Mate Baric, under the EU project "Avoiding Collisions at Sea" (ACTs), reveals critical gaps in the knowledge and teaching of COLREGs among nautical students and experienced deck officers.

Analyzing marine accidents, the study found frequent vessel collisions due to human error and misinterpretation of COLREGs. A questionnaire highlighted significant deficiencies in understanding and applying the Rules, suggesting widespread issues in current teaching methodologies across Europe.

The authors propose improving professional competence through realistic learning methods, including scenarios and e-learning, to address these gaps. New teaching methodologies within the ACTs project will incorporate practical scenarios, radar screen views, bridge views, electronic chart views, and bird's eye views to illustrate the consequences of non-compliance and the benefits of proper Rule application. The goal is to enhance real-life understanding of collision avoidance and prepare maritime professionals for real-world situations.

The study underscores the urgent need for effective teaching methods to improve COLREGs understanding and reduce collisions at sea [7].

The article by Reyes Poo Argüelles, Jesús A. García Maza, and Felipe Mateos Martín addresses the issue of ship collisions, which are noted as frequent and severe maritime accidents often caused by human error and breaches of COLREGs. The authors highlight the lack of communication between ships as a contributing factor to these accidents, especially in situations where there is ambiguity in COLREGs' application.

The research proposes a new approach to Collision Avoidance Systems (CAS) and introduces safety functions designed to reduce ship-to-ship collision risks on the high seas. These safety functions aim to facilitate coordinated compliance with COLREGs among ships. The implementation of these functions involves applying functional safety standards and utilizing real, accessible electronic programmable systems (hardware and software) [8].

Dalibor Ivanišević, Ana Gundić and Đani Mohović advocate for utilizing various pedagogical methods for teaching the COLREGs, including self e-learning, group distance learning, and training using a navigation simulator. To evaluate competencies, they recommend employing Bloom's taxonomy to establish learning outcomes. They propose several methods for assessing learning outcomes related to the COLREGs, such as training ships, multiple-choice tests, oral examinations, and navigation simulators.
In summary, the authors contend that enhancing the clarity and precision of the STCW Convention's competency requirements, combined with innovative and comprehensive teaching and evaluation methods, could significantly improve seafarers' adherence to the COLREGs and thereby reduce the incidence of maritime collisions [9].

The author of this article finds substantial agreement with the aforementioned researchers regarding the predominant issues in teaching COLREGs to prospective navigators. The principal challenges, such as misunderstandings, confusion, and misinterpretations of the COLREGs rules, necessitate the exploration of more efficacious pedagogical methods and techniques. To address these issues, the author has developed and tested over a period of four years three methodological recommendations for teaching the rules of COLREGs to cadets of maritime universities within the context of English language classes.

The primary focus of this work is on the lexical material presented in the COLREGs. Each rule is meticulously analyzed to identify key lexical units, the meanings of which are thoroughly discussed in class. Cadets engage with these lexical units through various exercises, including watching instructional videos, participating in role-playing games, conducting situational analyses of each rule, and using visual aids such as cards for rules on lights and signs. Additionally, they complete tests designed to assess their understanding by selecting the correct options and answering specific questions related to each rule.

The author concurs with the viewpoint of several researchers who advocate that the simultaneous use of simulators alongside theoretical material significantly enhances the effectiveness of COLREGs instruction. Integrating simulators into the curriculum provides cadets with practical, hands-on experience that reinforces their theoretical knowledge, thus fostering a deeper understanding of collision avoidance principles and better preparing them for real-world maritime scenarios.

**Conclusion.** The exploration of teaching methodologies for the International Regulations for Preventing Collisions at Sea (COLREGs) within the framework of English language classes for future navigators has revealed several critical insights and potential solutions. The primary challenges identified include misunderstandings, confusion, and misinterpretations of the COLREGs rules, which significantly contribute to human error in maritime operations. Addressing these issues is essential for enhancing navigational safety and reducing the incidence of maritime collisions.

The methodological recommendations developed and tested over a four-year period have shown promising results in improving the understanding of COLREGs among maritime cadets. The detailed lexical analysis of the regulations, focusing on the precise meanings of key terms, has proven to be an effective strategy. By thoroughly discussing these lexical units in class and reinforcing them through various practical exercises, cadets gain a deeper and more accurate understanding of the rules.
The integration of instructional videos, role-playing games, and situational analyses provides cadets with multiple perspectives on each rule, further solidifying their comprehension. The use of visual aids, such as cards illustrating rules on lights and signs, enhances the learning experience by offering clear visual representations of complex concepts. These methods ensure that cadets not only memorize the rules but also understand their practical applications in real-world scenarios.

Moreover, the concurrent use of simulators alongside theoretical instruction has been identified as a highly effective approach. Simulators offer cadets hands-on experience, allowing them to apply theoretical knowledge in a controlled environment. This practical exposure is crucial for building confidence and competence in navigating challenging maritime situations. The dual approach of combining theoretical learning with practical application ensures that cadets are well-prepared to implement the COLREGs effectively in their professional careers.

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