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Differences in Understanding the COLREGs Among the Students from Different Systems of Education for Seafarers

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ABSTRACT

The paper shows the results of the research conducted in order to analyse the differences in understanding the International Regulations for Preventing Collisions at Sea among the students in countries practising two different systems of education for seafarers: the so-called "sandwich system" and the continuing system. Methods of learning as well as their effect on understanding the International Regulations for Preventing Collisions at Sea and students' opinions on efficient methods of learning have also been analysed. Furthermore, the problems the teachers are facing have been identified. Measures for the improvement of the system have been proposed as well.

1. Introduction.

The International Regulations for Preventing Collisions at Sea (hereinafter the COLREGs) are a number of international regulations adopted in order to prevent collisions of vessels. The COLREGs also include a number of actions that have to be taken in the collision risk situations (Kuwata, 2014). The rules apply to all vessels upon the high seas and in all waters connected to the high seas and navigable by seagoing vessels.

The analysis has shown that at least 56% of sea collisions have been the result of not complying with the COLREGs (Smierzchalski and Michalewicz, 2000). This fact was also confirmed by the research published in 2015, proving that the most common reasons of tanker collisions are neglect to comply with the COLREGs and lack of knowledge of the COLREGs (Uğurlu et al., 2015).

The research on the most common reasons of tanker collisions, indicates that collisions usually occur when not complying with the following Rules: 5 (Look – out), 7 (Risk of collision), 6 (Safe speed), 34 (Manoeuvring 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) (IMO, 2009). The similar results were also identified in the research (Mohović et al., 2016) conducted in 2016 according to which the most difficult Rules to understand are Rule 6, Rule 10, Rule 13, Rule 14, Rule 17, Rule 18 and Rule 19.

Therefore, the questions what are the main reasons for such results and whether the structure of educational system has any effect on understanding the COLREGs arise. That is, does the practical experience on board ship of students, who come from countries practising the "sandwich system", have any effect on knowing and understanding the COLREGs?

2. Research Methods.

The research was conducted, in four countries, members of the European Union: Spain, Latvia, Croatia and Slovenia, in 2014/2015 and 2015/2016 academic years. There were 261 students participating in the research divided in two groups:

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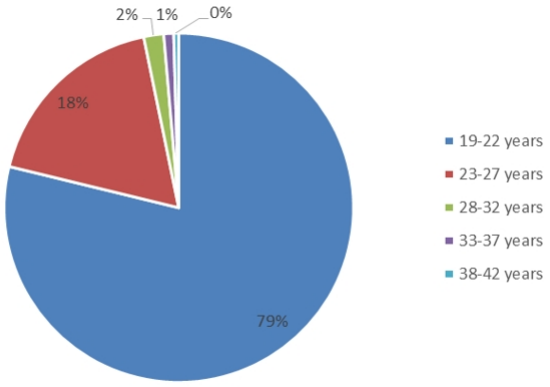
- students, part of the "sandwich system" with navigation experience;
- students, part of the continuing system without navigation experience.

The age range of the students was from 19 to 42, and 79% of them were between 19 and 22 (See Fig. 1.).

Figure 1: Age of the participants.



Source: Authors.

Countries, participants in the research, have different educational systems for seafarers. Spain and Latvia practise the so-called "sandwich system", whereas Croatia and Slovenia practise the continuing system. Both educational systems have one thing in common. They both meet the standards and minimum conditions of International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention).

The "sandwich system" combines both, mastering theoretical knowledge as well as navigation experience, which is usually divided in two semesters and lasts from three months to one year. In this way, apart from theoretical knowledge students acquire practical knowledge that facilitates mastering the curriculum through the educational system.

The continuing system includes three levels of education that generally last from three to eight years, the undergraduate, graduate and postgraduate level. The undergraduate level usually comprises all contents prescribed by the SCTW Convention that are needed to achieve the highest ranks in maritime industry. After the undergraduate level, students have to undertake one-year cadetship.

The research is divided in three parts and, along with the students, the participants were the teachers who teach theoretical and practical part of the COLREGs.

The first part of the research analyses the answers of the students who have passed the COLREGs exam and who have attended the lectures. The scope was to identify the Rules that are the most difficult to understand as well as to identify the ones the students think they do not understand. A special attention was given to the differences among the students of these two educational systems.

The second part of the research analyses the methods of learning that students consider to be the most adequate to perform the COLREGs lectures.

The third part of the research refers to the analyses of opinions of teachers who teach the COLREGs. The scope was to identify the problems the teachers come across while teaching and evaluating the students' knowledge.

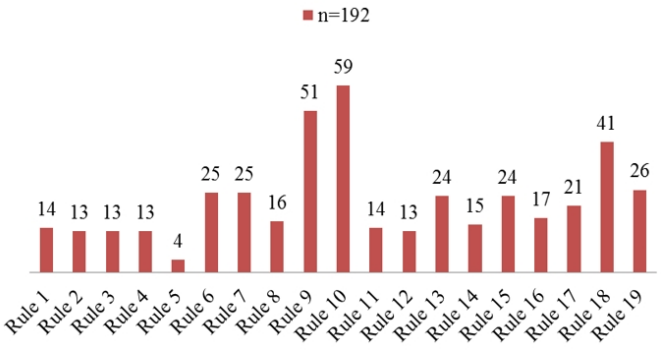
For the purposes of this research, the authors have used two questionnaires[6], one of which is a part of the European project called Avoiding Collision at Sea whose holder is the Faculty of Maritime Studies in Rijeka, whereas the second one was made by the authors themselves.

3. The analysis of the results.

3.1. The students self-assessment and the analysis of understanding the COLREGs.

The analysis of understanding the COLREGs was based on the students self-assessment. The analysed answers give the approximate assessment of understanding the COLREGs among students who are part of the "sandwich system" as well as of the continuing system. The questions were self-assessment based and the results have shown that the Rules that are the hardest to understand are Rules 8, 9, 10, 18 and 19 (See Fig. 2. and Fig. 3.).

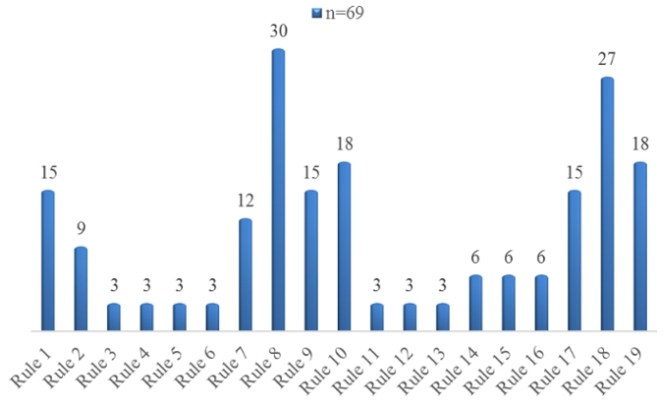
Figure 2: Self-assessment of understanding the COLREGs among students who are part of the continuing system.



Source: Authors.

[6] The authors have visited these high educational institutions. The students and the teachers have filled in the questionnaires in the written form.

Figure 3: Self-assessment of understanding the COLREGs among students who are part of the ”sandwich system”.



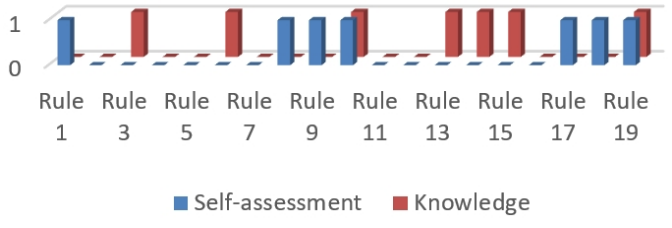
Source: Authors.

After analysing the questions that tested students' knowledge, it was found out that students who are part of the continuing system have the greatest trouble in mastering the Rules 3, 6, 10, 13, 14, 15 and 19. In other words, less than 50% of the students gave the correct answers to these questions.

After analysing the questions that tested students' knowledge, it was found out that students who are part of the "sandwich system" have the greatest trouble in mastering the Rules 1, 3, 6, 9, 10, 13, 14, 17, 18 and 19. That is, less than 50% of the students gave the correct answers to these questions.

The comparison of the students' answers to both, self-assessment based questions and the questions that tested their knowledge has shown a certain disproportion, (Fig. 4. and Fig. 5.), especially among the students who are part of the continuing system.

Figure 4: Disproportion between self-assessment and knowledge among the students who are part of the continuing system.



Source: Authors.

It has been identified that overlapping exists in only two out of 19 analysed Rules. In other words, students who are part of the continuing system think that only two rules are problematic to understand: Rule 10 and Rule 19. As far as the answers of the students who are part of the "sandwich system" are concerned, the overlapping was noticed with the following Rules: 6, 9, 10, 13, 17, 18 and 19.

It can be concluded that the students only partially understand what Rules are really the problematic ones. It is also important to emphasise that the percentage of students who passed this exam at the respective faculties was 75 to 90%.

Figure 5: Disproportion between self-assessment and knowledge among the students who are part of the ”sandwich system”.

Source: Authors.

After a thorough analysis of the answers that refer to students' knowledge, it was found out that both groups of students have problems with mastering the following problematic Rules: 3 (General definitions), 6 (Safe speed), 10 (Traffic separation schemes), 13 (Sailing vessels), 14 (Head-on situations) and 19 (Conduct of vessels in restricted visibility). As far as some Rules are concerned, namely Rules 6, 10 and 19, the authors think that they are not written adequately. Therefore, they are more difficult for the students to understand. The authors will try to explain the reasons why they are so difficult to understand.

The concept of safe speed when applying the Rule 6 can be very problematic both, during the students' training and in practice when navigating restricted areas like channels, traffic separation schemes, accesses to ports etc. In such situations, the officer of the watch can make a mistake when determining the safe speed since he predicts the hypothetic manoeuvres of other vessel/s. Therefore, the authors think that the defined maximum safe speed (in numbers) would be much more appropriate in some situations and for vessels of different sizes.

As far as the Rule 19 (Conduct of vessels in restricted visibility) is concerned, phrases such as "so far as possible" or "apparently" allow different interpretation of both, the rule itself and a part of it.

When referring to the Rule 10 (Traffic separation schemes), even its beginning can be confusing to the students:

"(a). This Rule applies to traffic separation schemes adopted by the Organization and does not relieve any vessel of her obligation under any other rule".

The Rule goes as follows*:*

"(i). A vessel engaged in fishing shall not impede the passage of any vessel following a traffic lane.

(j). A vessel of less than 20 metres in length or a sailing vessel shall not impede the safe passage of a power-driven vessel following a traffic lane."

The students do not often know how to determine reciprocal obligations of vessels when reading this Rule, which is because of all the above-mentioned reasons. This opinion is confirmed by the fact that Rule 10 is one of the most misinterpreted ones.

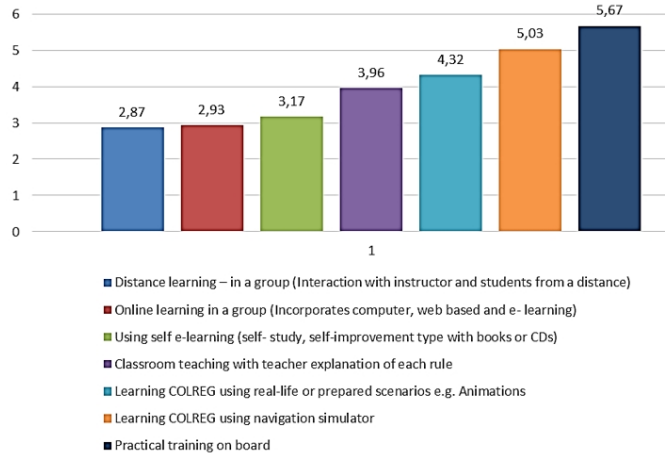
In addition, it is necessary to emphasize the importance of translation of the COLREGs from English language to respec-

tive mother tongues or official languages of the courses. Misinterpretation of translation can additionally confuse the students.

3.2. The analysis of methods of learning.

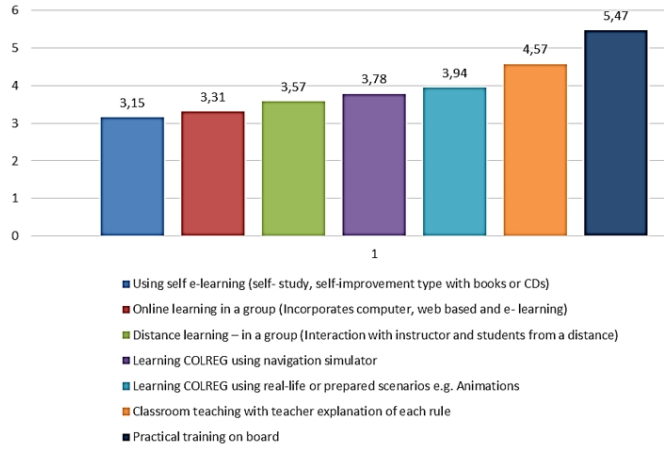
In this part of the research analysis, the authors will discuss students' answers referring to the methods of learning the COLREGs. The following methods were analysed: *classroom teaching with teacher's explanation of each rule, self e-learning, learning the COLREGs using navigation simulator, learning the COLREGs using real-life or prepared scenarios e.g. animations, online learning in a group, distance learning-in a group and practical training on board.* The answers were ranked as follows: the lowest figure stands for the most efficient method of learning the COLREGs whereas the highest figure stands for the least efficient one (Fig. 6. and Fig. 7.).

Figure 6: Analysis of the opinion on methods of learning the COLREGs among the students who are part of the continuing system.



Source: Authors.

Figure 7: Analysis of the opinion on methods of learning the COLREGs among the students who are part of the "sandwich system".



Source: Authors.

The analysis has shown that both groups of students think that self e-learning is an efficient method of learning. However, the problem with self e-learning is the fact that IMO Model Course defines the precise number of organised courses and does not take into consideration the hours the students spend individually to master the curriculum. That is why the changes of the IMO Model Course, that would define the topics that require the students' attendance, and the topics that would be dealt with through self e-learning, would facilitate mastering the curriculum.

It is interesting to notice that both groups of students think that practical training on board and using navigation simulator in training are less efficient methods of learning. Using a simulator has recently become an unavoidable method of learning in all high-risk professions like in navigation, medicine and aviation. It also has a positive effect on developing team-work skills. Overall, the question why do students consider using the navigation simulator as a less efficient method of learning, arises. According to the authors, the reason for such an opinion is the inadequate number of hours planned for the simulator training. Consequently, it leads to the inadequate use of the one. Furthermore, the research has shown that students with practical training on board do not understand the Rules any better. The possible reason for such a situation could be the fact that the COLREGs are neither studied nor applied analytically on board ship. The officer of the watch relies mostly on his experience and/or his already existent knowledge of the COLREGs. Besides, knowledge of the COLREGs is rarely assessed in everyday life, so the correct usage of theoretical knowledge varies from case to case.

The comparison of the results of this research to the research conducted among the high school students (Zekić et al., 2015) shows a difference in opinion and attitude towards learning the COLREGs. That is, high school students consider practical training on board and using navigation simulator, the most effective methods of learning the COLREGs.

3.3. Opinion of the teachers.

The scope of the research referring to the opinions of the teachers who teach the COLREGs has been to identify the problems they come across while teaching and assessing knowledge. According to them, the number of hours needed to teach the COLREGs properly, as planned by the curriculum, is not enough. Moreover, they do not have enough time to analyse sea collisions whose cause is lack of knowledge of the COLREGs.

The teachers emphasise that more time should be given to training on simulator, especially to familiarizing the students with the simulator.

Besides, some teachers who are part of the "sandwich system" think that the COLREGs have not been written in the appropriate way and they are difficult to understand. They do not have enough materials especially for the adequate e-learning programme. The Rules should be concise, unambiguous and very clear without any possibility of misinterpretation.

Furthermore, one of the problems, according to the teachers, is the insufficient independent work of the students. Table

1 shows methods of learning the teachers use in the teaching process.

Table 1: Methods of learning the teachers use.

Methods of learning	Barcelona	Latvia	Croatia	Slovenia
Simulator	YES	YES	YES	YES
CBT Module	NO	NO	YES	YES
Video materials	YES	YES	YES	YES
Lights and sound signals programme	NO	NO	YES	YES
E-learning programme	NO	NO	YES	YES

Source: Authors.

Conclusions.

The results of the research have shown that there is a difference in understanding the COLREGs among the students who have attended the course but are without any navigation experience, and those who have also attended the course but have 6 months to one year experience in navigation. The authors have come to the conclusion that the practical experience on board ship of students , who come from the countries that practice the "sandwich system", does not have any influence on their knowledge or understanding of the COLREGs. That is, students with practical experience mostly do not understand the Rules any better, than those without any experience.

Moreover, it has been confirmed that students of both educational systems have problems with understanding almost the same Rules. These results coincide with the results of other researches done on this topic. The problem is that some Rules and/or parts of some Rules belong more to the descriptive than deterministic category (e.g. safe speed, reduced visibility etc.), and some Rules, such as the Rule 10, cannot be understood at all or are misinterpreted. The aforementioned reports and results coincide with the authors' opinions who think that some Rules have not been adequately written and are very difficult to understand. Furthermore, a special attention has to be given to translation of the COLREGs from English language to official languages of the courses, that is, to the materials and literature available to the students in their respective mother tongues. In that way, the possibility of misinterpretation of the Rules, due to the inadequate translation, could be avoided.

It is necessary to emphasize that both, students and teachers think that self e-learning is a very efficient method of learning, although teachers emphasise that they do not have a satisfactory e-learning programme. In addition, the IMO Model Course, which only partially recognises this type of learning, has posed another problem for teachers and students.

The authors think that it is necessary to improve learning the COLREGs by using navigation simulator. It is necessary to increase the number of hours needed to familiarize the students with the simulator, with its restrictions, possibilities, and, finally, its adequate usage.

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