University College of Southeast Norway

The new Norwegian captains – As good as it gets?

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This thesis is worth 30 study points

Abstract

Maritime education within nautical subjects has for a long time been known as an education where you learn navigation. The Standards of Training, Certification and Watchkeeping for Seafarers (STCW code), states some minimum requirements of what you are supposed to learn at an education that leads to a deck officer certificate. This thesis is measuring the amount of knowledge amongst finishing nautical students in Norway on the subjects that are required by the STCW code not dealing with navigation, but knowledge about rules, regulation and your responsibility as a deck officer.

Data was collected from a questionnaire performed from five different educational institutes performing education within nautical subjects. All three different types of education were participating in the research (Vocational schools, University Colleges and the Naval Academy)

The analysis of the data shows lack of knowledge amongst the students in some of the areas covered by the STCW code, especially regarding maritime language, knowledge of regulations concerning stability of the vessel and knowledge of the international code of signals. Overall the students are performing good, with an average score on the questionnaire 74,4% correct answers. Overall knowledge is stated as acceptable.

The study suggests clarifying and strengthen the educational part of the STCW code where the research shows lack of knowledge amongst the participating students.

Key words: STCW; Maritime education; Nautical subjects

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My good colleague from work, Executive officer Lieutenant Commander Espen Skare who helped me a long way when my knowledge of MS Excel was not sufficient.

At last, but most important, friends and family who have supported me through almost five years of part-time study in addition to full-time work. My fiancé Carina and daughter Astrid, Thank you!

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List of abbreviations

- AB Able bodied seamen
- CBT Competency based training
- COLREG International Convention for Preventing Collisions at Sea
- EPIRB Emergency Positioning Indicating Radio Beacon
- GM Metacentric height (ship stability)
- GMDSS Global Maritime Distress Safety System
- GZ Righting moment (ship stability)
- IAMSAR International Aeronautical and Maritime Search and Rescue
- ICS International Code of Signals
- IMDG International Maritime Dangerous goods code
- IMO International Maritime Organization
- IMSBC International Maritime Solid Bulk Cargoes Code
- IS International Code on Intact Stability
- ISM International Safety Management Code
- ISPS International Ship and Port Facility Security Code
- MARPOL International Convention for the Prevention of Pollution from Ships
- NOKUT Norwegian Agency for Quality Assurance in Education
- SART Search and Rescue Transponder
- SMCP Standard Marine Communication Phrases
- SOLAS International convention for Safety of Life at Sea
- SOS International emergency signal
- STCW Standards of Training, Certification and Watchkeeping for Seafarers
- VTS Vessel Traffic Service

Chapter 1. Introduction

1.1 Background

The education of personnel with nautical competence is today regulated by the Standards of Training, Certification and Watchkeeping for Seafarers (STCW code). Safety of life at sea and the marine environment as well as over 80% of the worlds trade depends on the professionalism and competence of seafarers. (Ziarati et.al, 2010).
The statement that was the background for the idea of the thesis came from a college of mine that claimed that Norway educated the best navigators (with explicit mentioning navigation) in the world, but far from the best mates or Master mariners. The fact that a bigger part than before of the job as a mate or captain today is management and operating the ship according to rules and regulation concerning ships activities. My colleagues (and also my own) experience from this field as inspectors onboard other ships in force of being Coastguard officers, was that vessels with crew educated in Norway and operating in Norway had at least the same amount of deviations on knowledge of rules and regulations as their foreign educated colleges. Without having explicit numbers on this, I wanted to dig a little deeper into this matter. I find this research useful because of is a way of check the quality of Norwegian nautical education seen against the International requirements.

1.2 Research aim and Research Question

The primary purpose of the study was to determine if graduating students in nautical science in Norway hold the right amount of knowledge according to the requirements in the STCW code. The second purpose was to evaluate if there were some major findings that where common lack of knowledge, independent of which school you were studying at. The aim was to gather a sample of students in the Norwegian Maritime academies, and see them as one group of Norwegian nautical students. The aim is not, and therefore it is only

commented when the variations have been large, to compare the different schools, but that the sample was to be a valid sample of the three different types of nautical education in Norway.
In my master thesis plan, delivered fall 2016 I wrote:
For a modern navigator/captain on board vessel, less time is used for navigation duties and more time is used on "administrative" work than earlier. Keeping ship according to rules & regulations, customer relations, safety management etc. Hence this development, my hypothesis is that a lot of the newly educated navigators today is well educated within navigation, but maybe not sufficiently within other segments of the work of a modern navigator today.
I want to conduct research of navigators that is about to finish their education, and measure their knowledge within areas that is not typical navigational knowledge but is mandatory knowledge for a navigator today, ref. IMO. To narrow down the research field, I will focus on the parts of the IMOs Standards of Training, Certification and Watchkeeping for Seafarers (STCW code/convention) that is not regulating navigational duties.

Research question:

Is a newly educated navigator at a Norwegian educational institution sufficiently trained according to the STCW code demands on knowledge of rules and regulations?

In Norway, there are three different educational ways to become a Master Mariner (Person that holds the highest deck officer certificate, Class 1).

1. You can undergo a bachelor program within Nautical science.
2. You can study nautical science at a vocational school, presupposes that you hold a certificate of apprenticeship as an AB (Able bodied seaman).

3. You can study leadership at the Norwegian Naval Academy with recess in nautical science.

All of the educational institutes that are teaching nautical subjects are undergoing approval from Norwegian Agency for Quality Assurance in Education (NOKUT). In the approval process, it is overlooked that the curriculum of each study corresponds with the demands in the STCW code for education and training to receive a Master Mariner certificate, independent of which one of the three ways of education you are undergoing.

1.4 History

The original vision of IMO was to improve safety by improving technical aspects of shipping. It was not until the early 1970s, when statistics showed that the main factor in maritime accidents was and continued to be the human element, that IMO officials attempted to curb accidents by setting standards of training for seafarers. As a result, the IMO created the *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978* (STCW78). The STCW78 sets qualification standards for masters, officers and engineers on seagoing merchant ships, which signatory countries are obliged to meet or exceed (Gholamreza & Wolff, 2008, p. 260-272).

At the time, the IMO was a consultative organization and politically with limited power; it therefore left part of the standards to the satisfaction of governments. Sometimes after 1984, many in the field felt that the STCW78 was unsuccessful because it included vague requirements that were left to the discretion of each government and because there was a lack of clear standards of competence, which resulted in different interpretations being made. There was also a demand to bring the *STCW78* up to date. Finally, from 1992 on - after a

series of major human-caused shipping accident with disastrous consequences (environmental pollutions and loss of lives) and faced with demands for action from politicians, press and public - the IMO decided to review the Convention (Gholamreza & Wolff, 2008, p. 260-272).

In 1993 the IMO embarked on a comprehensive revision of STCW78 to establish the highest practicable standards of competence. On 1 February 1997, the new amended *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1995* (STCW95) entered into force. It laid out greatly improved seafaring standards through competency-based training (CBT). The training mandate of STCW95 is outcome based; it requires that candidates for licenses demonstrate their ability to perform the task for which they are going to be certified. It means applicants for competency certificate are expected to show that they are able to "do" what they are trained to do (Gholamreza & Wolff, 2008, p. 260-272).

The STCW convention was revised in 2010, under the STCW Manilla 2010 conference, by recognizing the importance of establishing detailed mandatory standards of competence and other mandatory provisions necessary to ensure that all seafarers shall be properly educated and trained, adequately experienced, skilled and competent to perform their duties in a manner which provides for the safety of life, property and security at sea and the protection of the marine environment. (IMO, 2010)

1.5 Overview of the thesis

The thesis is divided into five chapters. Chapter 1 gives an introduction to the thesis, explaining the background, reason and aim with the research. It also presents the research question. It also discusses and mentioned earlier similar research with corresponding fields of research. There is a brief history of the STCW code and how it was developed, because of the

role of the code as background for the entire thesis. Chapter 2 mainly discusses the methodology used in the thesis, including the development of the questionnaire and how it was conducted. Chapter 3 presents the data collected from the questionnaire, both in plain text and with a diagram for each question to easily visualize the questions. There is also briefly mentioned findings on each question. Chapter 4 reviews the research question and comments and discuss the findings from chapter 4. Chapter 5 holds the conclusions that are drawn from the research. In addition, you have references and appendixes at the end of the thesis.

1.6 Former research

When searching for former research within maritime education and how it is correlated to the international STCW code, I have mainly used the academic search engine Oria. I started with search combining the keywords “education” and “STCW” giving 273 hits, amongst them 168 different scientific articles. A lot of those was from the late 90´s, presumably because this is the last time the STCW code was revised. By narrowing down the search to only data that is less than 10 years (from 2007), the hits where down to 207, amongst them 111 scientific articles. By adding the keywords “school” and “maritime”, I was down to 47 hits, amongst them 33 scientific articles. It was within these 33 articles I found the most relevant earlier research within my field.

One of the most interesting articles is mentioning some of the same results as my research, the understanding and communication skills in maritime English (ref IMO SMCP). The research was on Chinese seafarers and their English education and training in China. The article is being published in the December edition of *Marine Policy*, but was accepted in September 2017. In the conclusion, the authors of the article states; *The majority of the maritime English teachers interviewed in this research felt greatly dissatisfied with their graduates’ English communicative competence. The reasons were attributable to maritime English teachers and*

students themselves and the maritime English education and training system in China. The prominent issues were the impractical maritime English examination system and the concomitant exam-oriented teaching and learning approach. (Lidong et al., 2017 p. 56-63). Using a mix of qualitative and quantitative methods, this paper reveals that English communicative incompetence of Chinese seafarers was attributable to the maritime English examinations system, teaching materials, teaching methods and teachers and students themselves. Recommendations were made to improve maritime cadets' English communicative competence (Lidong et al., 2017 p. 56-63).

In 2017, There was conducted a research on the awareness of the 2010 Manilla amendments to the STCW code amongst nautical students in Nigeria, stating that;

"The study reveals low level and low quality of awareness of the STCW-78 as amended in Manila 2010. It was recommended that; Maritime Training Institutions should be sensitized on the provisions of the STCW as amended. Also, IMO should ensure that, STCW awareness is enshrined in relevant curricular of Maritime Education and Training." (Evans, U. F. et al., 2017, p. 168-171)

Amongst other, this statement inspired me to undergo studies to understand the knowledge level amongst Norwegian students undergoing education that is based on the same framework and codes is used worldwide in nautical education. Further on I continued to review other literature concerning and evolving around the same subjects.

Chapter 2. Methodology

2.1 Research approach

The overall purpose of the conducted research is to measure Norwegian students that are studying nautical science to become future deck officer's knowledge about key elements within the STCW code. A questionnaire survey was conducted among the students who was about to graduate at the five participating educational institutions in Norway in April 2017. To make sure that that the results was valid, and that the findings from the survey was answering my theses research questions, appropriate research methodology and techniques were needed. This chapter will elaborate and explain the research design and research techniques that were used in this thesis.

2.1.1 Research design

To obtain reliable findings from the answers from the questionnaire it was important to use appropriate research design and research techniques. Good research design is important to make the data valid and as accurate as possible. This is also a way to ensure that the answers you get will help you to get answers for our own hypothesis.
Research design is defined by (Frankfort-Nachmias et al., 2015) as; "*The program that guides the investigator in the process of collecting, analyzing and interpreting observations. It allows inferences concerning casual relations and defines the domain of generalizability"*
Validity is concerned with the question "Am I measuring what I intend to measure?" (Frankfort-Nachmias et al. 2015) It is always difficult to construct a questionnaire to measure knowledge amongst students. Therefore, for me it was especially important to stick with the STCW code that regulates what is imposed to be thought at a nautical education to be able to receive the certification as a certificate rewarding education. In that way, I ensure that the

questions should be familiar to all of the students, if not the schools are not teaching what they are supposed to, hence that this could be a finding of its own.

Language is also important, and the fact that the respondent can understand and write the language that the questionnaire is written in, and understand the setting and meaning of the question is particularly important (Kruuse, 2005). The fact that the questionnaire was written in English as chosen due to my thesis and research is all done in this language. In addition to this I was not sure that every respondent was Norwegian. To obtain validity it is important to cover what you are supposed to cover, and not anything else (Martinussen et. al, 2010, s. 125). Hence to my questionnaire it was important to strictly base all of the questions with reference to the STCW code.

2.1.2 Research strategy

According to (Saunders et al., 2016) you can divide into eight different main research strategies:

- Experiment
- Survey
- Case study
- Action Research
- Grounded Theory
- Ethnography
- Archival Research and Documentary research
- Narrative Inquiry

In this thesis, I choose a quantitative method with and questionnaire survey strategy. The fact that the survey was performed as measurement of knowledge instead of a classical survey

where you typically range something from disagree to fully agree, or range something on a numeric scale, make it more difficult to use statistical resources that normally apply to quantitative research. The data gathered by the questionnaire was therefore sorted in an Excel spreadsheet where you can pick the data and numbers needed. To ensure an efficient way to complete the questionnaire with a high number of respondents I choose not to do the classical internet survey with mail follow ups described by (Frankfort-Nachmias et al., 2015), but was in directly contact with contact persons for the respondents. By meeting them and performing the questionnaire when I was present, I am confident that I got more respondents than I would get with an internet questionnaire.

2.2 Questionnaire development

When constructing the questions in the survey it was important to stay between the boundaries of the STCW code, therefore I choose to extract questions directly from the Code, and especially from the chapters involving the Master and Deck department. The questions were taken from Table A-II/1, Navigation at the operational level, and from Table A-II/2, Navigation at the management level. I choose to use factual questions to make the wanted measurements of knowledge. When constructing factual questions, it is important to be precise and construct understandable questions. People often think that factual questions are easier to design than other types of questions. However, even factual questions can present the researcher with problems. How accurately people report depends on what and how they are being asked (Kruuse, 2015).

2.3 Data collection procedures

Experience shows that to clear and accurate answers on a questionnaire that is shaped like a test, the best would be to implement the test by physically travel and visit the

participants. Therefore, the first thing I started with, was to contact the educational institutes I wanted to participate. Based on this to get a valid sample (Jacobsen, 2015), I started to contact 5 Schools, and got a positive feedback for their participation in my research. The participating schools are 2 university colleges, 2 vocational schools and the naval academy. My goal was to gather answers from students that was about to finish their nautical education, independent of what type of schools they were studying at, but it was interesting to see if there were major differences between the schools. Therefore, it was important to get participating educational institutes from all of the three alternatives for a nautical education in Norway. This was achieved.

In April 2017, I travelled around in Norway, conducting the questionnaire at these 5 schools, and got 75 participants from the different schools to take the questionnaire. In my meaning, also supported by the teachers that was lecturing on the different schools, the fact that I travelled and met the students face to face helped me to raise the numbers of students participating. On all 5 schools 100% of the students that were present at my arrival participated.

By contacting the different schools in advance, I got in touch with different section leaders, teachers and class representatives. My instruction after getting their approval for joining the research, was to try to find a date and time were as many students as possible were present. This was a success, on 4 out of 5 schools over 90 % of the students belonging to the class was present at the time.

The tour around Norway was finalized and I had 75 students that fitted the criteria as finishing students that participated. The data was then systematized in Microsoft Excel and used as data in Chapter 4 & 5 in this thesis.

2.4 Research ethics

Scientist have become increasingly concerned with the ethics of conducting social science research. Each of the social science professional associations has dealt with the issues related to the rights and welfare of the research participants, just as they have considered researchers obligations to their subjects. (Frankfort-Nachmias et al., 2015)

It was important to me to threat the student's data as one homogeneous group, and the data is solely analyzed as one group. When the data is showing large amount of differences between each different educational institute, this is commented. By using the data in the thesis, it is not possible to identify students at a personal level. By using the guidance and test at the Norwegian Centre for Research Data, it showed that the questionnaire and data collected was not an object for notification (Appendix II)

Chapter 3. Results

Overall the students answered 74,4% correct on all answers. The highest average score amongst the educational institutes was Bergen Technical Vocational school with an average score of 81,6%, lowest average score with 65,2% was the Norwegian naval academy. Three students from three different educational institutes shared the top score with 91% correct answers, the student with the lowest score had 46% correct answers. If you see the score in I scientific way, often the score of 40% will make you pass in an educational setting. This questionnaire is though tried to make “easy” in a way that the questions is stated from the major parts of the curriculum in the STCW code. It is expected that you have a higher knowledge level amongst these subjects when graduating from a nautical education that eventually will give you the right to call yourself a Master Mariner. I have tried to find trends within the demographic differences amongst the participants without finding special groups performing better/worse than average. The sources of error are present due to the low numbers in some of the demographic groups. These numbers showed an average higher score amongst participants with former seagoing experience, but this was expected due to the fact than when you are out sailing you get to know a lot of the rules & regulation of shipping independent of sailing as an officer or rating.

3.1 Summary of results

Category	Correct answers (%)	Wrong answers (%)	Don't know (%)
Average all	74,4	15,8	9,8
Male	75,4	15,5	9,1
Female	67,1	17,7	15,2
Age 20-24 (yrs)	75,7	16,3	8,0
Age 25-29 (yrs)	69,9	15,0	15,1
Age 30-34 (yrs)	76,1	11,4	12,5
Age 35+ (yrs)	79,1	16,4	4,5
Seagoing experience 0 (yrs)	69,5	12,9	17,6
Seagoing experience 0-1 (yrs)	66,9	21,4	11,7
Seagoing experience 1-2 (yrs)	80,0	16,2	3,8
Seagoing experience 2-5 (yrs)	76,2	18,2	5,6
Seagoing experience 5+ (yrs)	76,7	14,2	9,1

3.2 Respondents demographics

Sex		
Male	66	88%
Female	9	12%

Age		
20-24	47	64%
25-29	19	25%
30-34	4	5%
35+	5	6%

Nationality		
Norwegian	74	99%
Other	1	1%

Previous experience at sea before the start of nautical studies		
None	24	32%
0-1 years	7	9%
1-2 years	23	31%
2-5 years	13	17%
More than 5 years	8	11%

3.3 Detailed results

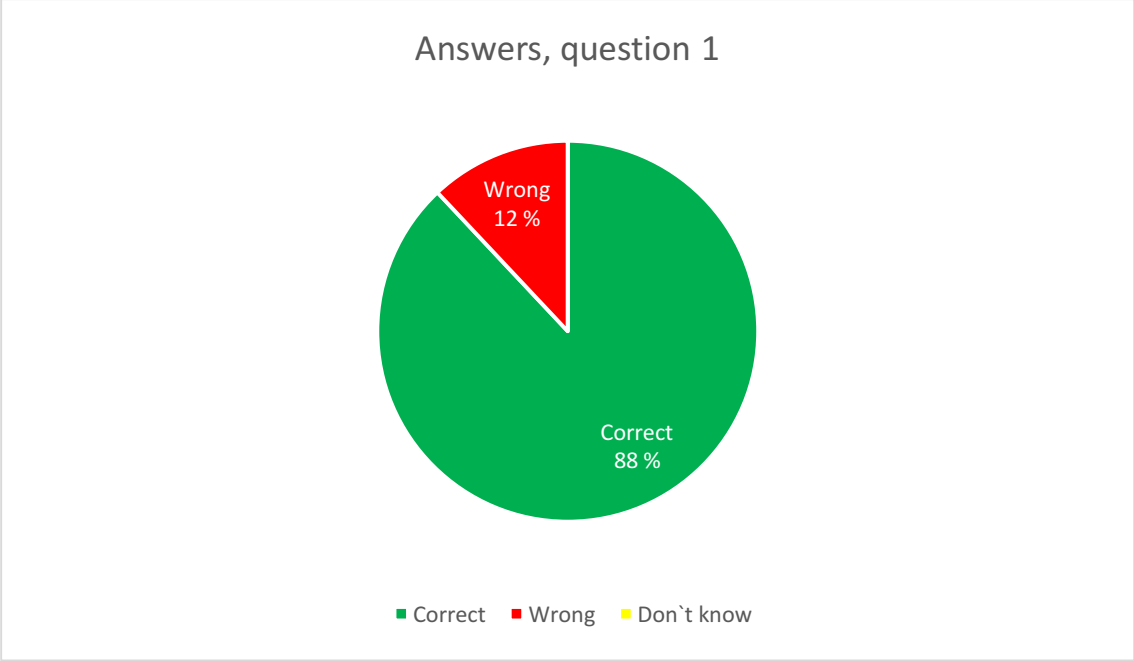
Each question in the questionnaire is here presented with the reference to the STCW code and background for why the question was made and used in the research. In addition, each question is graphically shown in a diagram to visualize the answer ratio in a standardized and easy way to understand for the reader. On each question, there is a comment called Findings where the answers and amount of correct answers are shortly commented. Those answers that where seen ass unexpected and pointed out as findings not expected is commented in chapter 4, Discussions.

Question 1

What is the meaning of the abbreviation STCW?

Regulation II/1 in the STCW code, point 2.5 states that *"Every candidate for certification shall have completed approved education and training and meet the standard of competence specified in in section A-II/1 of the STCW code"*

This meaning that every candidate for certification should have a thorough knowledge about the STCW code to ensure that you have the right knowledge and certification after ended education.



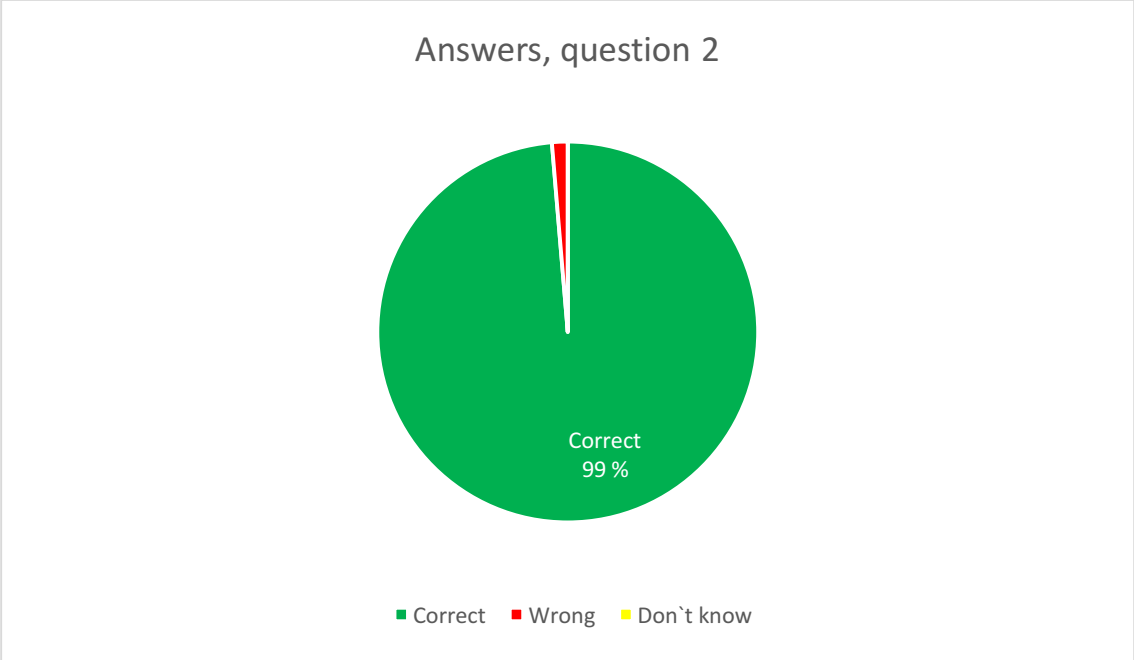
Findings:

None particularly, already at the first question the number of students answering the wrong answer instead of answering "don't know" is shown as a factor that is important to bear in mind through the analysis of the answers.

Question 2

Ref STCW Table A-II/2 – SOLAS – What is the meaning of the abbreviation SOLAS?

Regulation A-II/2 states that knowledge of international maritime law embodied in international agreements and conventions, and that regards shall be paid especially to the following subjects; *"responsibilities under the relevant requirement of the International Convention for Safety of Life at Sea"*



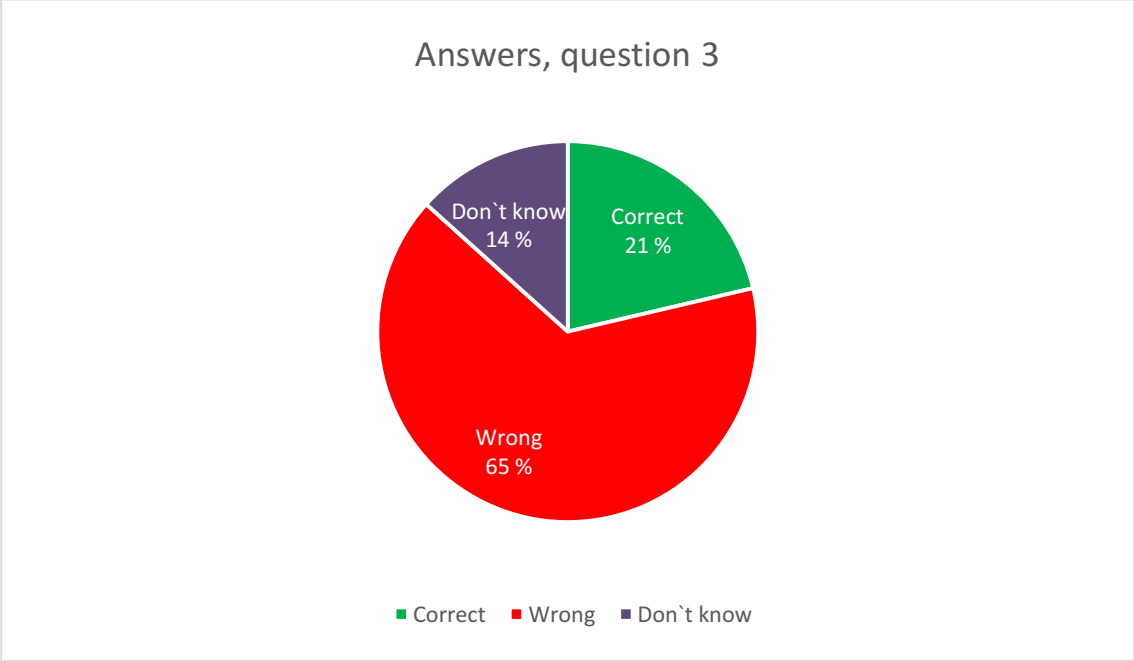
Findings:

74 out of 75 students answered this correctly, stating that the students have the appropriate knowledge about the SOLAS convention, though the question does not measure anything about the knowledge of the contents of the regulation.

Question 3

Ref STCW Table A-II/2 – How often do you <u>have</u> to test a man-over-board boat on the water according to today's regulation?

Regulation A-II/2 states that you should have *"Thorough knowledge of life-saving appliance regulations (International convention for the Safety of Life at Sea)"* The fact that this is one of few places in the STCW code where the word "Thorough" is used, and wanted to measure this by adding one question from the content of the regulation.



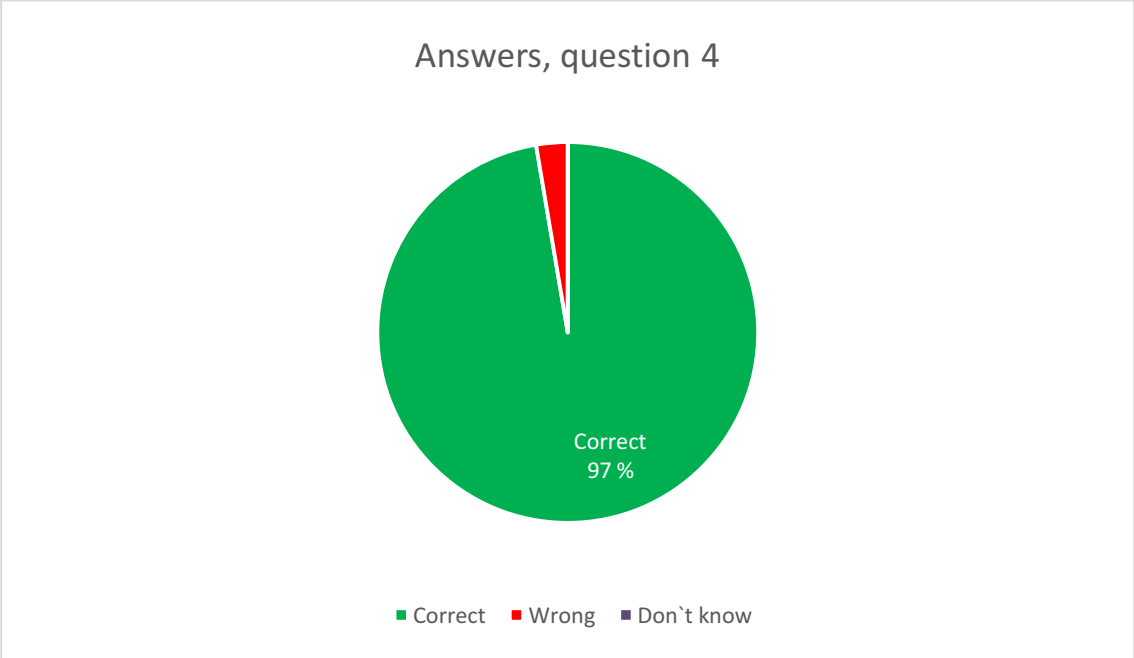
Findings:

The data shows that there has been a lack of study of the content in the SOLAS convention. It is mentionable that 43 out of 49 students that answered incorrectly, answered once per month, instead of the right answer who was once per 3 months. By crosschecking this with the years of experience at sea amongst these 43, shows that this is mainly students who has been at sea. This shows, and my experience is that it is normal to test the man-over-board boat more often than the mandatory quarterly test.

Question 4

Ref STCW Table A-II/2 – The IMDG code is important to maintain a safe ship and conduct a safe voyage – What is the IMDG code?

The IMDG code is mentioned as important multiple times in the STCW code, with the two columns regarding Cargo handling and stowage and management level; "*Knowledge, understanding and proficiency within International regulations, standards, codes and recommendation on the carriage of dangerous goods, including the IMDG code and the IMSBC Code"* and *"Ability to establish procedures for safe cargo handling in accordance with the provisions of the relevant instruments such as the IMDG code, IMSBC Code, MARPOL 73/78 Annexes III and V and other relevant information"*.



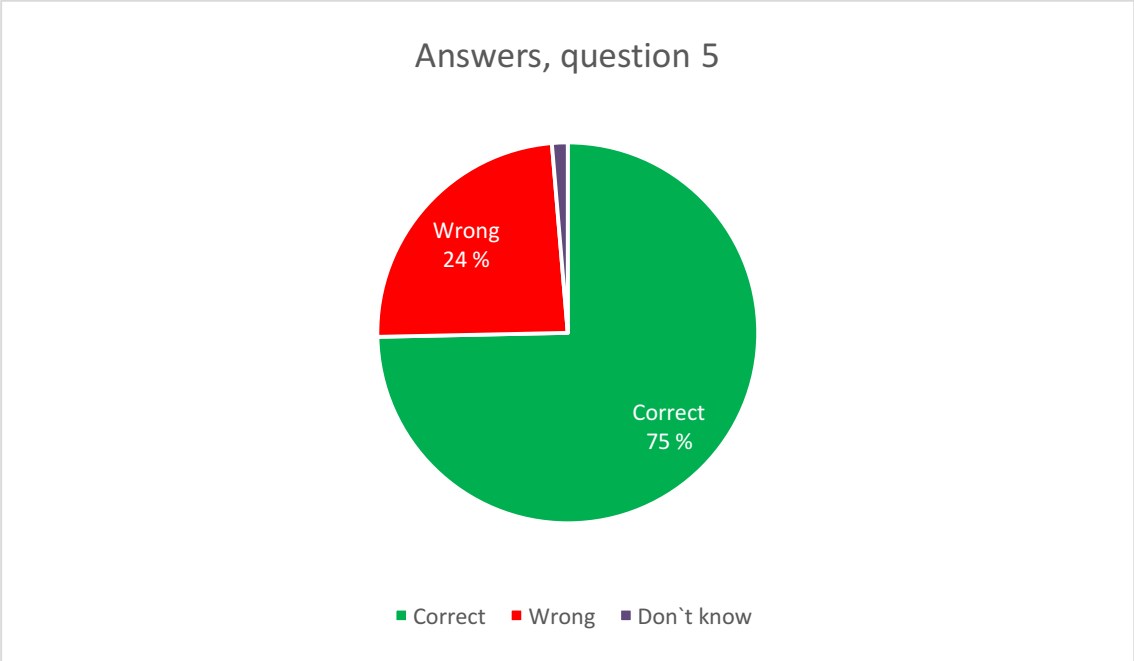
Findings:

The students show sufficient knowledge about the content of the IMDG code.

Question 5

Ref STCW Table A-II/1 – What is the objective of the MARPOL convention?

Table AII/1 states that you should have *"Basic working knowledge of the relevant IMO conventions concerning safety of life at sea, security and protection of the marine environment"*. In addition to this MARPOL is also mentioned in Table A-II/2, under Cargo Handling and stowage at the management level. IMO states the MARPOL convention as; *"The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes"*.



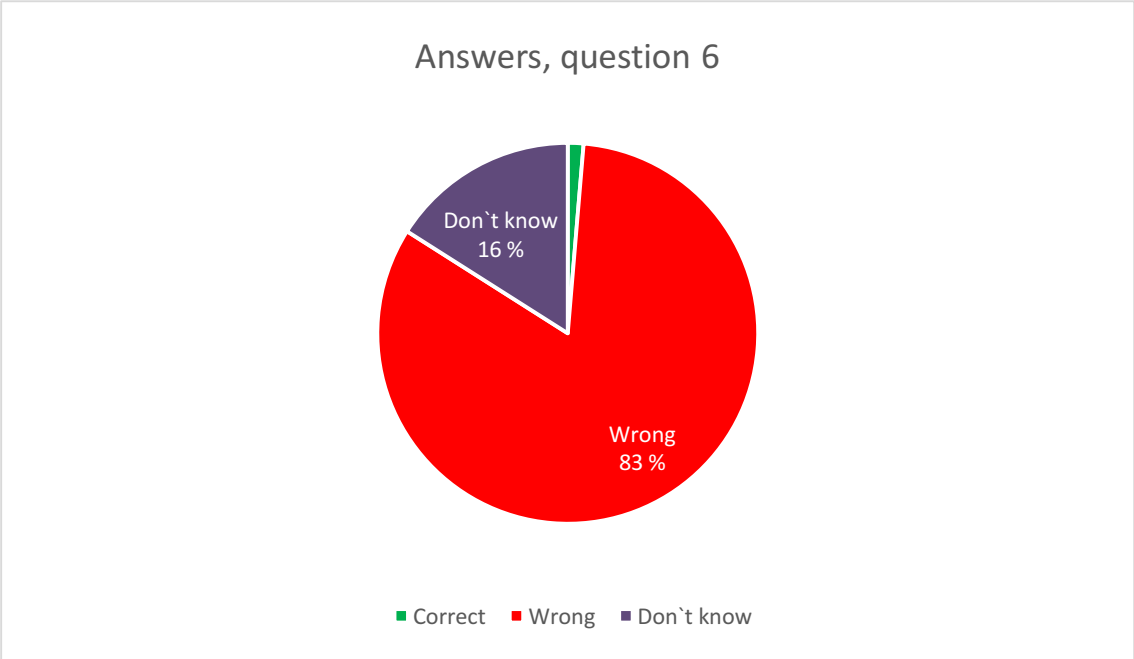
Findings:

¾ of the students answered correctly, though it should be a question you should be able to answer as a finishing student in nautical science in Norway. The persons who has answered incorrected is evenly spread throughout the other alternative answer. This rules out possible misunderstanding regarding the question.

Question 6

Ref STCW Table A-II/2 – According to the STCW code you should have "Knowledge about IMO recommendations concerning ship stability" – Where do you find these recommendations?

IMO has long developed intact stability criteria for various types of ships, culminating in the completion of the Code on Intact Stability for All Types of Ships Covered by IMO Instruments (IS Code) in 1993 (resolution A.749(18)) and later amendments thereto (resolution MSC.75(69)). The IS Code included fundamental principles such as general precautions against capsizing (criteria regarding metacentric height (GM) and righting lever (GZ)); weather criterion (severe wind and rolling criterion); effect of free surfaces and icing; and watertight integrity. The IS Code also addressed related operational aspects like information for the master, including stability and operating booklets and operational procedures in heavy weather (IMO, 2017)



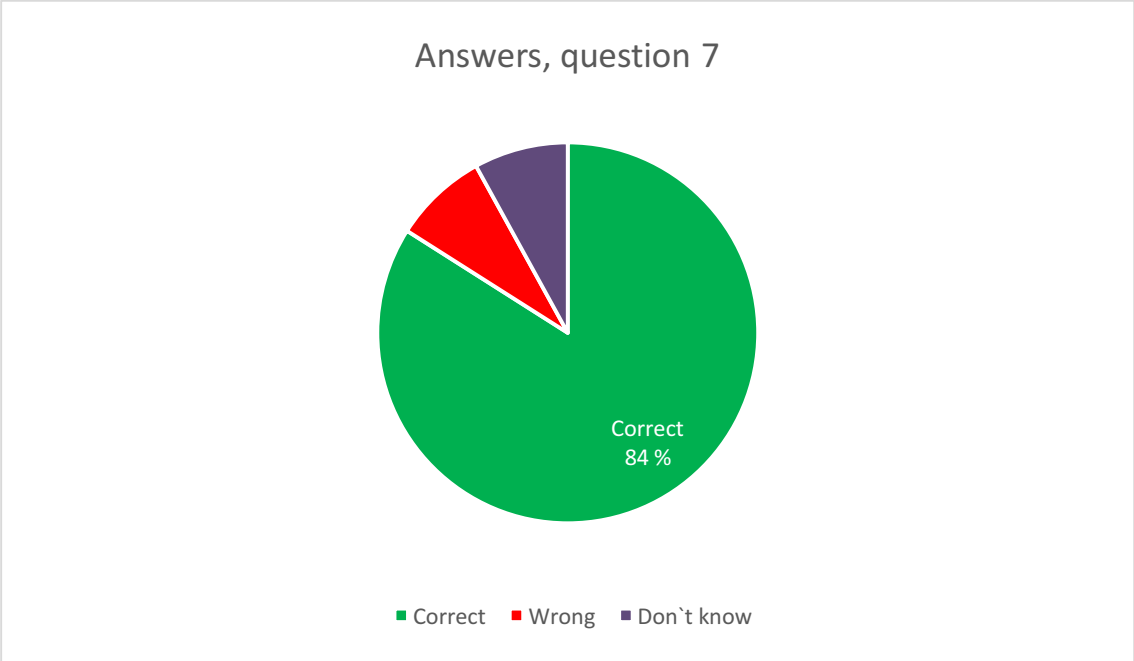
Findings:

Large numbers of wrong answers show lack of knowledge, see chapter 4.

Question 7

Ref STCW Table A-II/2 – According to the STCW code you should have "Thorough knowledge of life-saving appliance regulations". – Where do you find these?

Regulation A-II/2 states that knowledge of international maritime law embodied in international agreements and conventions, and that regards shall be paid especially to the following subjects; *"responsibilities under the relevant requirement of the International Convention for Safety of Life at Sea".* The question was put in to measure the students understanding of the correlation between rules & regulation in the STCW code. This with reference to question 2 & 3.



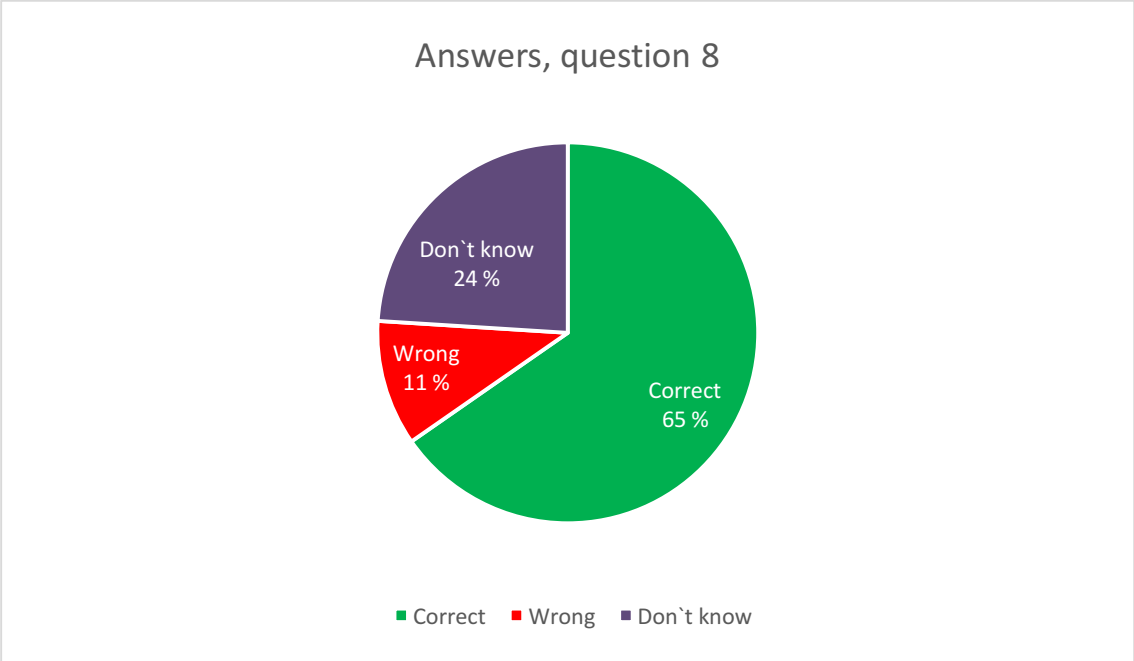
Findings:

84 % percent with correct answers shows that there is sufficient knowledge about the correlation between rules and regulations regarding life-saving appliances onboard a vessel. Findings in question 2 & 3 states the same thing.

Question 8

Ref STCW Table A-II/2 – The IMBSC Code deals with one special ship type – Which one?

In the column of Cargo handling and stowage and management level; "*Knowledge, understanding and proficiency within International regulations, standards, codes and recommendation on the carriage of dangerous goods, including the IMDG code and the IMSBC Code"* and *"Ability to establish procedures for safe cargo handling in accordance with the provisions of the relevant instruments such as the IMDG code, IMSBC Code, MARPOL 73/78 Annexes III and V and other relevant information".*



Findings:

The international Maritime Solid Bulk Cargoes Code, is regulating the trade of goods in Bulk. It is one of few vessel specific codes mentioned in the STCW code. 65% of the students knew this, and that signals that it has been mentioned in lectures.

Question 9

Ref STCW Table A-I/4 – It is the ship owning companies' responsibility to have a safety management system onboard their vessels – Which IMO code regulates the safety management system?

In 1989, IMO adopted *Guidelines on management for the safe operation of ships and for pollution prevention* - the forerunner of what became the International Safety Management (ISM) Code which was made mandatory through the International Convention for the Safety of Life at Sea, 1974 (SOLAS) (IMO, 2017). This again is connected to table A-I/4 and A-I/14 in the STCW code, regarding sufficient training to ensure the safety to all seafarers onboard the ship owners vessels.

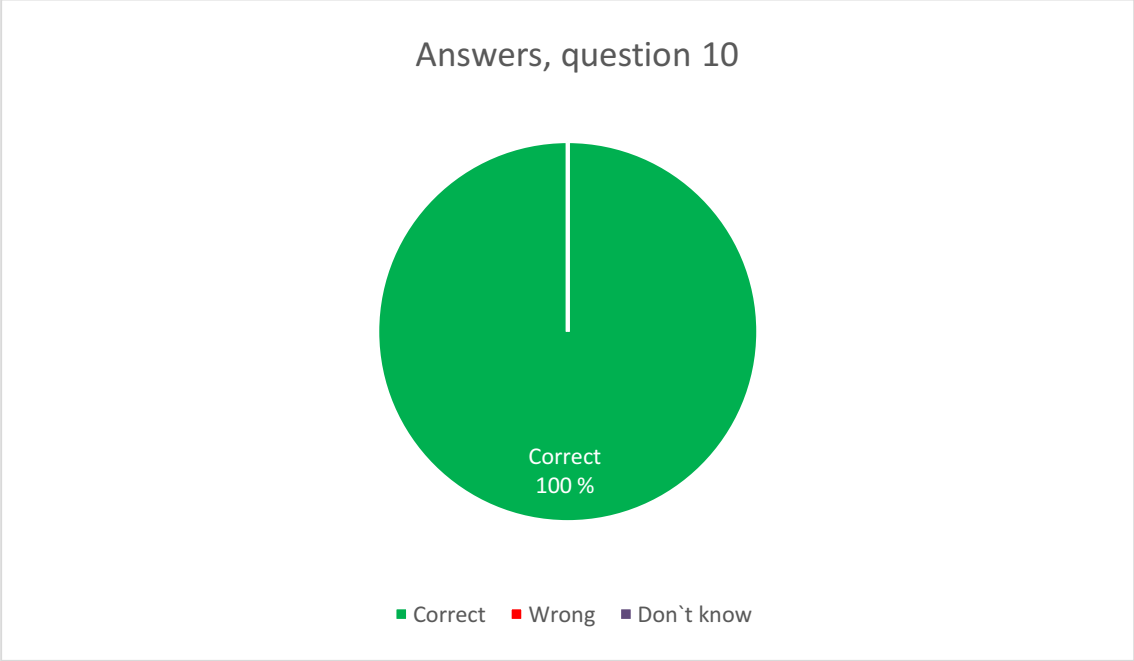
Findings:

The students have the appropriate knowledge about where you find rules and regulations about a vessels safety management system.

Question 10

Ref STCW Table A-II/2 – What is the international emergency channel (international distress frequency) on a VHF radio?

In table A-II/2 under competence "coordinate search and rescue operation" it states that the criteria for evaluating competence within this field, amongst others is, "Radio communications are established and correct communication procedures are followed at all stages of the search and rescue operation"



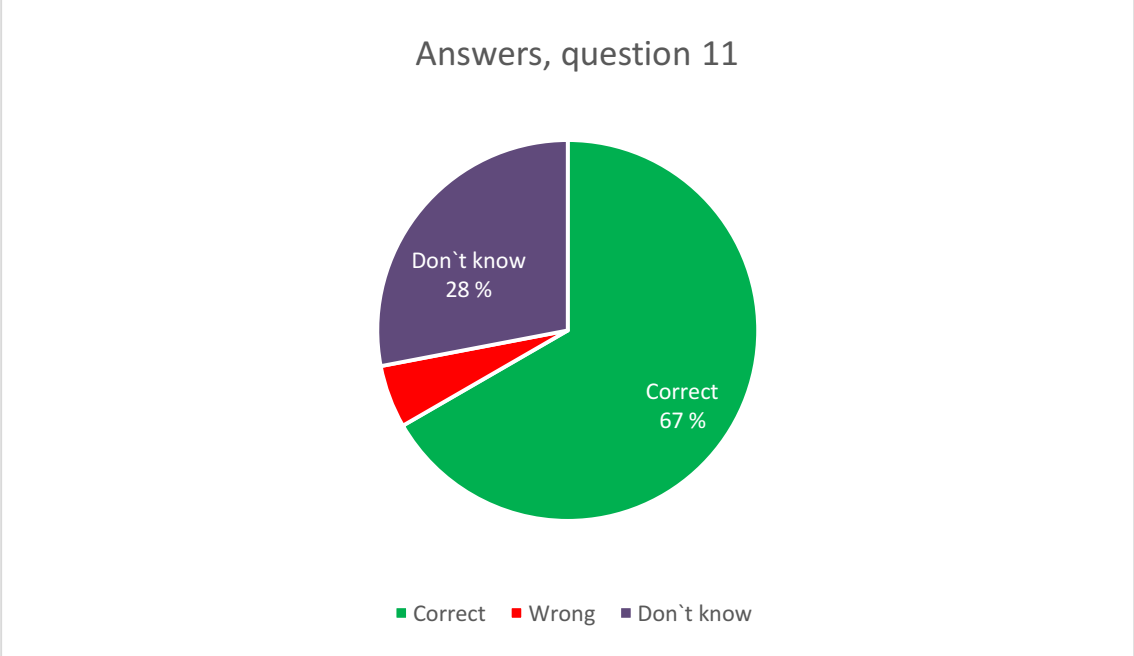
Findings:

All of the participants answered correctly, shows that the basic knowledge of emergency communication is good.

Question 11

Ref STCW Table A-II/1 – Inmarsat-C is a part of the radio station (GMDSS equipment) onboard a ship trading worldwide. Which code do you use on the Inmarsat-C terminal to get medical advice?

Both the operating requirements of the GMDSS equipment and the column; Controlling the operation of the ship and care for persons onboard in table A-II/2 and in A-II/1 is relevant. It is important to see the question in relation to question 10, who measures the most common knowledge of GMDSS emergency equipment, where this question is an attempt to measure a deeper understanding of the knowledge that are required by the STCW code to serve as an OOW.



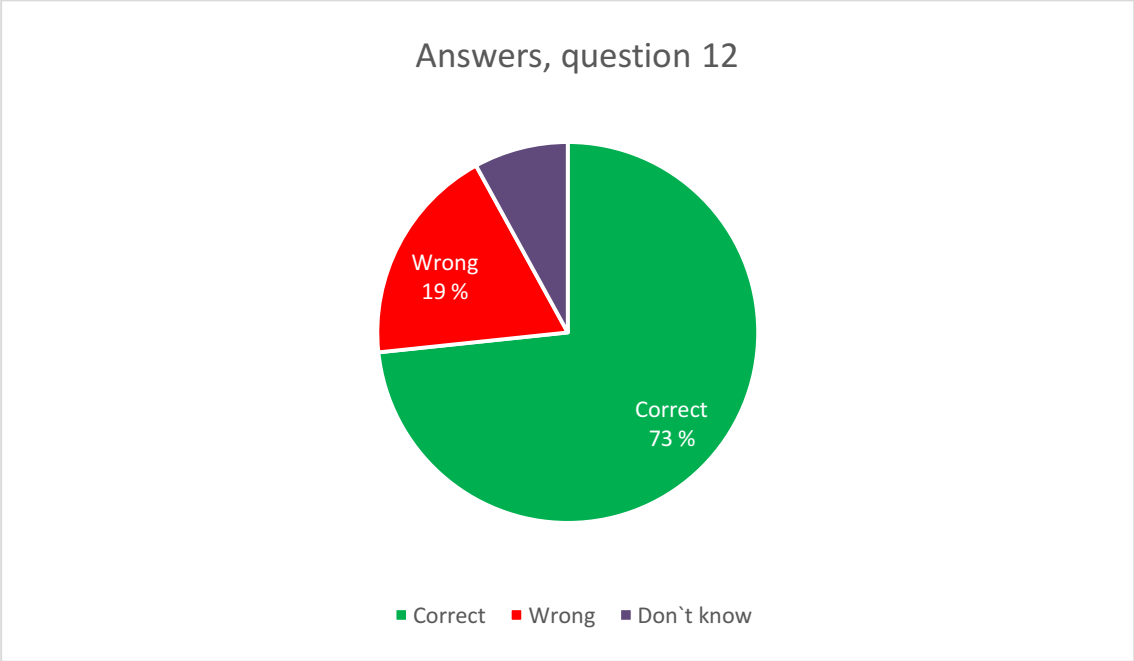
Findings:

As this question was an attempt to measure knowledge within the GMDSS knowledge, and the knowledge within the Table A-II/2 “Controlling the operation of the ship and care for persons onboard”, the fact that 2/3 of the students knew this is seen as good. Interesting to see the amount of people answering don’t know, instead of guessing the wrong answer.

Question 12

Ref STCW Table A-II/1 – Morse Signals – Ability to transmit and receive signals by Morse light. How is the international Morse signal for emergency (SOS)?

The STCW code clearly states that you are going to be able to transmit and receive, by Morse light, distress signal SOS as specified in Annex IV of the international Regulations of preventing collisions at se, 1972, as amended, and appendix 1 of the International Code of Signals, and visual signaling of single-letter signals as also specified in the International code of Signals. My reason for including this question is to check if the students have learnt this, because it is often seen as outdated knowledge by the schools, but the code states clearly that it is a part of the required knowledge.



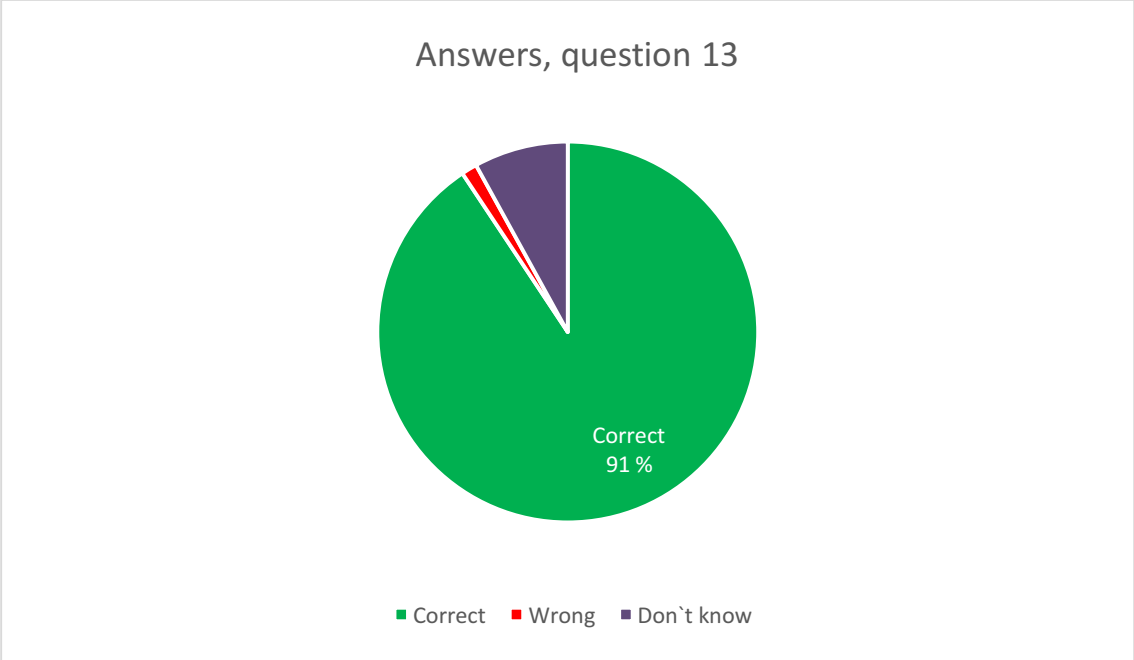
Findings:

Isolated 73% with correct answer is ok, but I expected more on this question because of the common knowledge about how to send SOS signal I thought where about this. It is therefore difficult to measure if it has been thought at school, or if it is “old” knowledge that the students had before the start of the study.

Question 13

Ref STCW Table A-II/2 - Thorough knowledge about the IAMSAR manual is required by the STCW Code – When does the IAMSAR manual help you?

Table A-II/2 states that the candidate shall have a thorough knowledge of and ability to apply the procedures contained in the International Aeronautical and Maritime Search and Rescue (IAMSAR) manual.



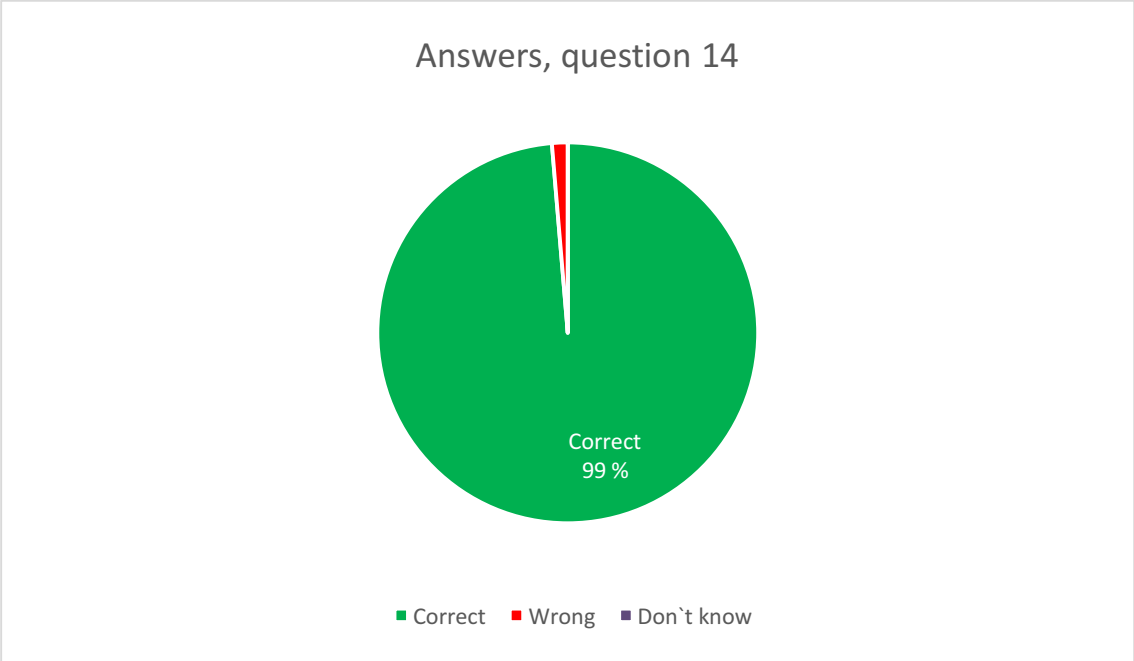
Findings:

The students have the appropriate knowledge according to the STCW code about the IAMSAR code.

Question 14

Ref STCW Table A-II/2 – What is a VTS in the maritime domain?

Knowledge about a Vessel traffic service (VTS) is mentioned two times in Table A-II/2, both under “Plan a Voyage and coduct navigation” and in “Manouvre and handle a ship in all conditions”. In addition, it has it owns underscore where it is especially mentioned “Reporting in accordance with the General principles for Ship Reporting System and with VTS procedures”. Large parts of the Norwegian Coastal line are covered by VTS areas; therefore, the knowledge is especially important within the Norwegian education, hence the fact that most of these students will mainly sail in these waters.



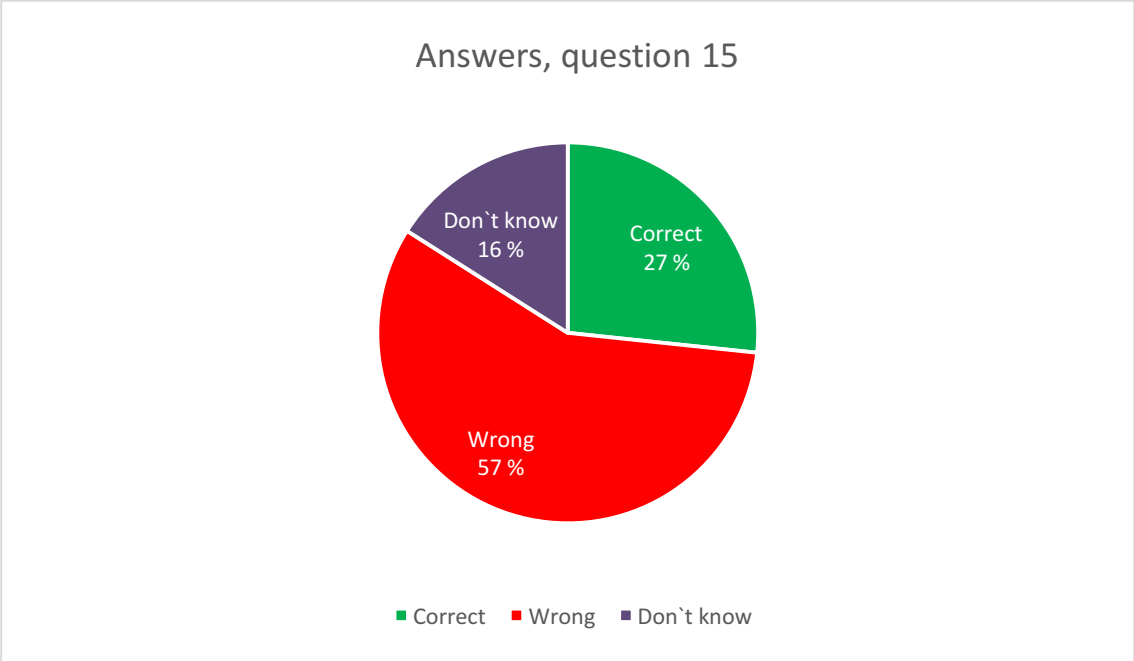
Findings:

The students have the appropriate knowledge according to the STCW code about the Vessel Traffic Service (VTS).

Question 15

Ref STCW Table A-II/1 – Language and communication – All communication between other ships, pilots, coastal radio stations etc. shall be done according to?

According to the STCW code you should have; "*Adequate knowledge of the English language to enable the officer to use charts and other nautical publications, to understand meteorological information and messages concerning ship´s safety and operation, to communicate with other ships, coast stations, and VTS centers and to perform the officer´s duties also with a multilingual crew, including the ability to use and understand the IMO Standard Marine Communication Phrases (IMO SMCP)".*



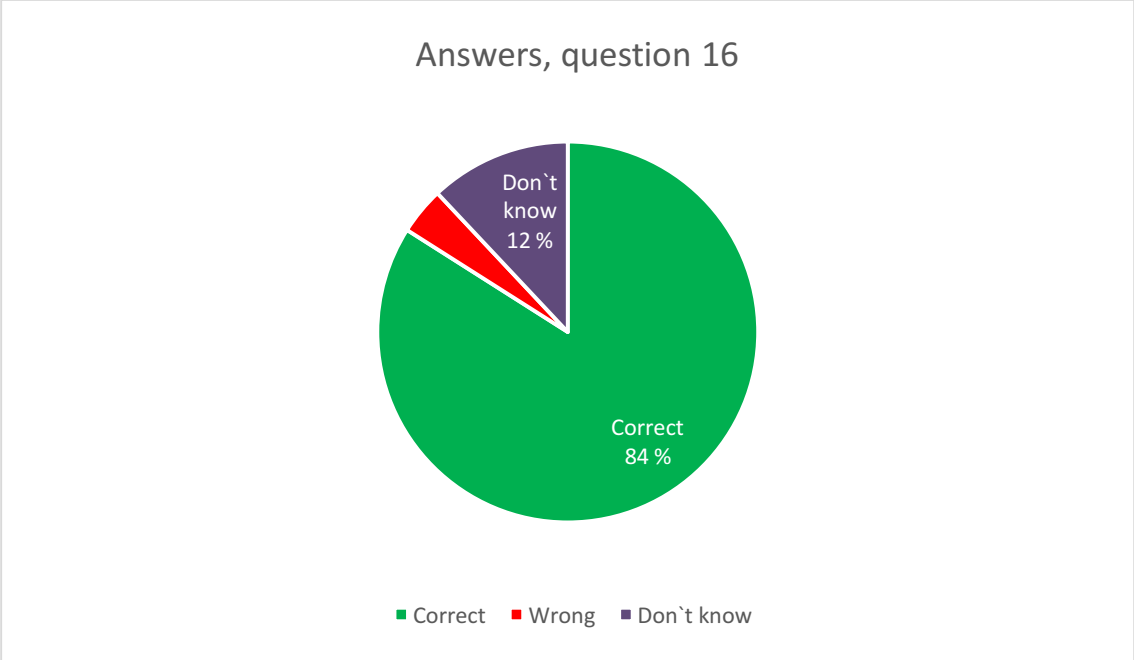
Findings:

Only ¼ of the students know that IMO Standard Marine Communication Phrases (IMO SMCP), is regulating the communication at sea, shows that, even if every school has based their training on the IMO SMCP. (according to the lecture plans). The learning outcome is not precise with reference to the STCW code.

Question 16

Ref STCW Table A-II/2 – The ISPS code is an amendment to the SOLAS code. – What is the ISPS code regulating?

Having entered into force under SOLAS chapter XI-2, on 1 July 2004, the International Ship and Port Facility Security Code (ISPS Code) has since formed the basis for a comprehensive mandatory security regime for international shipping. (IMO, 2017)



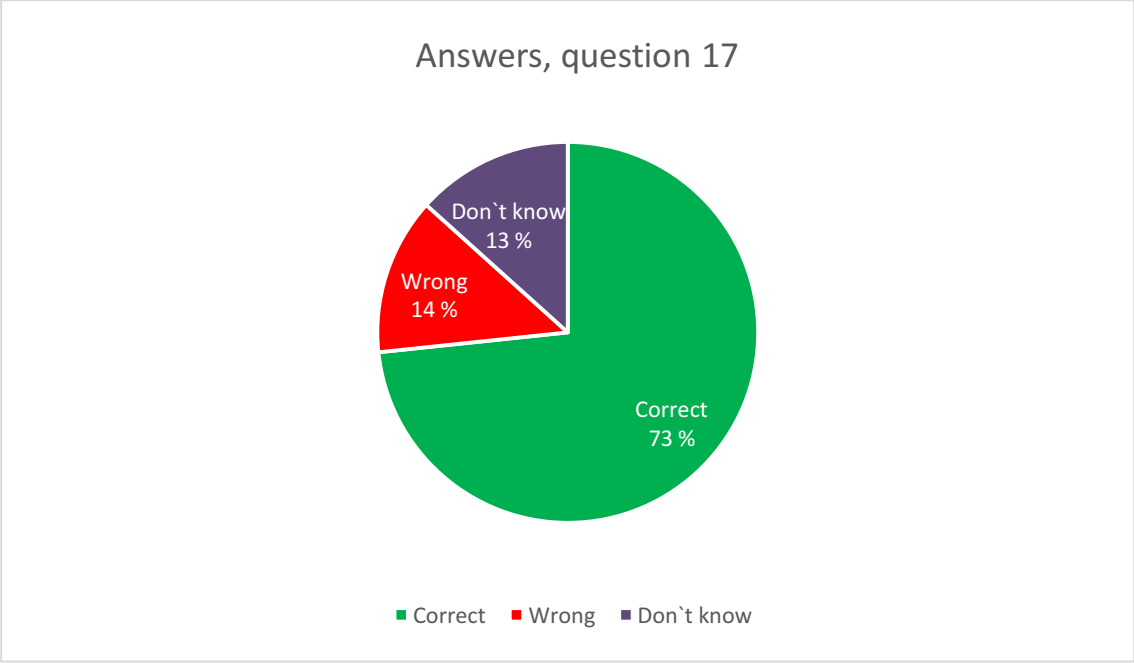
Findings:

Sufficient number of students know what the ISPS code is regulating. The fact that wrong answers are low (3), and the students that didn't know answered that they didn't know, shows that the question was understandable and the answers are reliable.

Question 17

Ref STCW Table A-II/1 – What is the intention of the COLREG convention?

The STCW code states both in table A-II/1 and A-II/2 that you should have; "*Thorough knowledge about the content, intent of the International Regulations for Preventing Collisions at Sea"*.



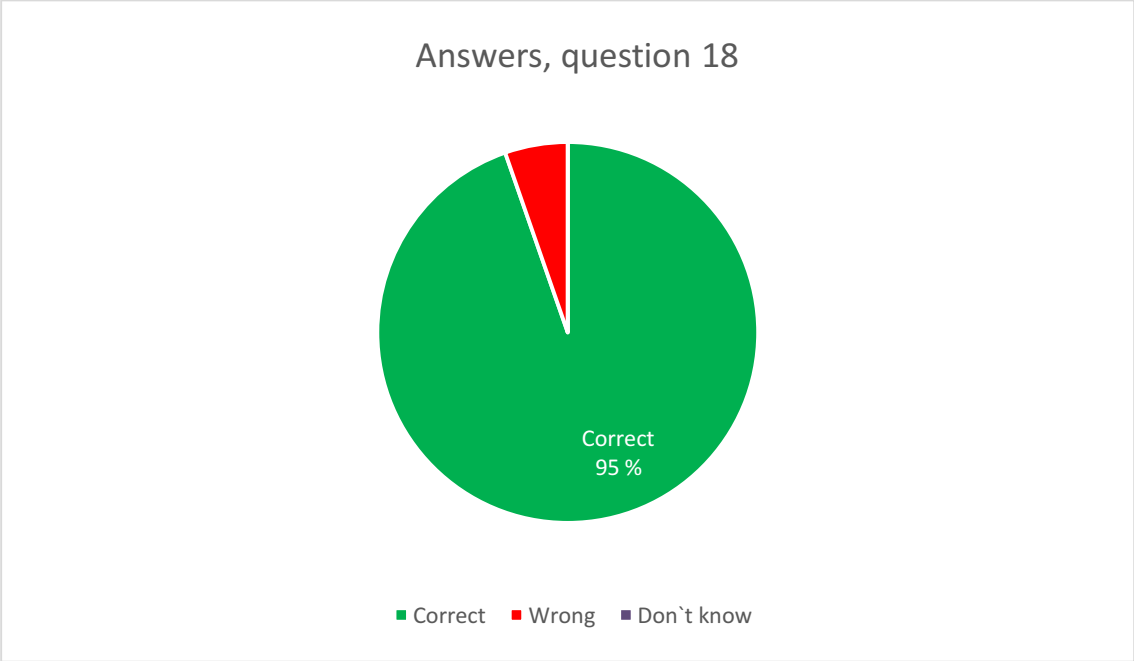
Findings:

73% of the students know the intention of what is called the backbone of the navigational education (COLREG; International Regulations for Preventing Collisions at sea). 10 of the students is answering wrong, given the other answering options, it is clearly that in fact both those answering, "don't know", and those answering wrong alternative, total of 20 students is a higher number than expected.

Question 18

Ref STCW Table A-II/1 – Emergency situations – A search and rescue transponder (SART) is mandatory onboard a merchant vessel. What kind of navigational instrument displays information from the SART?

Under the column Operate life-saving appliances you can read; *"Ability to organize abandon ship drills and knowledge of the operation of survival craft and rescue boats, their launching appliances and arrangements, and their equipment, including radio life-saving appliances, satellite EPIRBs, SARTs, immersion suits and thermal protective aids."* In table A-II/2 as mentioned earlier you can read (*Thorough knowledge of life-saving appliance regulations, SOLAS)*



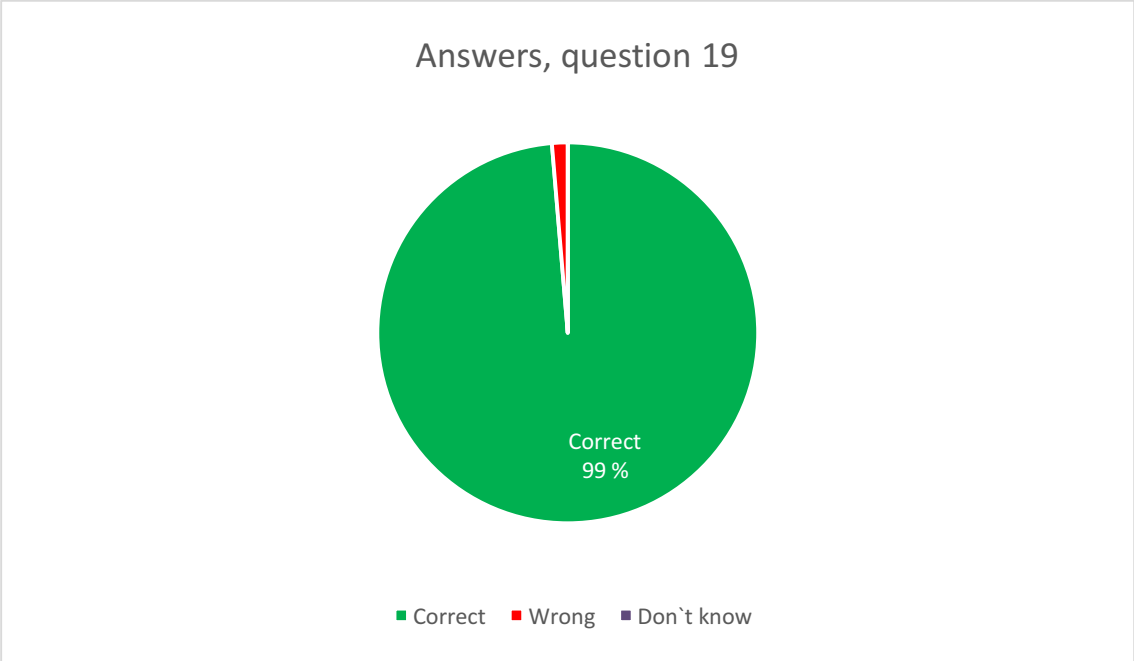
Findings:

The students have the appropriate knowledge according to the STCW code about the SART, and what kind of navigational instrument that displays the data from it.

Question 19

Ref STCW Table A-II/1 – Emergency situations – An EPIRB is another life-saving appliance. – What is an EPIRP?

Under the column Operate life-saving appliances you can read; *"Ability to organize abandon ship drills and knowledge of the operation of survival craft and rescue boats, their launching appliances and arrangements, and their equipment, including radio life-saving appliances, satellite EPIRBs, SARTs, immersion suits and thermal protective aids."* In table A-II/2 as mentioned earlier you can read (*Thorough knowledge of life-saving appliance regulations, SOLAS)*



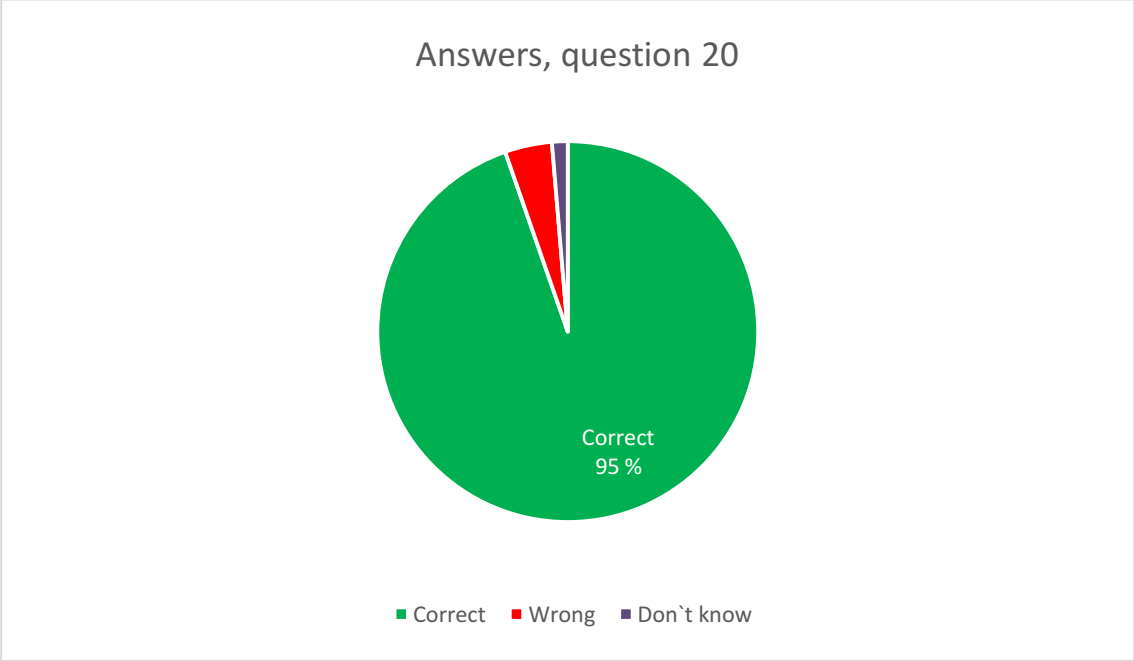
Findings:

The students have the appropriate knowledge according to the STCW code about the EPIRB

Question 20

Ref STCW Table A-II/1 – What is correct about the squat effect?

With reference to table A-II-1 the students shall have knowledge of: *1. The effects of deadweight, draught, trim, speed and under-keel clearance on turning circles and stopping distances. 2. The effects of wind and current on ship handling. 3. Manoeuvres and procedures for the rescue of a man over board. 4. Squat, shallow-water and similar effects. 5. Proper procedures for anchoring and mooring.*



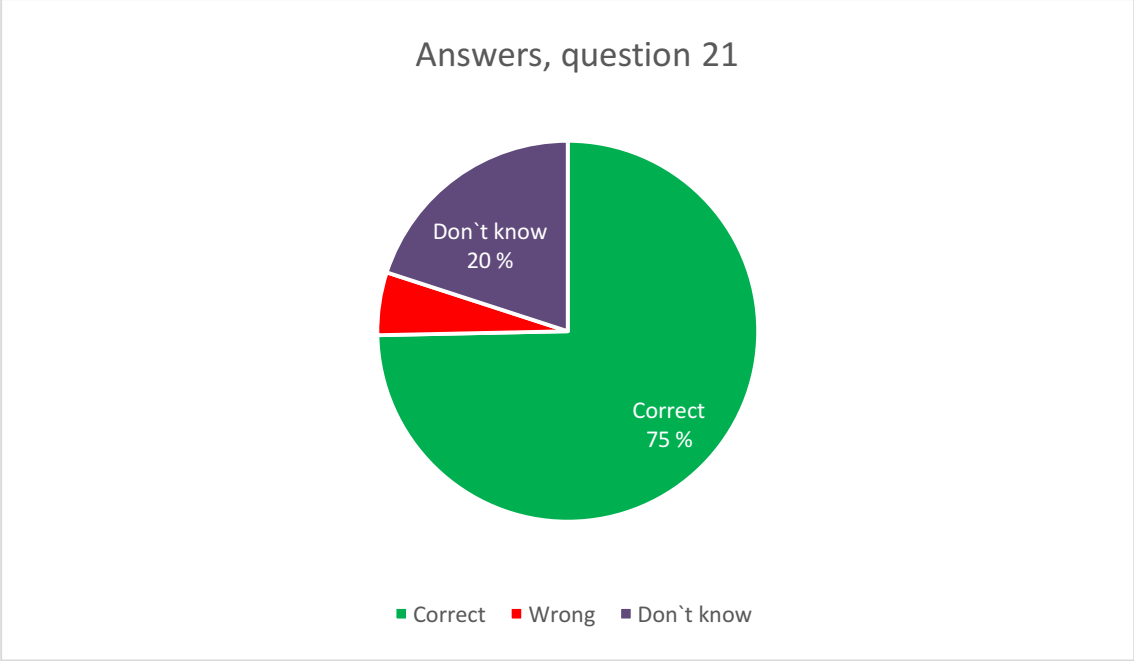
Findings:

The students have the appropriate knowledge according to the STCW code about the Squat effect.

Question 21

Ref STCW Table A-II/2 – All ships are obliged by the MARPOL code to have an emergency plan in case of oil pollution from their own vessel. – What is this plan called?

The STCW code states that within the column Monitor and control compliance with legislative requirements and measures to ensure safety of life at sea, security and protection of the marine environment. "*Regard shall be paid especially to the following subjects; .4 responsibilities under the International Convention for the Prevention of Pollution from Ships. .7 methods and aids to prevent pollution of the marine environment by ships.*"



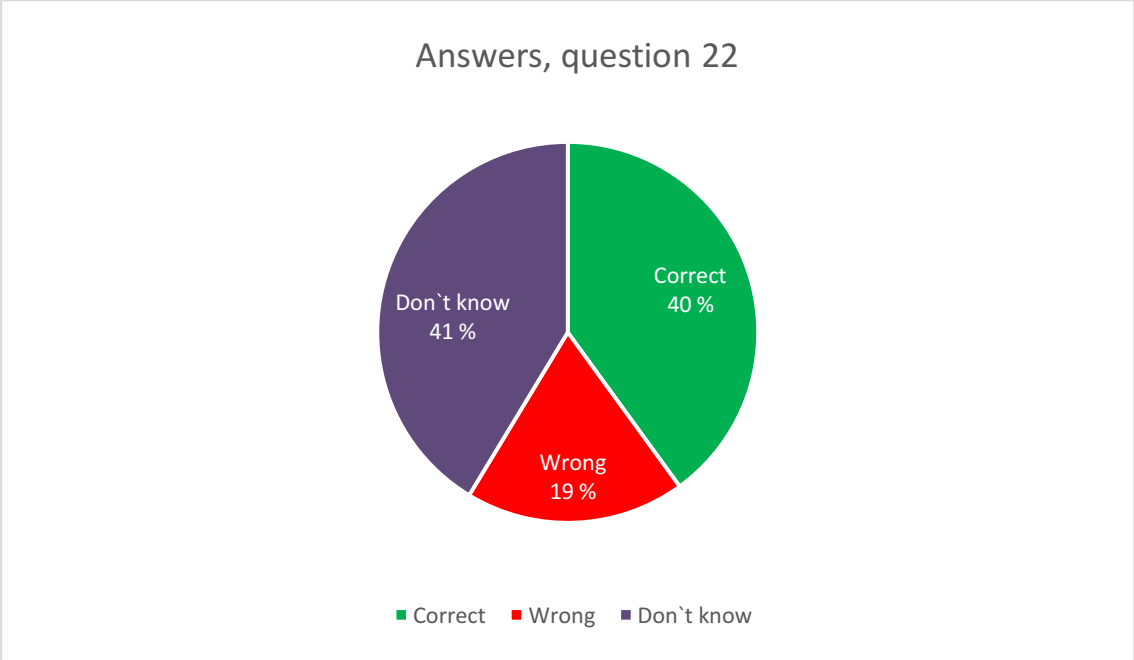
Findings:

¾ of the students knew that the plan was called a Ship oil pollution emergency plan (SOPEP). By the numbers I see that those with experience at sea knew this, but those without seagoing experience didn't know. It is questionable if this is thought at school, or if it is knowledge brought on from the experience as seagoing personnel.

Question 22

Ref STCW Table A-II/1 – International code of signal (ICS) – Flag Hotel (H) means what according to the ICS code?

The STCW code states that within the column Transmit and receive information by visual signaling, it states; *"Ability to use the International Code of Signals"*



Findings:

Flag Hotel (H) "I have a pilot onboard" was chosen because it is the most common signal flag to use within todays shipping. That only 4/10 students know this tells us that the knowledge about the ICS code is not sufficient according to the STCW code.

Chapter 4. Discussions

4.1 Review of hypothesis

Hypothesis: *Is a newly educated navigator at a Norwegian educational institution sufficiently trained according to the STCW demands on knowledge of rules and regulations?*
By basing the research and the questionnaire on the STCW code, you are covered by international regulations on what the students have been studying, independent of eventual differences between the curriculum on the different educational institutes. All of them have to teach what is described in the STCW code to maintain their status as a certified education to obtain a deck officer certificate. The questions are therefore strictly and only obtained from the STCW code only. This was also what I found as the best way to narrow down the area of research, and as my target was to "generalize" Norwegian students, and not put the educational institutes up against each other's, therefore the choice to use the education related to the STCW code was easy.
By focusing on the main objectives in the code, and what is mentioned as the most important parts, the questions were shaped as "easy" so that you could expect a high degree of right answers on each question. In that way questions with low degree of right questions, could prove that the students haven't been "*sufficiently trained according to the STCW code demands on knowledge of rules and regulations"*

4.2 Limitations and possibility of further research

The use of a single survey instrument is the main limitation in this study. There is no way to prove trends and to state clearly that the educational institutes have not done what they are supposed to do. Another key limitation is the magnitude of generalization, even if the participation was high on participating schools, I ended up with a data number consisting of

75 persons making the standard deviation small due to the low number. Appx 450 students graduates within nautical subjects in Norway each year.

The survey is conducted in April, in the students finishing year of studies. There was not mentioned anything, but there is always a chance that some of the curriculum tested in the questionnaire was not gone through in class. My impression was that all of the educational institutes where finished with classroom instruction, and used the time for exam preparation. Many of the students said the questionnaire where helpful in their exam preparation.

4.3 Discussion of main findings

After reviewing the answers in chapter 3, the main findings are the lack of knowledge about Code on Intact Stability for All Types of Ships Covered by IMO Instruments (IS Code), the lack of knowledge about the language standard; IMO Standard Marine Communication Phrases (IMO SMCP) and the lack of knowledge of the international code of signals (ICS Code). In the next paragraph, you can read a short summary of these three codes, and what they are dealing with.

4.3.1 IS Code

The purpose of the code is to present mandatory and recommendatory stability criteria and other measures for ensuring the safe operation of ships, to minimize the risk to such ships, to the personnel om board and to the environment. The code contains intact stability criteria for the following type of ships and other marine vehicles of 24 m in length and above; Cargo ships, Cargo ships carrying timber deck cargoes, passenger ships, fishing vessels, special purpose ships, offshore supply vessels, mobile offshore drilling units, pontoons and cargo ships carrying containers on deck and containerships (IMO, 2008)

4.3.2 IMO SMCP

As navigational and safety communications from ship to shore and vice versa, ship to ship, and on board ships must be precise, simple and unambiguous, so as to avoid confusion and error, there is a need to standardize the language used. This is of particular importance in the light of the increasing number of internationally trading vessels with crews speaking many different languages since problems of communication may cause misunderstandings leading to dangers to the vessel, the people on board and the environment (IMO, 2010).

The Standard Marine Communication Phrases (SMCP) has been compiled:

- to assist in the greater safety of navigation and of the conduct of the ship,
- to standardize the language used in communication for navigation at sea, in port-approaches, in waterways, harbors and on board vessels with multilingual crews, and
- to assist maritime training institutions in meeting the objectives mentioned above.

Under the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as revised 1995, the ability to understand and use the SMCP is required for the certification of officers in charge of a navigational watch on ships of 500 gross tonnage or more (IMO, 2010).

4.3.3 ICS Code

The purpose of the international Code of Signals is to provide ways and means of communication in situations related essentially to safety of navigation and persons., especially when language difficulties arise. In the preparation of the Code, account was taken of the fact that wide application of radiotelephony and radiotelegraphy can provide simple and effective

means of communication in plain language whenever language difficulties do not exist (IMO, 2005).

The first international code of signals was drafted in 1855 by a committee set up by the British Board of Trade, it contained 70,000 signals and 18 flags and was published in 1857. Later on, it was revised several times, and especially during World War I & II the code of signals where heavily relied on (IMO, 2005).

In 1964 a Sub-committee of the Maritime Safety committee, with a Norwegian representative, started to develop the International Code of Signal, and in 1965 the code was adopted by IMO (IMO, 2005).

The question regarding the use of a man-over-board boat (Question number 3) has been questionable due to the wording in the regulations. The regulation states; *As far as reasonable practicable, rescue boats other than lifeboats which are also rescue boats, shall be launched each month with their assigned crew aboard and maneuvered in the water. In all cases this requirement shall be complied with at least every three months.* By using the alternative 3 months as the correct answer, but also putting in an answering alternative on one month is poor judgement from me when preparing the questionnaire. 47 out of 49 students answering wrong on this question, answered alternative one month. Therefore, after reconsidering the text in the regulation this is not stated as a finding in the thesis.

The three main findings presented earlier in this chapter is all seen as essential for a deck officer, especially the fact that the knowledge of the Code on Intact Stability for All Types of Ships Covered by IMO Instruments (IS Code), is surprising. The question was analyzed thoroughly and the answers was spread out on different answering alternatives, but especially on SOLAS and Load line convention (last alternatives was IMDG code, only chosen by 3). Only 16% off the persons was answered don't know, 1 person answered correctly and 83% off the persons answered wrong.

The knowledge of the IMO Standard Marine Communication Phrases (IMO SMCP), is also shown as low. This doesn't necessary mean that the ability to speak English correctly in the maritime domain is low, but it reveals that the focus of where the curriculum is based, and why language education is a part of nautical subjects is not known for the students. Only 27 % of the students knew that all communication between other ships, pilots, coastal radio stations etc. shall be done according to IMO SMCP. Other answering alternatives on this question was Standard English, Working language on board or SOLAS standard. The wrong answers, 57%,

were almost evenly spread on alternatives Standard English and SOLAS Standard. 16% of the students answered don't know.

The International Code of Signals is given space and focus within the STCW code, within normal use for a seafarer it is in less use than before. The question was therefore picked from one of the things in the Code that still is highly applicable, signaling that you have a pilot on board your vessel. This is done by hoisting flag Hotel (H). Only 40% of the students answered correctly on this, as high as 41% answered don't know, and 29% answered wrong. The wrong answers are evenly spread on all other alternatives. This is a question where there are major differences between the educational institutes. The group from the two participating vocational schools scored 64,5% correct on this question. The group from the three participating educational institutions giving a bachelor degree scored 22% correct on this question, where one of them only scoring 7% correct. The main finding is that there are large differences between knowledge and what is learned on the different institutions, clarified by the differences described over.

Chapter 5. Conclusions

Overall the rate of correct answers in the questionnaire is 74,4% and is seen as good, and by removing the questions regarding the three main findings and the question about MOB boats (see chapter 3), the overall rate of correct answers is 86%. This is seen as a confirmation of the knowledge level on a general basis is acceptable amongst the graduating students in Norway.

The results of the research show that there are areas of the STCW code where the Norwegian students have a lack of knowledge seen up against what the STCW code demands, but there is no pattern indicating that Norwegian student's general knowledge about the rules and regulations in the STCW code isn't good enough.
There is neither no pattern that the educational institutes isn't teaching what they are supposed to, given the main findings, more thorough research need to be done to establish if these results are random, lack of education from the institutes or lack of interest in learning from the students. As a result of this research the recommendation is to clarify the curriculum even further, and crosscheck it against the STCW code to close the gaps in knowledge amongst the students in those areas that are discovered in this research.

With regards to findings you can see similarities to former research, amongst them the lack knowledge in rules & regulations regarding maritime language and English. This with reference to the newly published research by Lidong et al. (2017 p. 56-63).

Further study on this topic could seek to explore how well the curriculum on each school correlates with the STCW code, is every part covered by different subjects and are they

especially mentioned in the curriculum with reference to STCW. Another interesting topic for further study are if the expectations from the shipping companies to what the candidates should have of knowledge corresponds with reality. What expectations does a captain have to a newly educated officer signing on his/her vessel for the first time?

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Appendixes

Appendix 1. Questionaire

The new Norwegian captains – as good as it gets?

This questionnaire that you are holding now is aiming to provide information about the knowledge level for finishing students studying navigation at the management level (Deck officer class 1). All questions refer to what the International Maritime Organisation (IMO) put as minimum knowledge through their rules and regulations regarding education.

Information:

Only one answer is correct.

Maximum time is 40 minutes.

Information on the first page will only be used for statistical matters

To make the data as accurate as possibly, please use the “don’t know” alternative when you don’t know the answer instead of guessing.

Thank you for participating!

Bård Lunde
Student
Maritime Management
University College of Southeast Norway

School:

- HSN – University college of southeast Norway (Høgskolen I Sør-øst Norge)
- Norwegian naval academy (Sjøkrigsskolen)
- Western Norway University of Applied Sciences (Høgskolen på Vestlandet)
- Bergen Maritime Vocational school (Bergen maritime fagskole)
- Karmsund VGS Vocational school (Karmsund VGS fagskole)

Gender:

- Male
- Female

Age:

- 20-24
- 25-29
- 30-34
- 35 +

Nationality:

- Norwegian
- Others: _____

Previous experience at sea before the start of nautical studies:

- None
- 0-1 years
- 1-2 years

- 2-5 years
- More than 5 years

1. What is the meaning of the abbreviation STCW?

    - Safety training for watchkeepers at sea
    - Safety standards for training, certification at international waters
    - Standards of training, certification and watchkeeping for seafarers
    - Standards of safety training for officers in charge of navigational watch
    - Don't know

2. STCW Table A-II/2 – SOLAS – What is the meaning of the abbreviation SOLAS?

    - Standards onboard legally at sea
    - Safety of life at sea
    - Standards of loading, air- and sea transfer of fuel.
    - Standards of loading at sea
    - Don't know

3. STCW Table A-II/2 – How often do you <u>have</u> to test a man-over-board boat on the water according to today's regulations?

    - Once per week
    - Once per month
    - Once per 3 month
    - Once per 6 month
    - Don't know

4. STCW Table A-II/2 – The IMDG code is important to maintain a safe ship and conduct a safe voyage – What is the IMDG code?

    - International maritime dangerous goods code

- International maritime defence greencard code
- International maritime dumping garbage code
- International maritime prevention of damage on goods code
- Don’t know

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5. STCW Table A-II/1 - What is the key objectives of the MARPOL code?
   - Protect human life and prevent marine pollution
   - Protect human life and anti-piracy activities
   - Prevent marine pollution and oil spill
   - Prevent damage on goods carried onboard ships
   - Don’t know

6. STCW Table A-II/2 – According to STCW you should have “Knowledge of IMO recommendations concerning ship stability” – Where do you find these recommendations?
   - SOLAS code
   - IMDG code
   - IS Code
   - Load line convention
   - Don’t know

7. STCW Table A-II/2 – According to STCW you should have “Thorough knowledge of life-saving appliance regulations” – Where do you find these?
   - MARPOL Code

- Safety management system
- The international regulations for keeping safe at sea
- SOLAS Code
- Don’t know

8. STCW Table A-II/2 - The IMBSC Code deals with one special ship type – Which one?
   - Ro-Ro vessels
   - Tanker
   - Passenger vessels
   - Bulk
   - Don’t know
9. STCW Section A-I/14 – It is the ship owning companies’ responsibility to have a safety management system onboard their vessels – Which IMO Code regulates the safety management system?
   - IS Code
   - IMDG Code
   - ISM Code
   - COLREG
   - Don’t know
10. STCW Table A-II/1 - What is the international emergency channel (international distress frequency) on the VHF?
   - Ch. 10
   - Ch. 112

- Ch. 66
- Ch. 16
- Don’t know

11. STCW Table A-II/1 - Inmarsat-C is a part of the radio station onboard a ship trading worldwide. Which code do you use on the Inmarsat-C terminal to get medical advice?
    - 01
    - 10
    - 32
    - 55
    - Don’t know

12. STCW Table A-II/1 – Morse signals – Ability to transmit and receive signals by Morse light. How is the international Morse signal for emergency?
    - 3 short, 1 long, 3 short
    - 3 long, 1 short, 3 long
    - 3 long, 3 short, 3 long
    - 3 short, 3 long, 3 short
    - Don’t know

13. STCW Table A-II/2 – Thorough knowledge about the IAMSAR manual is required by STCW. – When does the IAMSAR manual help you?
    - Oil spill
    - Death amongst crew or passengers
    - Search and rescue

- Navigation/ship handling in ice
- Don’t know

14. STCW Table A-II/2 - What is a VTS in the maritime domain?
    - Vessel traffic service
    - Vessel towing service
    - Voyage tidal service
    - Voyage tracking service
    - Don’t know

15. STCW Table A-II/1 – Language and communication. – All communication between other ships, pilots, coast stations etc. shall be done according to:
    - IMO SMCP
    - Standard English
    - Working language onboard
    - SOLAS standard
    - Don’t know

16. STCW Table A-II/1 - The ISPS code is an amendment to the SOLAS code. – What is the ISPS code regulating?
    - Safety Management onboard
    - Access to trade in international waters
    - Emergency towing operations
    - Maritime and port security-related requirements
    - Don’t know

17. STCW Table A-II/1 - What is the intention of COLREG convention?

- Prevent maritime pollution
- Prevent damage of cargo
- Prevent dangerous operation by using risk assessment
- Prevent collisions at sea
- Don’t know

18. STCW Table A-II/2 – Emergency situations – A search and rescue transponder (SART) is mandatory onboard a merchant vessel. What kind of navigational instrument displays information from the SART?

- Navtex
- GPS
- Echo Sounder
- Radar
- Don’t know

19. STCW Table A-II/2 – Emergency situations – An EPIRB is another life-saving appliance. – What is an EPIRB?

- Emergency Position Indicating Radio Beacon
- Exactly Position Inside Radio Beacon
- Emergency Position Inside Raft Beacon
- Emergency Positioning Indicating Receiver Beacon

20. STCW Table A-II/1 – What is correct about the squat effect?

- Low speed in deep water causes the ship to be closer to the seabed than normally expected
- Low speed in shallow water causes the ship to be closer to the seabed than normally expected
- High speed in deep water causes the ship to be closer to the seabed than normally expected
- High speed in shallow water causes the ship to be closer to the seabed than normally expected
- Don’t know

21. STCW Table A-II/1 - All ships are obliged by the MARPOL code to have an emergency plan in case of oil pollution from their own vessel. – What is this plan called?
    - COP (Collect oil plan)
    - EOSPP (Emergency oil spill pollution plan)
    - POSP (Prevent oil spill plan)
    - SOPEP (Ship oil pollution emergency plan)
    - Don’t know

22. STCW Table A-II/1 – International code of signals (ICS) – Flag Hotel (H) means what according to the ICS code?
    - “I have a diver down; keep well clear at low speed”
    - “I require assistance”
    - “I wish to communicate with you”
    - “I have a pilot onboard”

- Don’t know

Appendix 2. Notification Test

Result of Notification Test: Not Subject to Notification

You have indicated that neither directly or indirectly identifiable personal data will be registered in the project.

If no personal data is to be registered, the project will not be subject to notification, and you will not have to submit a notification form.

Please note that this is a guidance based on information that you have given in the notification test and not a formal confirmation.

For your information: *In order for a project not to be subject to notification, we presuppose that all information processed using electronic equipment in the project remains anonymous.*

Anonymous information is defined as information that cannot identify individuals in the data set in any of the following ways:

- *directly, through uniquely identifiable characteristic (such as name, social security number, email address, etc.)*
- *indirectly, through a combination of background variables (such as residence/institution, gender, age, etc.)*
- *through a list of names referring to an encryption formula or code, or*
- *through recognizable faces on photographs or video recordings.*

Furthermore, we presuppose that names/consent forms are not linked to sensitive personal data.

Kind regards,
NSD Data Protection

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