



ESTABLISHING LEARNING OBJECTIVES FOR MARITIME SIMULATOR TRAINING

CoMET Project Report on Maritime Educational Needs and Learning Objectives

Antti Lanki (ed.)



Kaakkois-Suomen
ammattikorkeakoulu

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Educational Needs and Learning Objectives



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FOREWORD

This report is the first part of the CoMET Project report series on developing cross-border simulator training between partners in Finland and Estonia. The aim of the CoMET Project (Internationally Competitive Maritime Education for Modern Seagoing and High Quality Port Service, CB 714) is to connect maritime simulator centers across the Baltic Sea. Simulator connectivity enables students to train within the same virtual learning environment where multi-cultural communication and team-work are integral parts of the training. Currently, there are no cross-border training courses between maritime education institutes and their simulator centres.

This report is conducted within the Work Package T1 framework for the development of simulation methodology and pedagogy. The report aims to describe the process of establishing the educational objectives based on labor market and educational needs.

The first article of the report introduces the literature of reference and the framework of educational needs in the maritime sector. The second article summarizes the results of expert interviews to find the best practices and learning objectives. The third article summarizes the results of the survey for the partners and the established top learning objectives for next project tasks.

CoMET is financed by the European Regional Development Fund under the Interreg Central Baltic program and carried out together as joint-cooperation venture with project partners Ida-Virumaa Vocational Education Centre (IVKHK) and Tallinn University of Technology (EMERA) in Estonia, Joint Educational Authority of Kotka - Hamina Region (Ekami), Novia University of Applied Sciences (Aboa Mare) and South-Eastern Finland University of Applied Sciences (Xamk) in Finland.

The authors wish to thank the financier and all project partners for their contribution to the project and this study. A special acknowledgement is addressed to those maritime experts who give their time and devotion to the development of maritime simulation training by participating in the interview study.

Antti Lanki & Vesa Tuomala

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EDUCATIONAL NEEDS IN THE MARITIME SECTOR AN INTRODUCTION AND LITERATURE STUDY BEHIND SETTING THE COMET PROJECT OBJECTIVES

Antti Lanki & Vesa Tuomala

Educational needs arise from labor market due to economic and political changes or changes caused by global trends. In some sectors, e.g. the maritime sector, national or international regulation may affect the educational needs. These changes in the sector also drive new and sometimes unexpected needs. Educational institutions identify and react to these needs by improving, modifying and/or creating educational objectives.

Educational objectives and learning objectives (or sometimes learning outcomes) are competence-based and typically aim to increase the knowledge, understanding and/or skills of a student and are integrated into courses within a curriculum that leads to an academic degree. The degree is a proof of qualification or certification from the point of view of the labor market. The key is the process of identifying the relevant and important needs of a specific labor market sector and establishing learning objectives that directly respond to the needs (See Fig. 1). In this report, labor market refers to the Baltic maritime sector and particularly shipping and port operations.

Educational needs to objectives

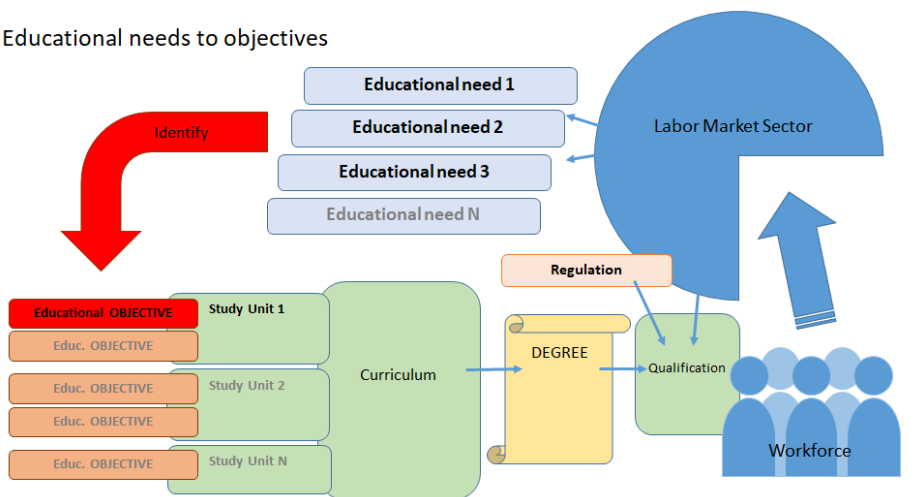


Figure 1: Process of emerging educational needs; their identification and adopting as part of an educational system leading to qualified labor force.

A degree in maritime studies is based upon the international convention on standards of training, certification and watchkeeping: STCW 1978 and amendments. STCW code supplements the convention and provides mandatory provisions regarding the possible types of attainable qualifications. Qualifications are ranked in three (3) levels of responsibility: support, operational and management. For example, a deck officer is an operational level qualification and consists of an approved education consisting of three (3) functions: navigation, cargo handling and controlling the operation of the ship. Within each function, there are several competencies that are defined by *knowledge, understanding and proficiency* (later KUP). (IMO 2017.) These KUP's are the bare minimum level that every seafarer must attain. In the future, this minimum level may not be enough.

The purpose of this report is to find the **most relevant and appropriate educational objectives for cross-border simulator training**. The definition of objectives was based on the study of previous research literature and interviews of experts in the field and compiling the findings and surveying the project partners.

LITERATURE STUDY ON EDUCATIONAL OBJECTIVES

Labor market studies are typically focused on the qualifications as a whole whereas competence studies focus more on competencies that form the content of degree studies and the basis of qualification. Thus, there are generally two (2) views to approach the competency of a professional – broad labor market view that is the labor market need for workforce with certain types of qualifications, and individualistic professional view that is the set of competencies and know-how that an individual has or should have to be relevant or competitive within the labor market. The scope of this report focuses more on the set of competencies of an individual. Also, the report aims to define the knowledge, understanding and skills a student should have to become a qualified professional.

The next chapter introduces a summary of previous studies that have been referenced and acknowledged. The studies range from European to national Finnish and Estonian level. The scope varies between the entire transportation sector to sub-sections or fields, more specifically, maritime (shipping) and port logistics.

PREVIOUS STUDIES

Previous studies related to the maritime sector's educational needs or objectives have been divided into two (2) categories: **labor market studies** and **competence studies**. Some studies contain aspects from both categories, and the categorization below is made for this report only. In total, 23 studies were reviewed and eight (8) selected and referenced.

LABOR MARKET STUDIES

Transportation sector is a significant part of labor market and has a great economic impact employing 11 million people in Europe, which accounts for 5% of the total employment and GDP (EU 2018). Rapid changes and developments in the sector increase the need for skillful labor and adequate education, training and qualification (SKILLFUL 2017).

Finnish National Agency for Education has established a forum for skills anticipation that aims to forecast or predict the changes and emerging needs in different industries and sectors. According to their study on the future needs of the traffic and logistics sector, competences of an individual must be maintained, developed or even completely renewed during a working career (Opetushallitus 2018, 8.) Workers are expected to move from clearly specified tasks to broader specializations, from regulation-oriented to adaptable and from individual roles to more teamwork-oriented ways of working. Education should be developed to facilitate problem solving and skills to apply knowledge and information instead of memorizing set truths. Jobs will require, in addition to skills and competences, a broader holistic understanding (big picture), individual decision-making and continuous self-improvement. Challenges in the competences arise also from different needs within the sector; some industries are growing rapidly while others, being more stagnant (yet economically stable and significant), face different needs. Challenges include e.g. specialization requirements, multi-cultural and linguistic skills and the ability to renew the industry to keep it relevant and desirable for future workers. (Opetushallitus 2018, 16–21.)

The maritime cluster or sector is a part of the transportation and logistics sector. It includes industries or authorities such as shipping, port operations, ship-building and repairs, agency and forwarding, classification societies and the public sector (Karvonen et al. 2016). For this project, shipping and ports are considered the most relevant industries. In Finland, the maritime sector consists of approximately 3 000 companies with shipbuilding and repairs having the largest share followed by shipping operations and ports (Karvonen et al. 2016). In Estonia, the maritime sector consists of approximately 460 companies with shipping being the largest followed by shipbuilding and repair (Alop & Leiger 2016). According to the studies referenced above, the role of the maritime cluster as an employer is significant.

Table 1. List of selected previous labor market studies used as reference.

Ref. No.	Author(s)	Title	Year
i.	Opetushallitus (EDUFI): Leveälähti & Nieminen	Liikenne- ja logistiikka-alan osaamis- ja koulutustarpeiden kehitysnäkymiä (in Finnish)	2018
ii.	Alop & Leiger	Methodological approach and basic analysis of labour market needs by case of Estonia	2016
iii.	Karvonen, Grönlund, Jokinen, Mäkeläinen, Oinas, Pönni, Ranti, Saarni, Saurama	Suomen meriklusteri kohti 2020-lukua (in Finnish)	2016

All of the listed studies emphasize the importance of the transportation sector and the need for qualified labor. The rate of changes in society and the demands these changes pose are also acknowledged. For the purpose of this report, some trends and themes are considered more relevant and the focus will be on them. In summary, the common trends and themes include:

- rapid development of labor needs due to technological development
- need for flexible and continuous training and education
- shift in education from set truths to problem solving and application of knowledge
- job descriptions with requirements of understanding of the big picture and individual decision making
- increased need for multi-cultural awareness and language skills.

COMPETENCE STUDIES

Education should not only adapt to the future but prepare students to embrace the future and have the capabilities to develop it (Hämäläinen 2012, 18). According to current trends, the competence requirements that are increasing the most are related to environment, safety and quality followed by working life skills, creativity and holistic understanding of the industry (Anttila & Salmenhaara 2011, 126-128). Educational needs and competences that are common to the entire maritime sector include multi-disciplinary and multi-professional skills, cultural- and linguistic skills, technological skills related to automation and digitalization and understanding the juridical and economical aspects of the industry. (Oravasaari, Paavola & Nissilä 2015, 5-6). However, these are relatively general themes and statements and do not specify the competences achieved in a simulator.

International Association of Maritime Universities define a Global Maritime Professional as *a person that has relevant technical skills, professionalism and ethical behaviour, human relation skills, emotional intelligence, multicultural awareness, team-working capabilities, sense of environmental consciousness and grasp of contemporary issues of the industry*. In their study (2019) to address the educational needs of such a person, a task force and committee analyzed what knowledge, skills and attitudes would be needed and defined the desired learning outcomes. These learning outcomes are described in detail in their publication Body of Knowledge. Twenty-eight (28) knowledge-, skills- and attitude-based learning outcomes were categorized into four (4) sets of skills: i) foundational knowledge and skills, ii) academic skills, iii) technical professional skills (elements) and iv) soft professional skills (elements). Eleven (11) of the learning outcomes are categorized under soft skills and seven (7) under technical skills. (IAMU 2019.)

Table 2. List of selected previous competence studies used as reference.

Ref. No.	Author(s)	Title	Year
i.	IAMU	Global Maritime Professional – Body of Knowledge	2019
ii.	Oravasaari, Paavola, Nissilä	Mahdollisuuksien meri : 23 suositusta Suomen meriklusterin osaamisen kehittämiseksi	2018
iii.	Infante & Sousa (SKIL-LFUL)	Proposed future training curricula and courses for the Transport sector (Deliverable D3.1)	2018
iv.	Hämäläinen	Merenkulun tulevaisuuden trendit ja niiden vaikutus merenkulun koulutuksen sisältöön tulevaisuudessa	2012
v.	Anttila & Salmenhaara	Merenkulkualan koulutuksen tila ja kehittämistarpeet	2011

The studies listed in Table 2 emphasize the importance of preparing for the future in a proactive manner. Some specific competences are also mentioned and evaluated. For the purpose of this report, some themes and topics are selected for the next stage. In summary, the common themes include:

- Educational needs are increasing in numbers and depth
- Working life and basic life skills are becoming more important
- Educational objectives are shifting from solely technical skills to incorporate more soft skills
- Communication skills are essential in multi-lingual and multi-cultural working environments.

COMMONLY RECURRING THEMES

Recurring themes found in previous studies and literature were reflected in terms of their applicability on simulator training. The themes were analyzed, categorized and phrased as single statements of skills or aspects of know-how, forming the potential educational objectives of the cross-border simulator training courses. These objectives are combined with the results of the expert interviews and later sent to project partners for evaluation to determine which of them are the most important and relevant.

Based on IAMU categorization, the objectives are divided into two (2) classes: technical elements (T) and soft elements (S). In total, fifteen (15) most relevant objectives for cross-border simulator training were selected:

1. Software skills (T)
2. Use of hardware and equipment (T)
3. Situational awareness – (status of self) (T)
4. Preparedness and response (T)
5. Risk management (T)
6. Compliance with rules (T)
7. Situational awareness of environment - “traffic” (T/S)
8. Leadership (S)
9. Teamwork (S)
10. Decision making (S)
11. Effective communication – internal (own organization)(S)
12. Effective communication – external (e.g. in English)(S)
13. Resource management (S)
14. Environmental awareness – sustainability (S)
15. Ethics and professionalism (S).

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EXPERT INTERVIEWS FOR FINDING THE BEST PRACTICES AND LEARNING OBJECTIVES IN MARITIME AND CARGO HANDLING SIMULATOR TRAINING

Vesa Tuomala

For a long time, simulators have been used in pilot training as well as in the military and nuclear power plants. Medical simulations have been used as part of studies and in specialized surgeon and resuscitation training. Simulator training has been used in teaching subjects where the risk of potential human error and catastrophe is high. Nowadays, simulation learning environments are popular for teaching and training the skills necessary in many industries. In schools, simulator training may be used in many different training programs. (Tuomala 2019)

FINNISH PARTNERS' INTERVIEW RESULTS ON SIMULATOR TRAINING

In the spring of 2019, a study and a report on simulation was conducted in Finnish that focused on the development of simulation pedagogy and education, best practices and learning objectives. The report included the interviews of twelve (12) maritime professionals working as authorities, on board vessels and shipping companies. In their work, the interviewees were all responsible for training and safety and/or security including both deck and engine department. Interviews were conducted using a semi-structured questionnaire with four (4) predefined themes. (Tuomala 2019.)

The interviews were conducted in Finnish, and the questions were arranged under four themes/categories; i) current strengths and weaknesses in maritime education, ii) current development needs in maritime simulation training, iii) professional skills, expertise and competences needed in today's maritime industry and iv) changes in professional skills and competences predicted in the near future (before 2030). The interviewees emphasized the skills of the educators and simulator trainers. The trainers should be familiar with the substance matter, pedagogy and effective teaching techniques. (Tuomala 2019.)

Based on a content analysis of the answers, the main themes were identified, comprising theoretical and general education, language skills, training requirements, information tech-

nology, navigation, loading and engineering of a vessel, on-board work and apprenticeship, simulator training and Crew Resource Management (CRM) skills. Based on these results, nine (9) specific educational needs were identified and listed (in alphabetical order):

1. Automation and electric systems education (T)
2. Basic technical skills (T)
3. Basic and traditional navigation skills (T)
4. Communication and social skills, Crew Resource Management (S)
5. Computer programs, excluding applications for mobile phones and tablets (T)
6. Emission control and scrubber handling (T)
7. Language skills, English and Swedish (on Finnish-flagged ships) (S)
8. Service and maintenance skills for vessels (T)
9. Maritime computer systems (Ballast Water Management and salary payment computer systems etc.) (T)

The items on the list were also categorized under two (2) classes: technical elements (T) and soft elements (S) (See previous article in this report).

ESTONIAN PARTNERS' INTERVIEW RESULTS ON SIMULATOR TRAINING

The interviews of port cargo handling professionals, especially practical training instructors were conducted in the spring of 2019 in Finland.

Also, some other groups such as port cargo handling teachers and simulator training instructors, practical training providers, as well as port operators' HR office representatives and port authorities gave their opinions of current strengths and weaknesses of current port cargo handling training, educational needs and professional skills.

Motoric skills for crane handling are on an adequate level, and students can operate cranes safely after simulator training. Some simulator educators gave feedback on the lack of theoretical skills with regards to crane operation. The interviewees did not identify any weaknesses in crane operating skills. However, some of them pointed out the need for information concerning daily and weekly inspections, service routines and maintenance issues. The training should include these aspects and their significance in companies' business.

The use of simulators in harbor crane training elicited positive feedback and was considered to positively contribute to efficiency and safety. Based on these assessments, crane training will be further developed.

The crane simulator mainly provides training in the motoric skills needed to control the crane and its movements. This emphasizes the importance of realistic simulation, e.g. the

dynamics of movements. It is very beneficial to learn the proper driving technique before climbing into a real crane. After all, it is better to learn from mistakes in the simulator than in the real crane.

Based on these interviews, ten (10) specific educational needs were identified and listed (in alphabetical order):

1. Ability to prevent misuse of equipment and accidents resulting from the use of wrong working methods (S)
2. Adequate vision and hearing for safety and security (S)
3. Basic education in and understanding of business finances (S)
4. Capability to work under stress (S)
5. Failures in crane operation and scenarios how to solve failures (T)
6. Good understanding of work sequences and co-operation with banksman on the vessel (S)
7. Simulator scenarios for handling break bulk such as pulp and sawmill residues, realistic behavior of simulated materials e.g. timber (T)
8. Understanding of automated operations, technological and technical aspects (S)
9. Visualization and graphics to provide in-depth perspective simulating operation in great heights (T)
10. Crane operator's working conditions, mental qualities and preparation (S)

The items on the list were also categorized under two (2) classes: technical elements (T) and soft elements (S) (See previous article in this report).

Tallinn University of Technology (EMERA) conducted interviews with several master mariners and chief officers working onboard Estonian fleet between the summer and early autumn of 2019. Answers address skills and needs for education concerning marine and simulator training.

Post-graduate students have good skills for navigation and technical skills for using ECDIS, radar and all technical navigation systems. They are also highly skilled in speaking and understanding English, familiar with the International Regulations for Preventing Collisions at Sea (COLREGs) and confident with navigational equipment and performing bridge watches.

However, they mentioned in the interviews that they had not gained any cargo handling experience and some of them do not seem to adequately understand the bigger picture at sea and react very late in avoiding dangerous situations. Some of them fail to even recognize cardinal buoys. The knowledge of COLREG rules and aspects affecting navigation in narrow channels varies, and there is lack of knowledge in terms of traditional navigation. On some vessels, there are no paper charts or publications anymore, so corrections and updates from the authorities for publications and charts can be difficult to implement.

The competencies and skills most commonly trained in simulators should include navigation, ECDIS, ARPA and GMDSS, as well as stability calculations and situational COLREG training. The types of exercises that can be run on bridge simulators comprise Search And Rescue (SAR), oil recovery, Man-Over-Board (MOB), navigation in restricted visibility, anchoring and berthing in strong wind and current, effect of shallow water, and ice navigation. In addition to this, it would be beneficial to exercise in a simulator Bridge Resource Management (BRM), emergency situations caused by malfunction of equipment (blackouts, engine or rudder failures), safe navigation in challenging circumstances (especially in heavy traffic, narrow channels and on rivers with poor visibility), collision avoidance and manoeuvring with tug boats. Also stress factors, communication with different nationalities, Vessel Traffic Service (VTS) and Standard Marine Communication Phrases (SMCP) and the English language could be exercised in simulators.

Joint simulator exercises between the bridge and engine room would be beneficial for exchange of information, e.g. when mooring the ship or suffering from equipment malfunction. Exercises involving both the vessel's crew and port cargo handling operators could be performed e.g. with reference to signals between the ship's crew and the crane operators.

At the moment, it would be important to focus on preparing the stowage plan and defining the correct stability for container vessels. There is a need for loading and discharging the vessels faster, so knowledge of different types of cargo loading equipment is in great demand. Vessels should not be overloaded so a good understanding of the calculations of maximum number of units or cargo to load is highly important. Cargo must be loaded efficiently, corresponding to load line zone requirements and the vessel's draft.

Some new technologies will be taken into general use in the future, before 2030. The answers of the interviews highlighted autonomous shipping, unmanned vessels and smart ports. All involved personnel should understand the use of Virtual Reality (VR) with regards to automated mooring systems and anchoring equipment. It is important to understand better the aspects of information and communication technologies (ICT) and machine learning procedures. In the future, ships will be using artificial intelligent (AI) and machine deep learning in fully remotely-controlled operations. Cyber security will be a crucial factor.

Vessels will be increasingly using liquefied natural gas (LNG) and battery power in the future, so marine engineers must have simulator training in safe fuel change-over procedures to avoid e.g. blackouts.

Some traditional aspects of training such as celestial navigation, verbal communication and crisis management may become less important with the introduction of autonomous shipping. Some safety and emergency procedures such as abandoning the ship become irrelevant if ships are automated and unmanned. Also, there may be no need for paper charts due to the comprehensive use of ECDIS.

Maritime education programmes should be provided with new types of simulators, especially in terms of training to operate autonomous vessels. When creating content in the curriculum, the educators need to be more innovative and add subjects which are relevant and important nowadays, at the same time removing outdated content.

The crew needs to have regular basic training every 5 years. Students, post-graduates and maritime professionals must be flexible and able to adapt to changes in the sector. We need to have more joint exercises.

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EVALUATING EDUCATIONAL NEEDS AND ESTABLISHING THE EDUCATIONAL OBJECTIVES RESULTS FROM QUESTIONNAIRE SURVEY AMONG THE PROJECT PARTNERS

Antti Lanki

In this paper, educational needs were examined based on a literature review and expert interviews, analyzed and combined into a list of 19 objectives. These objectives were then sent to project partners Ekami, Xamk, Aboa Mare and Emera for evaluation. Evaluation was done by simulator trainers and educators in partner institutes for the purpose of narrowing down and finding the most important and relevant learning objectives, in particular, for cross-border simulator training. A questionnaire accompanied with a cover letter was sent in November 2019, and a response time of ten (10) days was provided. One follow-up reminder message was sent after six (6) days. (See Appendix 1)

The questionnaire contained five (5) items:

1. My educational organisation is:
2. My experience as a simulation trainer is:
3. My field of expertise as a simulator trainer is:
4. What are the most relevant learning objectives for cross-border simulator training? Rate the following topics: (19 learning objectives)
5. What are the most important objectives to focus on in cross-border simulator training? Select one (1) to three (3) of the following topics: (19 learning objectives)

Questions one (1) to three (3) were demographical and intended to provide background information and possible filtering and cross-referencing of results. Question four (4) was measured by a 5-step scale (Likert) concerning the relevance of a specific learning objective whereas in question five (5) the importance of a specific learning objective in a cross-border exercise was measured. The number of respondents was seventeen (n=17), and responses were received from all partners. The average simulator instructor experience was 8.8 years with the highest experience being 20 years. Most of the respondent's field of expertise as a simulator instructor was in maritime navigation (13) followed by maritime engineering (2) and port logistics or other field (2).

(Q.4) Relevance of Learning objectives
by quarters (scale 1-5), n=17

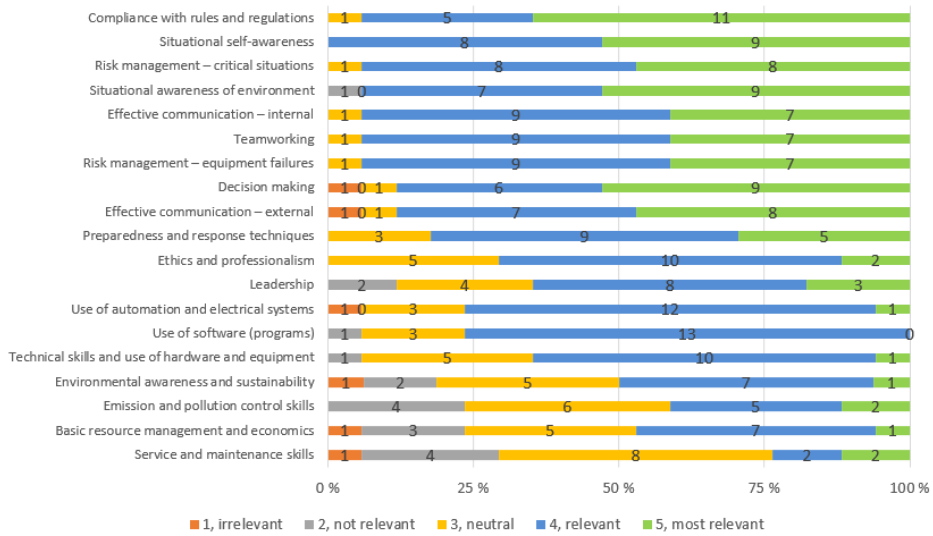


Figure 1: Result of question four (4) ordered from most relevant to least relevant topic (n=17).

According to the respondents, the most relevant learning objective for cross-border simulator training was Compliance with rules and regulations, followed by Situational self-awareness and Risk management in critical situations. Fifteen (15) of the top learning objectives were either relevant or most relevant by median, and none of the 19 learning objectives were irrelevant. Ten (10) of the learning objectives were in the upper quartile, and four (4) of the learning objectives were in the highest range (most relevant) by median. The learning objectives Service and maintenance skills and Basic resource management and economics were the least relevant having a neutral value by median. (See Fig.1.)

(Q.5) Selected as important Learning objectives
by respondents, n=17

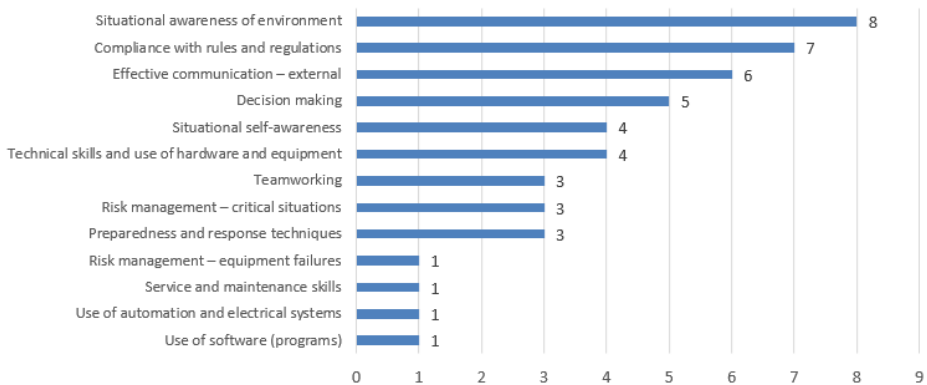


Figure 2: Result of question five (5) ordered from the learning objective that was chosen most frequently as important by respondents (n=17).

Each of the respondents had the opportunity to select from one (1) to three (3) learning objectives they saw as the most important and would use if they were to plan and execute a cross-border simulation. Eight (8) of the respondents selected **Situational awareness of environment** (e.g. traffic) as the most important learning objective followed by **Compliance with rules and regulations** in seven (7) cases and **Effective communication – external** in six (6) cases. Nine (9) of the learning objectives had been selected at least three (3) times, and six (6) learning objectives were not selected at all (out of 19). (see Fig.2.)

CONCLUSION

The learning objectives that will be used in the future cross-border simulator test and pilot courses have been established by studying previous research and literature, interviewing experts in the field and conducting a partner expert questionnaire. In the literature review, the objectives were listed after an initial analysis and a list of fifteen (15) objectives was drafted. Expert interviews were conducted with Finnish and Estonian partners. After the Finnish partners responded, the list of analyzed objectives was nine (9) items, and after the Estonian partners responded, the list comprised ten (10) items. Some of the objectives were similar or completely identical, and based on this, a single compiled list of nineteen (19) learning objectives was submitted for educational (simulator) experts in each of the partner’s organizations. After the survey, the respondents evaluated the (19) learning objectives based on their relevance and importance in cross-border simulator training.

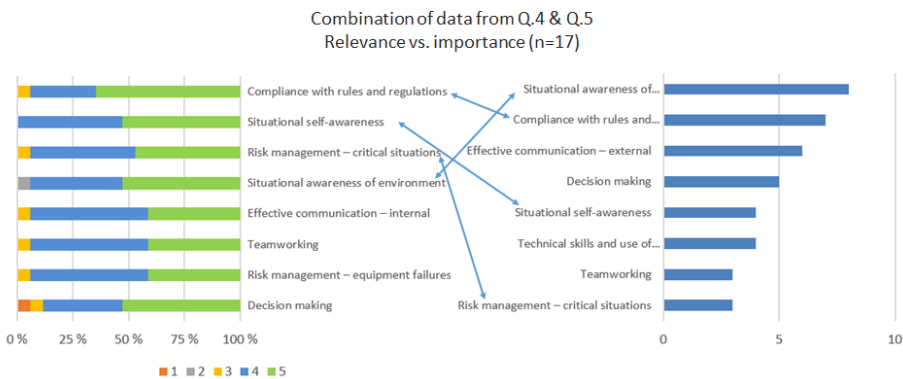


Figure 3: Combined results of questions four (4) and five (5) of the partner's educator's questionnaire. Same objectives appear in different order. (n=17).

An analysis of the questions (4 & 5) of the partner survey indicates that the same learning objectives are seen both as relevant and important. The order of the learning objectives, however, is not equal. For example: **Situational self-awareness** is second (2nd) on relevance and fifth (5th) in the list defined by importance (i.e. how many instructors have selected

1–3 topics from the total of 19). (See Fig 3.) Even though each of the topics were at least somewhat relevant, for the purpose of this project, a short-list was made using importance as a primary factor together with relevance. A final list of six (6) **most relevant and appropriate educational objectives for cross-border simulator training** is as follows:

COMET TOP 6 LEARNING OBJECTIVES

- 1. Compliance with rules and regulations (T)**
- 2. Situational awareness (T/S)**
 - of environment
 - of self – correct & safe working methods
- 3. Safety and Risk Management (T/S)**
 - Risk management – critical situations
 - Risk management – equipment failures
 - Preparedness and response techniques
- 4. Effective external communication (S)**
- 5. Decision making (S)**
- 6. Teamworking (S)**

After the literature study, every learning objective was identified as technical (T) element or soft (S) element. Some objectives could not be properly identified as one or the other so they effectively contain elements of both (T/S). These identifications were not revealed to partner experts in the questionnaire. The final list of educational objectives proved to provide a relatively balanced mix of both technical and soft elements.

DISCUSSION AND NEXT STEPS

The number of responses to the questionnaire was satisfactory (n=17). The selection and filtering of the learning objectives beforehand via literature study and interviews was necessary and increased the validity of the questions in the questionnaire. On average, the respondents had relatively high expertise as simulator instructors and trainers (8.8 yrs.), which increases the overall reliability of the results. There was little variance in the respondent's fields of expertise as most of the respondents were from the field of maritime navigation (13 out of 17). The questions, however, were not field-specific and are applicable to many different fields of industry. It is still recommended that maritime engineering professionals and port logistics operators re-validate the questionnaire in order to more precisely define suitable learning objectives for their field-specific training scenarios.

In the next phase, the “Top 6” objectives shall be introduced to partner simulator trainers in a workshop. Based on these learning objectives, training scenarios and descriptions will be drafted. The workshop will focus on the pedagogical and methodological aspects of cross-border simulator training.

APPENDIX 1



Educational objectives for cross-border simulator training

This questionnaire is a part of a project called *Internationally competitive maritime education for modern seagoing and high quality port services* (CoMET), which is funded by the EU. It is **targeted for maritime and port logistics teachers, educators and trainers that have experience in simulation-based training.**

The purpose of this survey is to **find the most relevant learning objectives for cross-border simulator training**, which can also be referred to as 'joint-operation training'. It means that two or more simulator centers are connected and students can operate in the same virtual environment in a simulation exercise. Test joint-operation training exercises and a course will be planned and developed in CoMET project based on your replies in this survey.

1. My educational organisation is:

- Aboa Mare
- EMERA
- EKAMI
- XAMK
- Other

2. My experience as a simulation trainer is:

Approximate experience in years (y.)

A horizontal slider bar with a blue square handle on the left and a vertical line extending to the right, representing a range of years.

3. My field of expertise as a simulator trainer is:

Choose one that is most appropriate.

- Maritime, Deck officers and crew (Navigation)
- Maritime, Engine officers and crew (Engineering)

- Port logistics, Port crane operators
- Other

4. What are the most relevant learning objectives for cross-border simulator training?

Rate the following topics:

In the following list there are specific learning objectives (skills/ understandings) found from literature and expert interviews. Please rate these objectives considering their relevance in a joint-operation training exercise scenario or course.

Scale: 1= *Irrelevant*, 2= *not relevant*, 3= *neutral*, 4= *relevant*, 5= *most relevant*

	1	2	3	4	5
Use of software (programs)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Use of automation and electrical systems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Service and maintenance skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technical skills and use of hardware and equipment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Preparedness and response techniques (e.g. emergency procedures)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Compliance with rules and regulations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Emission and pollution control skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Situational self-awareness – correct and safe working methods	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Situational awareness of environment (e.g. traffic)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk management – equipment failures	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Risk management – critical situations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Leadership	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Teamworking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Decision making	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Effective communication – internal (own organization)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Effective communication – external (e.g. in English)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Basic resource management and economics	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	1	2	3	4	5
Environmental awareness and sustainability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ethics and professionalism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. What are the most important objectives to focus on in cross-border simulator training?

Select one (1) to three (3) of the following topics:

In the following list there are specific learning objectives (skills/ understandings) as in previous question. Please select one, two or three (1-3) objectives which you consider the **most important** and would use if you were to plan and develop a joint-operation training exercise scenario or course.

- | | |
|---|---|
| <input type="checkbox"/> Use of software (programs) | <input type="checkbox"/> Use of automation and electrical systems |
| <input type="checkbox"/> Service and maintenance skills | <input type="checkbox"/> Technical skills and use of hardware and equipment |
| <input type="checkbox"/> Preparedness and response techniques (e.g. emergency procedures) | <input type="checkbox"/> Compliance with rules and regulations |
| <input type="checkbox"/> Situational self-awareness – correct and safe working methods | <input type="checkbox"/> Situational awareness of environment (e.g. traffic) |
| <input type="checkbox"/> Risk management – equipment failures | <input type="checkbox"/> Risk management – critical situations |
| <input type="checkbox"/> Leadership | <input type="checkbox"/> Teamworking |
| <input type="checkbox"/> Decision making | <input type="checkbox"/> Emission and pollution control skills |
| <input type="checkbox"/> Effective communication – internal (own organization) | <input type="checkbox"/> Effective communication – external (e.g. in English) |
| <input type="checkbox"/> Basic resource management and economics | <input type="checkbox"/> Environmental awareness – sustainability |
| <input type="checkbox"/> Ethics and professionalism | |

