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Digital Education Readiness in Maritime and Inland Navigation

POLICY RECOMMENDATION AND GUIDELINES ON LIFELONG LEARNING OF TEACHING STAFF WORKING IN MARITIME AND INLAND NAVIGATION EDUCATION AND TRAINING

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1. PURPOSE AND CONTEXT OF LIFELONG LEARNING

1.1 Introduction

Educational/training institutions as well as every industry and every business sector are likely to have their own 21st century skills requirements for successful, innovative, and sustainable future. Looking at some of the areas (including educational and professional environments) where research and strategies have been developed on this topic, some common trends can be identified. One of these common trends is the understanding and consistent implementation of the concept that learning, personal growth and professional empowerment are not one-off achievements. In order to develop a core set of professional skills, a transferable set of general skills, and a dynamic set of 21st century skills, it is essential to first develop the most important skill, which is to be a lifelong learner.

Students/trainees, teachers/trainers, non-academic industry professionals and the specific operations of the maritime and inland navigation industries must strive to identify key competencies required for a successful life in 21st century society. These key competences are not products that can be acquired overnight, but skills that need to be reviewed and refined. It takes great determination to figure out how these skills are acquired, but also how they are maintained and how they are able to evolve across industries, functions, and technological changes. The hypothesis is that lifelong learning skills need to be acquired before deciding to develop a core set of professional skills, a transferable set of general skills and a dynamic set of skills of the present and the future.

1.2 What is Lifelong Learning?

Continuing Professional Development also referred to as Lifelong Learning (hereafter: LLL), can be simply defined as learning that:

- takes place at all stages of life and;
- is included in all life contexts (e.g. school, workplace, home, in the community); and
- continuously building skills and knowledge throughout one's life.

Lifelong learning is a way of collecting information, qualifications and skills in a way that benefits all parties. It is education/training that is undertaken at any point after formal education ends, for instance apprenticeships or internships, online courses, self-initiated learning, on-the-job training, vocational courses and workshops. It is most often associated with older people who haven't gained any qualifications for several years, but lifelong learning actually applies to anyone who has completed formal education and still wants to learn new skills.

Lifelong learning means that people of all ages can acquire useful skills throughout their lives. Therefore, learning new skills and enhancing existing skills is likely to benefit both the individual and their professional roles.



1.3 Importance of lifelong learning

One of the reasons that demonstrate the importance of lifelong learning is considering that today's society and economy are not those from 10 - 20 years ago, and they will change in 10 - 20 years. The skills of the present are not enough to remain an essential and relevant member of society's workforce. The skills of today are not enough to remain an indispensable and relevant member of society. The impact of machine and automation on technology in different industries and countries shows very clearly that relevance can be temporary.

1.4 Lifelong Learning Skills

To enable lifelong learning, individual must have some core skills.

As per multiple opinions, lifelong learning skills generally include:

- **Adaptability** being flexible about opportunities, finding a balance between personal and professional life, and keeping up to date with current processes.
- **Creativity** being open to unconventional thinking.
- **Collaboration and communication** being open to working in groups, interacting with different people and accepting the knowledge, opinions and insight of others.
- **Curiosity** being open for learning new skills and absorbing new information.
- **Information management** developing the ability to absorb new information while understanding what is valuable and what is not;
- **Problem solving** developing appropriate methods for solve problems that arise.

1.5 Lifelong Learning need and opportunities

The overriding need for Lifelong Learning arises because actuarial knowledge and the environment in which the teachers/trainers work are constantly changing and developing. A teacher/trainer can only remain updated and competent in their areas of practice by studying continuously. Teachers/trainers need to keep up with the times in order to be able to provide high quality services. They are encouraged to undertake Lifelong Learning for the following reasons:

- To gain knowledge and experience from the start of their careers;
- To maintain familiarity with the complex environment in which they work;
- To keep up with the new development of the technology in the field of training/education;
- To keep up with developments in actuarial techniques so that their work is current and relevant;
- To be aware of current methodologies and factors that may affect the appropriateness of models and assumptions;
- To be aware of developments in national and international legislation, regulations and standards;
- To develop personally and professionally to equip themselves for new challenges in their careers;
- To acquire the skills and knowledge needed to work in new areas of practice due to the technological development;
- To meet the expectations of various stakeholders as a qualified trainer/teacher.





1.6 How can Lifelong Learning be approached?

Each teacher/trainer is responsible for developing and following appropriate Lifelong learning program.

In planning a LLL program, a teacher/trainer needs to consider maintenance, broadening and improvement of skills and knowledge.

The following should be considered by each teacher/trainer when planning and carrying out LLL programmes:

- Objectives should be set to achieve the programme.
- Actively monitor progress towards objectives, either by themselves or in collaboration with the employer.
- Consider how relevant work experience may be part of the LLL programme.
- Include interaction with other teachers/trainers, especially those from other organisations.
- Ensure that, in relation to the work performed, knowledge is up-to-date and covers the topics of the relevant parts of an appropriate education and training standard;
- Maintain a personal LLL record as good professional practice or habit.

1.7 How is Lifelong Learning achieved?

An LLL program can be achieved in a number of ways. These include:

- Participation in any of the following:
 - relevant training courses;
 - local, national, and international meeting, seminars and workshops;
 - events organised by other related professions;
 - relevant conferences and seminars;
 - research, either as an individual or in a group;
 - groups discussions on specific topics.
- Teaching/Training or supervising other teachers/trainers;
- Preparing or conducting examinations for teachers/trainers;
- Studying online relevant training courses or education programmes;
- Writing relevant papers and books;
- Giving lectures or presentations to colleagues or larger audiences at conferences or seminars;
- Private reading of relevant journals and books;
- Expanding one's skills through undertaking new challenges or working on new tasks.

2. APPLICATIONS OF LIFELONG LEARNING IN THE MARITIME AND INLAND NAVIGATION INDUSTRY

2.1 Generalities

In the maritime and inland navigation industry, crew members (or aspiring crew members) can be taught navigational skills, how to perform effective Bridge Resource Management (BRM), how to apply leadership and managerial skills, and





how to use shipboard technologies, such as Radar, Electronic Chart Display and Information System (ECDIS), Automatic Identification System (AIS) etc.

Ship owners or managers also train their crew members in specific company policies and procedures, focus voyage planning in the specific routes and regions of the ship's expected operations, tailor ship handling classes to anticipated ports of call, and collaborate with manufacturers to ensure that crew members know and understand the specific types of safety systems and environmental technologies on their vessels. Considering that, one may find training to seem endless at times. Even after attaining the rank of Captain/Boatmaster, various trainings and certifications need to be renewed regularly, and the systems on board may be often replaced with newer versions or completely new systems. Due to industry regulations, company requirements or individual advancement aspirations there are always opportunities for crew members to continue their training and development.

It may seem that there is almost no need for one to be a lifelong learner considering all these training schemes already available. However, one must become a lifelong learner by default if they pursue a career in such a highly-regulated industry or have goals of professional growth and these factors alone do not create a lifelong learner. One can receive training in how to lead and manage a team, but one cannot necessarily receive training in wanting to lead and manage others effectively. For instance, when someone receives an updated manual and instructions for the latest ECDIS software update from a manufacturer, they are not necessarily equipped with the optimism, commitment, patience, and perseverance necessary to 'rewire' the technical knowledge of the previous version that they are consciously or unconsciously holding on to. The qualities and characteristics of lifelong learning, then, are what distinguish those who simply find themselves in regular training courses from those who also value and seek out the opportunity to make that training an active and engaging learning experience that goes beyond the acquisition of a particular skill and beyond the present moment of training.

Simply put, most technical skills can be taught and a licence or certification can document those skills, but it is more difficult to teach or instil the qualities of wanting those skills or documenting them on paper and wanting more than what is required for that paper or ultimately for the professional position.

Lifelong learning differentiates trainees from engaged learners, and can reach out and extend its roots to improve crew members and maritime/inland navigation teachers/trainers beyond industry standards and technical requirements.

Lifelong learning is not only the underpinning for various other 21st century skills, but can also change the way the maritime/inland navigation industry supports current and future generations in various job roles.

2.2 Developing crew members for maritime and inland navigation

Many crew members sailing in the deck and engine departments aspire to obtain the required licenses, certification, and work experience to sail as Captain/Boatmaster or Chief Engineer. As mentioned earlier, there are a variety of training opportunities for crew members with these career goals, but sailing in these positions entails more than just the responsibility and authority to make decisions, oversee maintenance and equipment, and ensure compliance with all regulations.

Commanding a department of a ship, and even more so, commanding the entire ship, should also mean leading and motivating others through displays of lifelong learning, by encouraging questions and transparent discussions about operations and the process of decision making.





If lifelong learners attain these leadership positions, in addition to technical knowledge and skills, they have often already exemplified critical thinking, collaboration, and communication skills. In such a case, they may continue to look for opportunities to ensure they are up-to-date with the latest technologies and equipment outfitted on a ship/vessel, and thus continue their function as a lifelong learner. In an ideal case, those in command are also supporting their on-board teams and shore-side colleagues in engaging in lifelong learning. When lifelong learners flourish and grow into leadership positions, they often want to share their passions and motivations with others. Whether they formally act as a mentor to a cadet/apprentice or informally share some local knowledge on the next port of call in a casual conversation over coffee on the Bridge, these leaders can use their collaboration and creativity to encourage the development and engagement of the crew members they lead and manage.

While crew members will often have the opportunity to gain new technical skills in a classroom or a simulator, there are also opportunities for them to learn in more informal ways, such as listening to a colleague's navigation stories in the crew mess, gaining understanding by practicing closed-loop communication between the Bridge team and the Pilot, and actively participating in a drill debrief to identify what team actions could have been done better or differently. Encouraging crew members to apply technical skills in real-life applications, maintaining up-to-date training and certifications, and asking questions are important for professional development at all career levels – and these actions should not be limited to formal classroom training. Both formal and informal leaders should pursue their own lifelong learning goals while actively encouraging current and future generations of crew members to develop similar goals. For the maritime and inland navigation industry as a whole to adapt to global, economic, and technological demands beyond those of an individual vessel or company, lifelong learning is a must and enables crew members to support their individual value in a dynamic society.

2.3 Development of maritime and inland navigation teaching staff

When it comes to the development of crew members, the component of their formal education and training ashore must also be considered. Students and trainees can only be expected to develop and maintain 21st century skills if their educators and trainers have these skills. Many trainers teach/train others because it is a passion for them to share knowledge and because it fulfils them to inspire future generations. Others, due to circumstances or other factors beyond their control, find themselves in a role that no longer allows them to actively sail on ships/vessels. Transitioning to a role of instructor/trainer allows them to maintain a connection with the crew community, as they wish to continue to have strong professional and personal ties to the sector.

Regardless of the reason they originally took on a role in training, all educators/trainers must strive to support and inspire the development of lifelong learners by: encouraging students/trainees to find real-world applications of course material; motivating students/trainees to make connections and draw relevance to the course material beyond the present moment and their current role; encouraging students/trainees to ask questions and share their experiences; and adapting the course material to include current events, recent case studies, and advances in technology.





In order for instructors and educators in maritime/inland navigation to truly create lifelong learners who are prepared to use a wide range of 21st century skills, they must be lifelong learners themselves and practice that by:

- adopting new teaching strategies and tools in order to deliver content more effectively and engagingly;
- embracing the experience and knowledge students/trainees bring to a course whatever their background and level of experience;
- collaborating with peers when opportunities for interdisciplinary projects arise; and
- admitting that their individual development as an instructor, as a leader and ultimately as a person, is a continuously evolving process, no matter what their field of expertise is.

If instructors stick too rigidly to a predefined curriculum, do not engage in discussions and provide reference material or examples that are limited to specific scenarios and geographic regions, it is almost impossible to contribute to the development of students or professionals who develop innovative approaches that not only focus on multidisciplinary, networking, and cross-sectoral collaboration, but also create links between different disciplines and skills.

Looking at the specific skills required for global maritime and inland navigation sectors, one would hardly expect someone who does not have relevant expertise or certificate to taught ship handling, meteorology, crisis management, or engine room resource management.

Similarly to those specific skills, for more general and transferable skills that enable critical-thinking and problem-solving, facilitate strong interpersonal relationships and demonstrate openness to new technology, one would anticipate that training or practice in the application of these skills would also be led by someone with appropriate skills or qualifications.

Therefore, to ensure that generations of seafarers and river navigators benefit from a continuous learning process in professional settings and on board vessels, it is essential to find educators and trainers (whether they are based in a traditional classroom or have adapted to technological platforms) who demonstrate the same commitment to lifelong learning as it is expected from the maritime/inland navigation students and professionals they teach.

In conclusion, it is critical to take into account the wide range of roles and responsibilities, the diverse backgrounds of the seafarers and inland waterway professionals, and the multiple nations and regions that make up the maritime and inland navigation industries when considering what is needed beyond the technical skills needed for success.

Company procedures, recruitment specialists, and hiring managers can sometimes narrow down how to define an ideal professional, regardless of their individual characteristics and experience, by identifying industry-specific skill sets believed to be required for success. But the consideration, the assessment, the qualifying factor for success and achievements cannot be limited to only the skill set needed today. The engagement, motivation, and attitude of a professional must also be taken into consideration because these professionals will not all remain in that particular role or function for the entire career and because the technologies, regulations, and environment that guide the industry will not be static in the entirety of one person's career or one company's business plans. To fill the gaps that exist between today's measure of success and the future's needs, companies and continue providing training, leadership and industries can advancement





opportunities, collaborative networking events, and implementing new systems and equipment that outperform the outdated ones.

When evaluating potential employees for the maritime and inland navigation industries, it is crucial to recognise that success depends not only on the technical skills required for the job, but also on commitment, motivation and attitude of the individual. It is very likely that professionals will not stay in the same role throughout their careers and that the technologies, rules and environment in the industry will not remain static over time. Therefore, companies should provide continuous training, leadership development, collaborative networks and the introduction of state-of-the-art systems and equipment to ensure that their employees are well equipped for the future. This way, they can ensure that their employees are prepared for the changing demands of the maritime and inland navigation industries. In addition, companies should strive to create a culture of mentoring and support to help professionals learn and grow in their roles and acquire the skills they need to succeed in their current and future positions. They should also provide opportunities and resources for their employees to keep up to date with the latest trends and developments in the industry, as well as give them access to industry experts and mentors who can provide guidance and feedback. Finally, employers should strive to cultivate an atmosphere of collaboration and camaraderie where employees feel comfortable asking questions, sharing ideas and working together towards a common goal.

In addition to providing training, opportunities, events, and equipment, the maritime and inland navigation industries must also foster a culture of lifelong learning to ensure that professionals have the necessary 21st century skills to remain successful in today's rapidly changing environment. This includes encouraging, identifying and supporting those who are committed to lifelong learning and who are willing to adapt and learn new skills as needed. This could mean gaining access to industry experts and mentors, as well as resources to stay informed on the latest trends and developments in the industry. International Maritime Organization (IMO) regulations and codes, as well as shipboard technologies, will continue to evolve. The same situation exists in inland navigation industry.

Lifelong learners are in a more advantageous position to be successful in an ever-changing environment, as they strive to keep their knowledge and skillset up to date. This enables them to adapt quickly and effectively adapt to future changes, giving them a unique advantage in the workforce.

Predicting the precise technology and equipment that will power tomorrow's communication, the safety and environmental regulations that will need to be followed, or the platform that will be used for training in the future is often not easy or even possible. However, it is reasonable to assume that pairing the acquisition of essential 21st century skills with the enthusiasm and drive of lifelong learners will be beneficial for both the individual and the industry as a whole, providing professional sustainability and adaptability.





3. POLICY STATEMENT

The European Education Area strategic framework promotes collaboration between European Union Member States and key stakeholders and allows the monitoring of progress towards the achievement of their collective vision.

The European Education Area (EEA) strategic framework was established to create a structure of collaboration between the European Union (EU) Member States and key stakeholders in order to realize their collective vision. The framework does so by:

- strengthening means of policy cooperation and reaching out to stakeholders to encourage their participation in the initiative
- enhancing synergies with other relevant initiatives, including the European Research Area and the Bologna Process
- setting targets and indicators to guide work and monitor progress towards achieving the EEA
- fostering the integration of education and training into the European Semester process

European Skills Agenda-2020

The European Skills Agenda builds upon the ten actions of the Commission's 2016 Skills Agenda and sets objectives to be achieved by 2025, based on wellestablished quantitative indicators, being a five-year plan to help individuals and businesses develop more and better skills and to put them to use, by:

- strengthening sustainable competitiveness, as set out in the European Green Deal;
- ensuring social fairness, by implementing the first principle of the European Pillar of Social Rights: access to education, training and lifelong learning for all, everywhere in the EU;
- building resilience to react to crises, based on the lessons learnt during the COVID-19 pandemic.

The rapid shift towards a climate neutral Europe and digital transformation are changing the way we work, learn, take part in society and lead our everyday lives. Europe can grasp these opportunities only if its people develop the right skills.

The Covid 19 pandemic has also had a profound impact on millions of people in the EU who have lost their job or suffered significant income loss. Many will need to acquire new skills and find new jobs in a different sector of economy. Others will need to upskill to keep their job in a new work environment. For young people, entering the labour market could be a major challenging.

"Education and Training 2020" (ET 2020) is a new strategic framework for

European cooperation in education and training that builds on its predecessor, the "Education and Training 2010" (ET 2010) work programme. It contains common strategic objectives for Member States, including a set of principles for achieving those objectives, as well as common working methods with priority areas for each periodic work cycle.

European cooperation in education and training should be established in the context of a strategic framework spanning education and training systems as a whole in a lifelong learning perspective. Specifically, the framework should address the following four strategic objectives:

Strategic objective 1: Making lifelong learning and mobility a reality;





Strategic objective 2: Improving the quality and efficiency of education and training;

Strategic objective 3: Promoting equity, social cohesion and active citizenship;

Strategic objective 4: Enhancing creativity and innovation, including entrepreneurship, at all levels of education and training;

European Digital Strategy 2020-2025

Over the next years, the Commission will continue to focus on three key objectives to promote technological solutions that will help Europe chart its own path towards a digital transformation that works for the benefit of people and respects the values of 1) technology that works for people; 2) a fair and competitive economy; and 3) an open, democratic and sustainable society.

The main Strategy documents published on 19 February 2020 include:

- White Paper on Artificial Intelligence;
- A European strategy for data;
- Shaping Europe's digital future.

Mission Statement of IMO's Integrated Technical Cooperation Programme

To help developing countries improve their ability to comply with international rules and standards relating to maritime safety and the prevention and control of maritime pollution, giving priority to technical assistance programmes that focus on human resources development and institutional capacity-building, the United Nations Sustainable Development Summit adopted in 2015 the United Nations Sustainable Development Goals (SDGs) as part of the 2030 Agenda for Sustainable Development.

The 17 Sustainable Development Goals and 169 targets follow and build on the Millennium Development Goals (MDGs), agreed by governments in 2001.

International shipping is inherently indispensable for economic growth and sustainable development and therefore indirectly plays a role in all SDGs.

At its sixty-seventh session, the Technical Cooperation Committee approved linkages between IMO's technical assistance work and the 2030 Agenda for Sustainable Development.

While it was noted that all SDGs have some connection with IMO's mandate, those deemed to be most directly relevant to IMO's technical assistance work are:

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all;

SDG 5: Achieve gender equality and empower all women and girls;

SDG 6: Ensure availability and sustainable management of water and sanitation for all;

SDG 7: Ensure access to affordable, reliable, sustainable and modern energy for all;

SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

SDG 13: Take urgent action to combat climate change and its impacts;

SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development; and

SDG 17: Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development.

Global Programme on Skills and Lifelong learning

Employment Policy Department/ILO Headquarters/2021





Lifelong Learning as an enabler of structural transformation, decent work and inclusive societies

Technological change and globalization, along with demographic and climate change, are transforming the world of work and opening new opportunities – but they also pose challenges for people in obtaining access to decent work and for enterprises in adapting sustainably. The outbreak of the COVID-19 pandemic in the beginning of 2020 has caused the most serious disruption to the world of work in modern times, accelerating the structural transformations that have evolved over years and aggravating existing inequalities.

The waves of disruptions transmitted by such megatrends are making skills development increasingly complex, fluid and unforeseeable. In the changing world of work, constant adaptation is a renewed requirement for companies, workers and training providers who must engage in skills development from a lifelong learning perspective to ensure they remain market relevant and are able to seize opportunities for social and economic progress.

In most countries, regardless of their stage of development, the ongoing social and economic transformations continue to raise this key question about the future of work: What will be the jobs of the future and what skills will they require?

Skills mismatches are indeed a growing challenge in today's labour markets, with many consequences for workers, businesses and the future of work. The reinvigorated momentum for investing in women and men's capacities reflects a heightened sense of urgency and shared responsibility in the post-pandemic recovery process, which calls for placing greater priority on skills development and empowering women and men from a lifelong learning perspective. Skilling, reskilling and upskilling throughout all stages of life is a precondition – and an accelerator - for the smooth transition of women and men into and within labour market, for the repositioning of enterprises on local and international markets, and for the reduction of inequalities and inclusive societies.

Council recommendation of 22 May 2018 on key competences for lifelong learning

Nowadays, competence requirements have changed with more jobs being subject to automation, technologies playing a bigger role in all areas of work and life, and entrepreneurial, social and civic competences becoming increasingly important to ensure resilience and the ability to adapt to change.

This Recommendation aims to provide a common understanding of competences to a wide range of education, training and learning environments with a shared understanding of competences in order to facilitate transitions and collaboration between formal, non-formal and informal contexts. It outlines best practices that meet the needs of educational personnel, such as lecturers, trainers, teachers, teacher educators, researchers, university lecturers, youth workers, adult educators, staff responsible for training colleagues, employers and other labour market stakeholders. In addition, this Recommendation aims to help institutions, social partners, civil society organisations and others who support people to improve their competences from an early age and throughout their lives.

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4. PRINCIPLES OF LIFELONG LEARNING OF TEACHING STAFF WORKING WITH NEW TECHNOLOGIES IN MARITIME AND INLAND NAVIGATION EDUCATION AND TRAINING

4.1 Introduction

Higher analytical skills, higher qualifications, skills and competencies are required in the shipping industry. Human resources are critical to the efficiency of these industries. They have a great responsibility for the safety of life and property and the protection of the environment and are suited for shipping and other shipping-related activities. Therefore, education and training is a very important part of the shipping industry and consequently educators and trainers are vital to the progress of education and training.

Recruiting, training and retaining competent educators and trainers will enhance the skills of future human resources; this is a challenge in the current circumstances.

Several analyses of disasters have drawn attention to human errors as a major cause of accidents at sea. These analyses have made it clear that it was not only the Master/Boatmaster and the Crew who were responsible, but that the education and training institutions and the people ashore were also partly responsible. It is clear that the education and training institutions are directly responsible for the adequate competence of crew members and adequate education and training could be one of the most important risk reduction measures.

Shipping is an international industry; the word "industry" includes a broad spectrum of clients such as maritime/inland navigation administrations, shipping companies, education and training institutions, and so forth. The industry needs capable people with an aptitude for shipping and other activities associated with shipping; therefore, education and training institutions are a very important link in the chain of the shipping industry. Education and training institutions need to have, in addition to at least the minimum teaching facilities and simulator installations, also high quality teachers/trainers, supervisors and assessors.

A teacher/trainer is qualified to teach a number of shipboard-related subjects to students/trainees in competency courses. The basic prerequisite for the teachers/trainers is appropriate experience onboard. They should be appropriately qualified for the particular types and levels of training or assessment of competence of crew members. Continuously improving the competency of the teachers/trainers will naturally increase the skills of future crew members.

4.2 Shipping Industry Human Resources

The shipping industry should be focusing more on the human element rather than spending lot of money on bridge layout and increased automation, because the human contribution in the maritime industry plays vital role not only onboard ships but also in all shipping activities. Human resources are the crucial factor to ensure the satisfaction and success of final achievements. People having knowledge, skills and competency provide the cohesion between industry and the continuous developments in technology and the legislation. The shipping industry, which





strongly depends on highly qualified human resources, is dynamic by nature, for which reason it depends on a international regulatory system.

Shipping industry stakeholders need uniformly highly qualified and competent personnel and needs to upgrade their human resources in order to properly implement international legislation and keep pace with advanced technologies on board vessels as well as in their design and operation.

4.3 Education and Training

Education and training is a series of independent processes such as teaching, learning, researching and resources including human, material and information that function harmoniously to achieve specified educational objectives in the means of ensuring marine safety and the protection of environment.

It is important to distinguish education from training. Generally, education means the preparation for careers and for life in general, which involves the learning concepts, principles, and so forth. Education as a process involves teaching and learning. Learning is a complex process of acquiring knowledge, understanding, skills and values in order to be able to adapt to the environment. The process depends mainly on the teaching skills of those attempting to assist our learning.

On the other hand, training means the preparation for a specific job or set of tasks. The content of a training course is consequently more specialized than an educational programme. The main areas in which training can operate are knowledge, skills, techniques, attitudes and experience. Basically, training involves learning designed to change the performance of people doing their jobs.

Generally, education and training have a great influence on skills and competence of maritime and inland navigation human resources. All stakeholders, i.e. education and training institutions, maritime and inland navigation research institutions, ship-owners' associations, crew members' unions, maritime and inland navigation education administrations, professional associations and governmental administration of education and training, must continuously make adequate efforts to meet the needs of the shipping industry. Therefore, the education and training institutions as one stakeholder should be at the core and linked with all other stakeholders to meet these needs.

4.4 Quality Improvement of education and training in shipping industry

The world fleet of high-value ships such as product oil, chemical, Liquefied Natural Gas (LNG) and Liquefied Petroleum Gas (LPG) tankers has grown and continues to grow significantly. Many new technologies will be applied on these ships. Such advancements and equipment innovations call for high-quality crew with specialized knowledge and skills, which in turn place a high requirement on the teachers/trainers. To ensure that crew members are appropriately trained to operate highly technological ships in a safe and efficient manner, they must have access to satisfactory levels of updated training.

Developing an internationally recognised system of training and certification for crew members responsible for the sophisticated electronics equipment and systems on board ships has become essential in order to improve effectiveness and efficiency on board ships.

The need to upgrade global education and training in maritime and inland navigation sectors has arisen from the consequences of the imperfect match of objectives and





realities between education and training and the advanced development of the shipping industry. To illustrate, the development of computer pedagogic is not matched by the increased use of computers and application software. Improving education and training quality will help to increase the value of crew members in the labour market and increase the potential international mobility of them; moreover, it will make the shipping industry safer, more environment-friendly and more efficient. Education and training institutions need to constantly adapt themselves to face new technological and legislative challenges.

The rapid development of new types of ships and the wide application of Information Technology (IT) in shipping operations have required the operators, both on board and at education and training institutions, to be very well trained in computing techniques. In addition, the frequent amendments of the relevant international legislation necessitate the continual improvement of education and training system.

Teachers and trainers in education and training institutions need to keep pace with developments on board ships and in the various sectors of shipping industry. Teachers and trainers need to respond appropriately to new legislation and technological changes. In order to bring all education and training curricula up to date, an appropriate response to the amended international convention and other national and international regulations still needs to be developed.

4.5 Upgrading Skills and Knowledge of Teaching staff working in maritime and inland navigation education and training

As stated in relevant international legislation (STCW 78/95 Convention and EU Directive 2017/2397), each Party shall ensure that teachers, trainers, instructors, supervisors and assessors are appropriately qualified for the particular types and levels of training or assessment of competence of crew members either on board or ashore. What is not defined is what it means to be "appropriately qualified." It leaves to each party to determine the requirements of the qualification. As a result, these requirements could vary from country to country and also from institution to institution.

Furthermore, teachers, trainers, instructors, supervisors and assessors who are appropriately qualified need to keep upgrading and updating themselves to follow the development race in all aspects in the maritime/inland navigation field so as to be appropriately qualified tomorrow. The key to having better training staff lies in having individual efforts from them supported by a positive institutional attitude.

4.6 Quality Standards System in maritime and inland navigation education and training

Self-monitoring of quality assurance systems should mean that education and training institutions will continue to evolve. Similarly, Quality assurance of education and training institutions becomes much more complicated when safety, environment and quality management criteria need to be integrated into the existing dynamic processes of a training institution while defining knowledge, understanding, skills and competence.

In this context, the attention of the international shipping industry has recently focused on the creation of regulatory regimes, namely the STCW 78/95 Convention, and the ISM Code which is the legal instrument most closely connected





to STCW 78/95. Both aim to ensure the safety of operations by emphasising the quality of on-board operations.

The STCW 78/95 Convention and EU Directive 2017/2397 made mandatory a quality standards system to cover all education and training activities who require from each party to ensure that all training, assessment of competence, certification activities, and so forth, are continuously monitored within the framework of a quality standard system to ensure the achievement of defined objectives. In addition, these legal regulations require all training and assessments to be structured in accordance with the documented programmes and procedures necessary to achieve the prescribed standard of competence and conducted and supervised by properly qualified persons.

Education and training institutions are required to carry out their programmes through quality standards located within the framework of the national quality standards system. The quality assurance of the education and training process and the assessment of students and trainees are the key factor to satisfy the shipping companies and other parties in today's world. The success of the students and trainees is an indicator of the quality assurance of the curriculum of the maritime and inland navigation studies programme. In general, they are the deciding factors in forming an opinion of an educational and training institution.

4.7 Teaching Technologies of Institutions

Generally, technologies are just tools, or means to come closer to sustainable development in education and training. Yet more than skills are required to enhance the current and future requirements of human capacity building. Education and training institutions need to become effective agents for the proper handling of advanced technologies.

Careful consideration needs to be given to the impact on human resources when expanding education and training activities into the field of simulator training, creating computer-based networks and developing outreach through distance learning. The optimum utilization of modern technology for teaching and assessment, such as the effective use of simulators, plays a crucial role in enhancing education and training. Education and training institutions need to encourage their instructors to familiarize themselves with and properly gain the new opportunities offered by computer-based networks, the use of multi-media and the World Wide Web (www), and prepare themselves for future use of the interactive cyberspace medium. Updated and upgraded instructors being able to use modern Information and Communication Technology (ICT), particularly distance learning materials, will ultimately mean better qualified students and trainees.

4.8 Integrating the Curriculum with Safety Culture and Environmental Protection

It is crucial to include safety culture and environmental protection awareness in all education and training programmes at education and training institutions. Integrating them into all syllabi offered and developed by education and training institutions will give strength and development of commitment to safety and environment. Consequently, teachers and trainers need to extend their treatment of these topics.

Proper cooperation between education and training institutions as well as other relevant stakeholders to survey, review, develop and continuously promote





safety culture and environmental protection awareness needs to become an integral and ingrained part of ship operations.

4.9 Teaching staff working in maritime and inland navigation education and training

The maritime and inland navigation education and training system is characterized by four elements: Students/trainees, academic staff/training staff, programmes and facilities. Obviously, a better quality of education and training system graduate students is a consequence of a quality enhancement of the other three elements. Education is a process whereby information is exchanged between the student and academic staff. The education and training system provides specialists who can work in shipping operations, the shipbuilding industry and other shipping industry activities. The development of the industry as a whole depends on the education and training system and precisely, on the education and training staff's development.

The education and training institutions' future performance can be predictable by knowing the ability and the experience of the individuals in that institution. To be able to achieve a continuous progress in education and training, human resource development is one of the most important contributors. Generally, people are inherently flexible and adaptable, but at the same time, they can be very sensitive to change. Education and training institutional management needs to motivate teaching staff to improve themselves not only because they have to, but also because they have to really feel committed and believe in it.

Continuing Professional Development (CPD) is defined by the Institute of Marine Engineering, Science and Technology (IMarEST) in 2008 as "the systematic maintenance improvement and broadening of knowledge and skill and the development of personal qualities necessary for the execution of professional duties throughout working life." CPD includes updating the particular area of competence, development of management skills, increasing experience and improvement of personal proficiencies. Teaching staff and assessors, when they accept CPD, will be a major key of success to themselves and for their institutions. It is essential for teaching staff to maintain high levels of professional competence by continually upgrading their skills and knowledge.

Implementation of maritime and inland navigation standards on a global basis needs to be supported by a core of well-qualified and trained professionals. The major objective of these standards is to improve the quality of both training and assessment. This will only be achieved with highly skilled teaching staff and assessors.

To understand how the requirements of the maritime and inland navigation standards have to be implemented, teaching staff and others involved in maritime and inland navigation education and training activities need to be aware of fundamental pedagogical knowledge, practical teaching skills and advanced technology. They need to enhance their knowledge and skills which include training awareness, substantial technical knowledge, training skills, management skills and attitudes to meet the demand for new training and assessment methodologies.

4.10 Impact of international legislation and new technologies on maritime and inland navigation education and training system



4.10.1 Impact of international legislation

The requirement of new international legislation and technological changes which is taking place in the shipping industry has driven education and training institutions to adjust themselves to meet the industry's demands for competent crew members. As a result, education and training institutions introduced updated materials into their syllabuses to improve the education and training system with respect to the new developments.

Nowadays, the world is becoming an information society with advanced technologies and network capabilities supporting communication, sharing information and learning.

4.10.2 Impact of new technologies

Education and training are highly dependent on information, communication, and information technologies. The integration of technologies into education and training will continue to increase as technology advances, and education and training institutions will need to consider whether to incorporate new technologies into their provision.

Unfortunately, many institutions lack trained and experienced teaching staff and assessors who can handle the different types of simulators and CBT. Education and training institutions need to ensure that teaching staff has the appropriate qualifications and experience in these technological areas. In addition, teaching staff must have a clear understanding of the use of advanced technologies in education, training, supervision and assessment. Education and training institutions need to consider the potential of simulators and CBT to achieve training objectives, and teaching staffs also need to know whether the use of simulators for assessment is appropriate. To achieve this, the education and training institutions must have appropriately trained, qualified and experienced simulator instructors and assessors. Without such personnel, these institutions cannot fulfil their mission.

Computing

The growing impact of the developed electronic assisted learning, such as the use of advanced CBT and simulators in education and training, will raise the standards of competence. CBT and simulators are powerful tools which can be used to support reaching the training objectives. Introducing new technologies on board ships will force education and training institutions to initiate specialised courses to teach crew members how to properly handle these new technologies. The proper use of advanced technologies and facilities will help teaching staff and crew members to improve their capacity.

Simulators

STCW 78/95 and EU Directive 2017/2397 lay strong emphasis on the competency -based training at all levels of a crew members' career. The teaching staff conducting simulator training and assessment must receive appropriate guidance in instructional techniques, as well as in assessment methods and practice. Moreover, he/she needs to gain practical simulator operational experience and assessment experience on the particular type of simulator, who is not an easy task; it can, however, be accomplished by following the IMO simulator model courses, manufacturer provided courses and under studying with an experienced simulator





instructor. Inexperienced simulator instructors can easily introduce extraneous variables that can influence the task or performance beyond that conceived by the original training objective.

Simulators have been accepted as a major source to provide and prove competency. In recent years there has been significant progress made in the use of simulators as tools for the evaluation and assessment of students and crew members.

Communication

Telecommunication technologies have increased in reliability, flexibility and affordability, and in addition support national and international distance learning. The current technological and educational climate of CBT, satellite communication, mobile telephones, high broadband networks, www, E-mail, multi-media tools, handheld digital devices and virtual reality and other technologies have had a tremendous impact on current and future distance learning. The enhanced capabilities of wireless communication and 'mobile' connections to the Internet will meet the needs of crew members' for professional development and lifelong learning on their 'floating fields'.

Distance Learning

The United States Distance Learning Association (USDLA) defines distance learning as: "The acquisition of knowledge and skills through mediated information and instruction, encompassing all technologies and other forms of learning at a distance".

Technologies offer a mix of instructional media: Voice, video, data and print to meet the needs of the distance learner to achieve a high level of quality. Many education and training institutions worldwide have a wide range of technological options available for distance education. Conversely, many institutions do not have the expertise to design and produce electronic online study materials suitable for delivery through cyberspace.

Distance learning environments continue to evolve with advancing technologies, moving towards virtual classrooms, using a combination of live, twoway interactive audio, video, or both synchronous/asynchronous computer-based interactions that take advantage of local area networks (LANs), wide area networks (WANs) and the Internet. The Internet has become an essential communications platform and has new capabilities that can be utilized for distance learning.

The technology delivery method features, such items as the eight-way synchronous interactions, individual control screen viewing options, group control over content delivery speed, E-mail and electronic support features along with group facilitators who can support the teaching staff in handling several tasks during office hours. Using distance learning for education and training, institutions will provide increased face-to-face contact with other staff and students and take advantage of more resources and laboratories. Thus, distance learning is an economical way of expanding education and training institutions' activities and making effective use of the new technologies. Consequently, distance learning has increased the pedagogical effectiveness of course content.

Teaching staff and developers need to be aware of the weaknesses and strengths of distance learning and must become better acquainted with the needs of their students. The relationship between the teachers and student has changed from



teacher-oriented to student-oriented. They need to be sensitive to the different communication styles and cultural backgrounds. Teachers should be able to reduce the distance psychologically by using effective teaching methods, different strategies and appropriate technologies. For instance, during Interview Television (ITV) sessions, attention should be paid to the voice tone, body language, movements and eye contact with the camera to improve verbal communication. It is a challenge for teaching staff to keep the students' attention on the television screen for a longer period of time. Teachers should be able to change the design and content of the lesson through transmission, transaction, transformation, feedback and evaluation.

Virtual reality technology (VR)

Virtual reality technology (VR) creates a simulated educational and training environment, and VR trainings allow students to shape their professional competences comprehensively and systematically.

Modern hi-tech ship equipment requires specialized education and training with implementation of phantoms, replicas, simulators and simulation devices.

As international experience proves, the process of education and training of the future crew members should be supplemented with simulator-based training.

Among the factors promoting development of simulator-based training we can find competence-based approach in education and change of education paradigm aiming at dual and life-long learning, introduction of blended learning. Implementation and improvement of modern methods for building professional competence objectively increased the demand for skilled workers who are able to use hi-tech digital devices.

Nowadays, the scientific community is concerned with the idea of necessity of implementing new information technologies into the educational process; but absence of research experience, lack of evidence base connected with efficiency of new simulators' operation leaves much to be done on investigation of these technologies performance efficiency. Due to high initial cost of equipment and software development VR technologies are slowly adopted and implemented into the educational process.

4.11 Conclusion

In view of sustainable development of legislation and technologies, it has been argued that the shipping industry stakeholders share a critical need for competent and upgraded teaching staff.

Upgrading teaching staff requires permanent efforts from firstly, themselves and secondly, from education and training institutions and shipping industry stakeholders. It is vital for each education and training institution to offer appropriate upgrading programmes to its teaching staff.

It is also important for each education and training institution to keep developing and upgrading its teaching staff because these will be the key to the success of the institutions.

Teaching staff should, in addition to providing education and training services, seek to improve techniques, systems and approaches. They have to find new and better ways of doing things and innovating methods of teaching, training and managing. Teaching staff should be ready and willing to meet the demands of the





shipping industry's stakeholders and to meet the requirements of international and national legislation and new technologies.

To achieve these goals, the education and training community should work more actively to convince governments, the shipping industry and donors to contribute to funding the training and technical development of teaching personnel.

After all, the human resource remains the most valuable asset that any organization holds. Education and training institutions need to ensure that the knowledge and skills of their human resources are constantly enhanced. The teaching staff's eagerness, desire and ambition for continuous self-improvement are crucial.

The teaching staff's role should not be limited to that of passive recipient of an approved method, text or syllabus. Rather, the teaching staff's role and skills should be developed to ensure that it can act as a critically aware and well informed judge of how training tools and methods can be used to best effect. Success depends on the expertise, enthusiasm of the teaching staff themselves and their desire for constant self-improvement.

5. BEST PRACTICES OF LIFELONG LEARNING FROM THE OTHER MODES OF TRANSPORT

5.1 Continuing professional development in other modes of transport *Road transport*

(https://app.croneri.co.uk/topics/continuing-professional-development-road-

transport/indepth)

This document provides an introduction to Continuing Professional Development (CPD) as a means to maintain and improve individual competence. For transport organisations, CPD contributes towards meeting the obligation for safe and legal operation and gaining competitive advantage. A planned and structured approach to CPD is described.

The CPD Process in road transport

Since the aim is to improve the level of competence of individuals, emphasis must be placed on measuring individual levels of competence both before and after the development activity. A structured review process will seek to establish:

- current levels of competence and any gaps;
- opportunities for career development and the required additional competence.
- The aims and objectives of CPD for the individual will arise from these.

It is very likely that this analysis will throw up a good number of potential CPD aims and objectives and these will have to be put into an order of priority, for example:

Immediate — development needed right now in order to meet current job requirements.

Short term — not needed now for current job but will be in the near future; an example would be the planned introduction of new legislation or equipment or a new working practice.

Medium term — development needed in order to allow career progression to next job.





 ${\bf Long \ term}$ — development needed in order to lay foundations for career progression beyond the next job.

While managers will be keen to retain staff, especially in a time of shortages in certain areas, this should not be used as an excuse to restrict the development workers are permitted to undertake on the grounds that it will make them employable elsewhere. If the organisation operates proper succession planning then medium- and long-term development must be a part of it and will provide a career ladder within the organisation.

Once the aims and objectives, in their order of priority, have been established the focus shifts to making a plan to achieve them. This plan should be based on the SMART principle.

Based on this, the best method of providing the development opportunity will be determined and the plan should be written down in the form of a **Personal Development Plan (PDP).** This will form a learning contract between the individual and the line manager. Some medium and longer-term objectives will need to be broken down into several intermediate stages to conform to SMART principles.

The final stage is the **evaluation**. The most obvious question to ask at this stage is obviously whether or not the objective has been reached. However, this is not all there is to the evaluation. Other questions need to be asked, such as those below.

- "What improvement in performance has resulted already?"
- "How else can the newly-acquired competence be used in other areas?"
- "Where does this lead?"
- "Was the chosen development method the right one?"

The outcomes of the evaluation will feed into a new review, and so the cycle starts again. If the objective has not been achieved the review will need to establish why not and what is to be done about it. This may be to continue working towards the same objective or to replace it with a different one. Any new development needs as a result of changing circumstances in the period since the last review must also be considered.

The frequency with which the review and plan processes happen will depend on the timescale established for the development that has been identified but should not be less frequent than annually. When immediate development needs have been identified the frequency of evaluation and review will be much higher — perhaps quarterly or even monthly — but once the immediate needs have been met it can be extended to six-monthly or annually.

The focus of CPD is on the people taking responsibility for their own development, so the "evaluate — review — plan" process can be carried out by individuals alone. Greater benefit will be gained by both the individual and the organisation if it is done in conjunction with a trained mentor or advisor.

Rail transport

(https://www.ciro.org/professional-development)

The CPD Process for rail operators Self-Assessment

Self-assessment is the starting point of the CPD cycle and is essential for operators to be able to target their learning and development. **Plan**



From your self-assessment, identify specific competencies that you want to focus on. Consider what your goal is for a set period of time and be clear about what actions you need to take in order to achieve that. Set clear milestones and outcomes so that you can track your progress.

Act

Development activities can be structured or unstructured and can vary widely in the time and resources needed. Some activities you can do by yourself such as reading, and some require external input.

Reflect

Reflecting on your learning will help you to develop your self-awareness and critical thinking and it will improve communication of ideas.

Apply and share

Consider whether you can implement any changes or strengthen any existing processes. Who will be impacted by this, yourself or your team, or perhaps the wider organisation or the entire railway system?

Review

Reviewing refers to both the review of any changes you have made as well as the targets that you set for your personal development.

Plan in regular time to review what you have done. What changes have you made and how did you manage them? What learning?

Recording CPD

There are many ways of recording CPD. It can be as simple as a using a word document or spreadsheet. Use a method that works for you, that enables you to plan and reflect effectively. It may be useful for you to record your CDP in a way that allows you to share with your employer in personal reviews.

5.2 Refresher classes in other modes of transport https://platina3.eu/

Aviation

At international level, the International Civil Aviation Organization (ICAO) is responsible for setting minimum aviation safety standards, but these are not binding and so compliance is mainly dependent on the States parties' goodwill. The common civil aviation safety rules are based on the standards and recommendations adopted by the ICAO but are often more stringent. The creation of a European internal market in aviation has meant that all passengers should benefit from the same, high level of safety wherever they fly in the Union. National rules have thus given way to common binding rules at EU level. In the same way, national regulatory authorities have been replaced by an EU-level mechanism linking national civil aviation authorities, the European Commission and the European Aviation Safety Agency (EASA). According to the EASA regulation, "each flight crew member shall be periodically checked to demonstrate competence in carrying out normal, abnormal and emergency procedures". Desk study from the aviation sector indicates that in aviation education & training emphasis has moved to nontechnical skills. This was driven by enhancement of systems onboard. This could be a valuable insight for the





IWT sector which is confronted with a similar trend in electronical systems on-board. Aviation is one of the most regulated industries in the world. Pilots are among the very few professionals that are required to do repeated training as well as complete regular and rigorous examinations to maintain the existing skills and develop new ones. However, it is important to note that not only the management level, but the entire crew is subject to mandatory periodically trainings.

Task Based Training	Competency Based Training & Assessment
Focus on technical skills	Focus on technical and non-technical
	skills (competencies)
Measured by deviation from technical	Measured by observing & comparing
limits	behaviours with a behavioural standard
Output and analysis of deficient	Root cause analysis of deficient
performance	performance
Retroactive, master a known inventory of	Pro-active master a set of competencies
tasks	to prepare
	for the unforeseen

The pilot competences The International Air Transport Association (IATA) recommends following the latest ICAO provisions for competency-based training and assessment. Approved training organizations should use 9 pilot competencies (8 pilot competencies as proposed by ICAO and the competency "Application of Knowledge" as proposed by EASA for EBT (Evidence-Based Training).

The 9 pilot competences are:

PC 0 Application of Knowledge

PC 1 Application of Procedures and Compliance with Regulations

PC 2 Communication

PC 3 Airplane Flight Path Management, automation

PC 4 Airplane Flight Path Management, manual control

PC 5 Leadership and Teamwork

PC 6 Problem Solving and Decision Making

PC 7 Situation Awareness and Management of Information PC 8 Workload Management

Distinguished between technical and non-technical, the pilot competencies are:

Technical Competencies	Non-Technical Competencies
APK – Application of Procedures and	COM – Communication
Compliance with Regulations	
FPA -Flight Path Management,	LTW – Leadership & Teamwork
Automation	
FPM – Flight Path Management, Manual	PSD – Problem solving & Decision
Control	making
KNO – Application of Knowledge	SAW – Situation Awareness &
	Management of Information
	WLM – Workload management

Recommendations to mitigate the consequences of automation dependency





Concerns over the human factor have led to focus and reliance on automation. As a consequence, a lack of practice might occur and potentially a degradation of pilot skills for manual flight control.

Therefore, following recommendations have been listed:

- Up to date skills are essential for confidence and competence
- Standards and guidance should evolve to ensure training programs align with technological advancements.

- Further study of issues surrounding automation, including assessing the degree to which over reliance on automation may be occurring.

-Variation in approach between states in regulation and guidance adds extra complexity and forms potential risk

- Multilateral cooperation for certification.

At the national and regional levels, States may benefit from bilateral or multilateral cooperation, to identify automation dependency hazards and mitigate related operational safety risks.

Prevention of automation paralysis

It needs to be acknowledged and second to address individual differences in information processing and decision making both under routine and non-routine situations. Adapt automation to cater to the needs, limitations and capabilities of different pilots regardless of their experience and varied training standards. "The pilot doesn't need to understand the full complexity of the aircraft, the pilot just has to know how to react if a system fails".

Droning

Droning is related to aviation but is a little different mode of transport. For defence purposes both droning and remote piloting have been around for a long time. Only since the beginning of the century drones became mainstream for the wider public and commercial purposes. In 2019 the European Commission established common European regulation on drones to ensure drone operations across Europe are safe and secure. These common rules, in force since 2020, help drone operators, whether professional or recreational, to have a clear understanding of what is allowed or not. At the same time, it enables them to operate across borders. The EU roles on droning make an absolute distinguishment between the operator (registered as responsible for the drone) and the (remote) pilot who most have undergone appropriate training and licensing. Competences distinguished by training institutes are: accuracy, analytical skills, courage, innovation, independency, result orientation and autonomy. This emphasis is in line with the trend in aviation towards more non-technical competences relevant in training programmes.

Rail

The so-called Rail Directive 2007/59/ on the certification of train drivers operating locomotives and trains on the railway system in the Community, states in its article 23.8: 8. "A process of continuous training shall be set up in order to ensure that staff competences are maintained, in accordance with point 2(e) of Annex III to Directive 2004/49/EC." The point 2 of this directive 2004/49/EC (Railway Safety Directive) states as follow: "2. Basic elements of the safety management system are: (...)

(d) procedures and methods for carrying out risk evaluation and implementing risk control measures whenever a

change of the operating conditions or new material imposes new risks on the infrastructure or on operations;

(e) provision of programmes for training of staff and systems to ensure that the staff's competence is maintained, and tasks carried out accordingly." However, this



regulation could progress in the following months. A call for evidence "digitalization as a driver" has been launched in January 2022 by the Commission for a proposal of a new regulation The EU's transport policy includes a harmonised certification scheme for train drivers that allows them, on the basis of certain minimum requirements, to easily transfer between EU countries and/or railway companies. Following an evaluation, this initiative seeks to improve the scheme by ensuring that it: - is future-proof - keeps pace with technological progress & increased demand for international journeys - makes the train-driving profession more diverse & attractive to young people. Public consultation started in the first quarter 2022, and Commission adoption is planned for the fourth quarter 2022.

Road

For the road sector, directive 2003/59/EC of the European Parliament and of the Council of 15 July 2003 on the initial gualification and periodic training of drivers of certain road vehicles for the carriage of goods or passengers states in its article 3.1. "The activity of driving as defined in Article 1 shall be subject to a compulsory initial qualification and compulsory periodic training. To this end Member States shall provide for: (a) a system of initial qualification (...) (b) a system of periodic training In accordance with section 4 of Annex I, periodic training involves compulsory course attendance. It shall be certified by a CPC as provided for in Article 8(1)" With regard to the section 4 of this Annex I, "Compulsory periodic training", it provides in its article 3(1)(b) that "compulsory periodic training courses must be organised by an approved training centre. Their duration must be of 35 hours every five years, given in periods of at least seven hours. Such periodic training may be provided, in part, on top of-the-range simulators". It is also important to note that the Annex I of the Directive on the initial qualification and periodic training of drivers now explicitly includes a new mandatory objective for initial training (point 1.3) which reads: "ability to optimize fuel consumption: optimisation of fuel consumption by applying know-how as regards points 1.1 and 1.2, importance of anticipating traffic flow, appropriate distance to other vehicles and use of the vehicle's momentum, steady speed, smooth driving style and appropriate tyre pressure, and familiarity with intelligent transport systems that improve driving efficiency and assist in route planning".

Maritime

In the maritime sector, directive 94/58/EC of 22 November 1994 on the minimum level of training of seafarers gave the 1978 STCW Convention the full force of EU law. The convention underwent significant revisions in 1995, and again in 2010, entailing corresponding revisions to the EU directive, the most recent version of which is Directive 2012/35/EU of 21 November 2012. It outlines the rules on training and competency standards for seafarer certification, as well as regulated specialist training. Thedirective also deals with Member States' requirements for seafarer training, communication between crew members, and the verification of crew members' certificates (port State control). It also includes stronger measures to combat fraudulent certification, higher standards for physical aptitude and updated safety training.

Article 12 provides the applicable regulation regarding the revalidation of certificates as follow:

1. Every master, officer and radio operator holding a certificate issued or recognised under any chapter of Annex I other than Chapter VI who is serving at sea or intends to return to sea after a period ashore shall, in order to continue to qualify for seagoing service, be required at intervals not exceeding five years:

(a)to meet the standards of medical fitness prescribed by Article 11; and

(b) to establish continued professional competence in accordance with section A-I/11 of the STCWCode





2. Every master, officer and radio operator shall, for continuing seagoing service on board ships for which special training requirements have been internationally agreed upon, successfully complete approved relevant training.

3. Each Member State shall compare the standards of competence which are required of candidates for certificates issued before 1 February 2002 with those specified for the appropriate certificate in Part A of the STCW Code, and shall determine the need to require the holders of such certificates to undergo appropriate refresher and updating training or assessment.

Refresher and updating courses shall be approved and include changes in relevant national and international regulations concerning the safety of life at sea and the protection of the marine environment and take account of any updating of the standard of competency concerned.

4. Each Member State shall, in consultation with those concerned, formulate or promote the formulation of a structure of refresher and updating courses as provided for in section A-I/11 of the STCW Code.

5. For the purpose of updating the knowledge of masters, officers and radio operators, each Member State shall ensure that the texts of recent changes in national and international regulations concerning the safety of life at sea and the protection of the marine environment are made available to ships entitled to fly its flag.

Ad 3. For example the Basic Training (STCW) Refresher is for all who already have an Basic STCW certificate and must take the compulsory refresher course (once every 5 years). The training consists of refreshing the Personal Survival Techniques, Elementary First Aid, Personal Safety and Social Responsibilities, and Fire Prevention and Fire Fighting module. Until January 1, 2017, seafarers may provide evidence of having maintained the minimum of competence in basic training by documenting 12 months of service within the last 5 years. After January 1, 2017, seafarers must provide evidence of maintaining the standards of competence in basic training every 5 years. Also in relation to Part B of the STCW, there are refresher courses. They are not mandatory, though based on the requirements of the shipping line, or insurance companies, seafarers may be required to take the refreshers courses.

Ad 5. The comparison with Dynamic Positioning (DP) certificates may be relevant. There are several model courses. DP basic and advanced. After five years, a DP certificate needs to be renewed. For a renewal or revalidation of an existing certificate, 150 DP sea time days are required. If sufficient days are not obtained, a revalidation course (kind of refresher course) can be taken to extend the current certificate for another five years (if attending for the first time). Potentially a similar model could be in place for RCCO. For decades, refresher classes have always been part of the debate for all the other modes of transport. This overview of the current regulation of refresher classes in aviation, drones, rails, road and maritime sectors highlights that gualified work force will be prepared to carry out tasks for modern and more automated operations. Except for the droning sector regulation, which is relatively new, a system of periodic training is provided for each mode of transport. In terms of qualified work force who is prepared to carry out tasks for modern and more automated vessel operation, IWT may fall behind, if refresher classes were mandatory in other modes of transport whereas they are not in IWT, if IWT does not seize the opportunities that exist in non-mandatory refresher classes.





ANNEX 1

BIBLIOGRAPHY

- 1. <u>https://commons.wmu.se/cgi/viewcontent.cgi?article=1002&context</u> <u>=imla2021</u>
- 2. <u>https://www.simplyacademy.com/purpose-of-lifelong-learning/</u>
- 3. <u>https://ec.europa.eu/social/skills-agenda</u>
- 4. <u>https://www.imo.org/en/OurWork/TechnicalCooperation/Consultanc</u> ies
- 5. <u>https://education.ec.europa.eu/about-eea/strategic-framework</u>
- 6. https://ec.europa.eu/education/sites/education/files/recommendati on-key-competences-lifelong-learning.pdf
- 7. <u>https://www.eda.admin.ch/agenda2030/en/home/agenda-2030/die-</u> <u>17-ziele-fuer-eine- nachhaltige-entwicklung.html</u>
- 8. <u>https://eur-lex.europa.eu/legal-</u> content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)
- 9. http://eacea.ec.europa.eu/LLp/project_reports/documents/ka4/201 1/final/KA4-KA4MP-518911-VSPORTplus.pdf
- 10. <u>https://epthinktank.eu/2013/10/02/european-cooperation-in-vocational-education-and-training-europe-2020-strategy/</u>
- 11. <u>https://iseecolor.ning.com/group/distancelearningeducationtraining</u> <u>dlet</u>
- 12. <u>https://ec.europa.eu/eurostat/statistics-</u> <u>explained/index.php/Education_and_training_statistics_at_regional_</u> <u>level</u>
- 13. http://www.imo.org/en/MediaCentre/PressBriefings/Pages/37-A30.as
- 14. <u>http://oidel.org/doc/Doc_colonn_droite_defaultpage/ET%202020%2</u> <u>ORESUME.pdf</u>
- 15. <u>https://documents.pub/document/allianz-global-corporate-specialty-safety-and-shipping-global- corporate-specialty.html</u>
- 16. <u>https://sdgs.un.org/un-system-sdg-implementation/international-telecommunication-union-itu-24522</u>
- 17. http://revistacalitateavietii.ro/2011/CV-4-2011/01.pdf
- 18. <u>http://ec.europa.eu/dgs/education_culture/repository/education/lib</u> <u>rary/study/2013/prison_en.pdf</u>
- 19. <u>https://platina3.eu/</u>





ANNEX 2

ABBREVIATIONS

- AIS Automatic Identification System
- BRM Bridge Resource Management
- CBT Computer Based Training
- CPD Continuing Professional Development
- ECDIS Radar, Electronic Chart Display and Information System
- EEA European Education Area
- ET 2010 Education and Training 2010
- ET 2020 Education and Training 2020
- EU European Union

EU Directive 2017/2397 - Directive (EU) 2017/2397 of the European Parliament and of the Council of 12 December 2017 on the recognition of professional qualifications in inland navigation and repealing Council Directives 91/672/EEC and 96/50/EC

- ICT Communication Technology
- ILO International Labour Organization
- IMarEST Institute of Marine Engineering, Science and Technology
- IMO International Maritime Organization
- ISM Code International Safety Management Code
- IT Information Technology
- ITV Interview Television
- LANs Local Area Networks
- LLL Lifelong Learning
- LNG Liquefied Natural Gas
- LPG Liquefied Petroleum Gas
- MDGs Millennium Development Goals
- PDP Personal Development Plan
- SDGs Sustainable Development Goals





SMART - Specific, measurable, achievable, relevant, and time-bound (related to objectives)

STCW-78/95 Convention - the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended in 1995

USDLA - United States Distance Learning Association

VR - Virtual Reality

- WANs Wide Area Networks
- www World Wide Web