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THE EFFECTIVENESS OF BLENDED LEARNING IN MARINE SKILLS COURSES

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ABSTRACT

Since COVID-19 hit the world, Marine Colleges and schools in the world have experienced severe disruption. The challenge that arises is how to maintain the quality of education and training while still upholding the Knowledge, Understanding and Proficiency as required in the Standards of Training, Certification and Watchkeeping for Seafarers (STCW). To solve this problem, the IMO through a Circular in 2020 requires each member state to develop specific tips on dealing with the problem. Blended Learning is one of the special tips or solutions to solve it. The purpose of this study is to explore the implementation of blended learning in Nautical Astronomy courses, develop appropriate blended methods and see the effectiveness of the implementation of blended learning. The method used is participatory research of actions with quantitative descriptive analysis. The subjects used were 27 students of the Diploma III Study Program in Nautical Studies with one lecturer who taught the course. The results showed that blended learning is very good to be implemented with criteria including: 1) it needs the readiness of planning and a mature learning system; 2) development of complete and engaging blended learning content according to bloom verbs; 3) in-depth and routine evaluation and supervision is carried out during the learning process. Blended learning in the Nautical Astronomy course has the advantage of how the material preparation is presented very well. However, there are still various weaknesses including the adaptation process of learning delivery between lecturers and students because blended-based lectures in this course have never been carried out before.

Keywords: Blended Learning, Nautical Astronomy, IMO, STCW.

1. Introduction

The pandemic has opened up the view that seafarers provide a very crucial service as they ensure trade in essential goods such as medical and food supplies and they keep the supply chain running through commodities transported by ship. In the Maritime Safety Committee session 102, agenda 22 (MSC 102/INF.25) which was held on 14 October 2020 with the title "The Impact of COVID-19 on Maritime Education and Training" concluded 2 things namely the administrations of member countries shall:

1. Develop guidance on “temporary measures” that can be implemented and implemented for the Administration to mitigate the effects of COVID-19 in a sailing school, such as making flexibility in terms of prala time (shortening practice time on board, recognition of simulator practicum hours in lieu of practical work experience on board), requirements for updating, revalidating and enhancing seafarers' competencies as well as revalidation under the STCW convention;

2. Considering the development of guidelines on distance learning (PJJ) and the validation of schools that offer maritime courses according to the requirements of the STCW convention which are delivered online because this trend will become a "new normal" during and after the COVID-19 pandemic.

The guidelines on distance learning (PJJ) as mentioned in point 2 above were followed up by the Human Resources Development Agency of the Ministry of Transportation as the supervisor of maritime tertiary institutions in Indonesia by issuing Guidelines for the Prevention and Control of COVID-19 in On Campus Teaching and Learning Activities. The guideline contains directions for each lecturer to design and plan online learning.

The readiness of planning and a mature learning system by lecturers and tertiary institutions is very

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crucial in supporting the achievement of competency by each student as expected and in accordance with international standards. The planning begins with sorting out and selecting what blended learning methods are appropriate according to the bloom taxonomy. STCW through IMO Model Course 7.03 has provided guidance in achieving learning that is at least acceptable according to international standards. Meanwhile, through the IMO Model Course, lecturers can easily identify key verbs which are then formulated into a mature lesson plan through the selection of a Learning Management System and other available learning application platforms to create an ideal blended learning environment.

Based on the results of observations on students of the Barombong Shipping Polytechnic, DIII Nautical Studies Study Program, semester IV of the astronomy navigation course, there were students who did not focus on learning, the low self-reliance of students' learning and the ability to think critically made learning not conducive so that students' interest in learning decreased. Moreover, knowing that in practice astronomical navigation is a lesson that today is starting to be less attractive to sailors due to the rapid progress of shipping science and technology.

2. Literature review

Blended learning or a combination of face-to-face (classical) learning and online learning according to Thorne in (Sjukur, 2012: 370) explains that blended learning is a learning activity that integrates or combines innovation and technology with conventional learning interactions and participation. This is in accordance with the opinion of Torraro (2007) which explains that blended learning is learning that combines face-to-face learning (vis-a-vis) and electronic learning (e-learning). E-learning can train students to learn independently in accordance with the ZPD (Zone Proximal Development) concept by Lev Vygotsky, so that they can make themselves interested in learning which is bridged by social interaction in utilizing social networks and guidance from More Knowledgeable Other in this case the lecturer alone. In addition, students can strengthen their own knowledge by finding the knowledge they need themselves through internet facilities. Face-to-face meetings are also needed so that lecturers and students get closer and know each other psychologically to foster a sense of calm and certainty about competence achievement. Thus, blended learning is conventional and online learning combined with the aim that learning and competency indicators provided by lecturers can be achieved. Also, the use of e-learning can provide flexibility, interactivity, speed and visualization through the various advantages of each technology used.

Interest in learning becomes very crucial in the learning process, because interest is an internal factor that greatly influences learning. Slameto (2010: 180) explains that interest is something that tends to remain in a person to pay attention to an activity he likes so that his attention will occur continuously, feeling satisfied and interested in a thing or activity without any orders or coercion from others. In the learning and teaching process, when students do not have an interest in learning, it will certainly create an atmosphere that is not conducive.

According to Qomariah and I Ketut RS (2016: 42), interest in learning is a feeling of interest or liking from students towards lessons so that they can encourage learning and mastering knowledge and experience shown through participation and activeness in seeking knowledge and experience. Therefore, interest in learning will encourage students to study even better because they are interested and like the subject so that they will have the initiative to continue learning and will find it very useful for them.

Djamarah (2011) states that learning and teaching activities will run effectively and efficiently if students have a high interest in learning. Indicators of interest in learning include, 1) Feelings of pleasure in an activity without coercion to learn it, 2) Student interest in the activity or it can be an experience stimulated by the activity itself, 3) Student attention by concentrating or doing activities on certain observations, and 4) Student involvement in an object that results in that person being happy to learn and feeling interested in doing or working on the given learning activities.

3. Method

This research is a descriptive research to describe phenomena or events systematically according to what is in the field. The data used in this research is descriptive qualitative data. The research location is in the Diploma III Study Program in Nautical Studies at the Barombong Shipping Polytechnic with a population of 27 semester IV students.

The collection of data in this study was a questionnaire to obtain data on student interest in learning, interviews and observations. The results of student interest in learning use the percentage formula from the results of data collection using a

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questionnaire. The questionnaire instrument for learning interest uses a valid questionnaire through expert judgment and test questions using a Likert scale. Data collection techniques using triangulation, namely questionnaires, interviews and observations.

Ridwan (2006: 88) explains the score interpretation criteria for the Level of Achievement of Respondents as follows:

Table 1. Scale Range of Respondents' Achievement Levels

No	Angka	Keterangan
1	00% - 20%	Sangat lemah
2	21% - 40%	Lemah
3	41% - 60%	Cukup
4	61% - 80%	Kuat
5	81% - 100%	Sangat kuat

Sumber: (Ridwan, 2006:88)

1. Activity Steps

In developing and implementing the study of astronomy navigation courses with LMS-based blended learning there are several activities that must be carried out. The steps for blended learning activities consist of: 1) Need Assessment (Needs Analysis), needs analysis is important in the process of developing an online learning system (blended learning) in astronomy navigation courses; 2) Planning (planning); 3) Developing (Making and Development); 4) Implementation (Implementation).

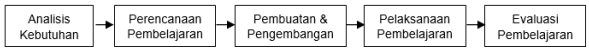

Figure 1. Activity process flow

2. Needs Analysis

Needs analysis is carried out by conducting a pre-test or student's initial ability and comprehensively describing the objectives to be achieved in accordance with IMO Model Course 7.03. The pre-test was carried out with a population of 27 semester IV students at the Diploma III Study Program in Nautical Studies at the Barombong Shipping Polytechnic.

3. Learning Planning

Learning objectives are formulated after being identified based on steps according to indicators in IMO Model Course 7.03 which includes cognitive, affective and psychomotor domains. These indicators have their respective sub-competencies and are grouped into 3 main functions, namely function I Navigation, function II Load Handling & Management and function III Control of ship operations and caring for the crew on board. The navigational astronomy course is one of the subjects included in the function group I of Navigation.

4. Manufacturing & Development

The development stage is the stage where the availability of types of technology in the learning environment will be studied so that the types of technology that exist and are currently available are known and then used as solutions to overcome existing learning problems. In addition, it will be seen how close the available technology is to students who will use the technology. The things that need to be paid attention to are the type of technology in question, namely the type of technology that exists as a reference or that supports the process of achieving learning objectives, namely technology that can be used in the learning process (practical and easy to use). Therefore, the results of this analysis are used to determine the right media solution to be used in overcoming problems in learning and in addition, can determine the skills that are important for teachers to master before carrying out learning.

5. Implementation and Evaluation of Learning

The research was carried out in the study of astronomy navigation courses with blended learning based on the Learning Management System (LMS) and evaluation based on interviews and questionnaires distributed.

3. Results/findings and discussion

3.1 Needs Analysis

In the development and implementation of learning of astronomical navigation courses with Learning Management System (LMS)-based blended learning, there are several activities that must be carried out. Needs analysis is an important thing in the process of developing an online learning system (blended learning) in astronomy navigation courses. So it was determined that the blended learning system with the Lab Rotation method was the best.

Soebekti (2012) states that astronomy is a science that studies celestial / celestial bodies in general, and which is divided into a theory section and a practical section while "Falak" means "Orbit" or "Track" of celestial bodies, so that the Science of Astronomy is the science that studies the trajectories of celestial bodies – especially the earth – the moon and the sun – in their respective orbits with the aim of knowing the positions of celestial bodies between one another. From this

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understanding of astronomical navigation, it can be concluded that in fact this course is a very conventional course.
Based on this definition, several LMS can be considered, including:

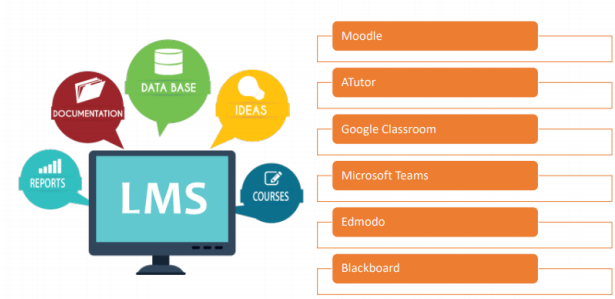

Figure 2. LMS being considered (Mustofa, 2020)

LMS has various forms and one that is often used is Moodle (Modular Object-Oriented Dynamic Learning Environment). .Moodle also allows teachers to provide subject matter, explain, answer questions and assess student learning assignments easily and quickly (Hunt, 2010). Moreover, in conventional learning, where the teacher still uses face-to-face routines, assignments are done using paper media so that it is not uncommon for students to get lots of paper ranging from subject matter to assignments that need to be done. This way of teaching is believed to have a pressure effect on students. Agina (2013) emphasized that teaching methods that burden students with frustration make students not understand the content of the discussion and are not interested in studying the material presented by the lecturer. Of course this is a problem in achieving learning objectives.

Therefore, Hunt (2010) states that teachers who use LMS, especially Moodle, will provide an added value in managing learning, namely flexibility. Teachers can design learning outside the classroom, without using a lot of paper as learning media and also add interesting discussion content through links with other learning sites that attract attention.

On this basis, Moodle was chosen as the LMS for the Astronautical Naval Science course. There are several display options for activities in the Moodle LMS, including assignments, attendance, chat (chat/discussion), choice (multiple choice questions), database (data center), lesson (instructional lessons) quiz (questions short verbal), surveys (surveys), polls (opinions) and others such as files, books, pages and urls.

Needs analysis is carried out by conducting a pre-test or student's initial ability and comprehensively describing the objectives to be achieved in accordance with IMO Model Course 7.03. The pre-test was carried out with a population of 27 semester IV students at the Diploma III Study Program in Nautical Studies at the Barombong Shipping Polytechnic.

2. Planning Learning According to Bloom & IMO Model Course Verbs 7.03

In accordance with the study from IMO Model Course 7.03, the verb bloom is obtained as an example:

After conducting a study like the example above, it will then be continued until all sub-cpmk are identified according to the subject matter of "Celestial Navigation", while the data obtained and classified include:

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COMPETENCE 1.1	Plan and Conduct a Passage and Determine Position

1.1.1 CELESTIAL NAVIGATION

Textbooks: T8, T9

Teaching aids: A1, A4, A13, A14, A17, A21, A23, A24, A25, A26

Required performance:

1.1 Solar system (4 hours)

- describes the composition and dimensions of the solar system
- names inferior and superior planets
- describes the earth's elliptical orbit, and states approximate perihelion and aphelion distances and dates
- explains the eccentricity of the earth's orbit
- describes the inclination of the earth's axis to the plane of the orbit and the stability of the axis (ignoring precession) and its effect on the seasons
- states the dates of the solstices and equinoxes
- explains the concept of the earth's axial rotation giving day and night
- explains the varying length of daylight through the year
- explains daylight and darkness conditions in various latitudes at the solstices and equinoxes
- describes the significance of the tropics of Cancer and Capricorn and of the Arctic and Antarctic Circles

Figure 3. Snippet of IMO Model Course 7.03 – Detailed Teaching Syllabus

Table 2. Identification and classification of Sub-CPMK indicators according to the cognitive domain.

Mata Kuliah	CPMK	Kode Sub CPMK	Sub CPMK	TINGKAT KOGNITIF						Indikator / Total
				C1	C2	C3	C4	C5	C6	
Ilmu Pelayaran Astronomi	Plan & Conduct Navigation - Celestial Navigation	Sub CPMK 1	Solar System	2	8					10
		Sub CPMK 2	Celestial Sphere and Equinoctial System of Coordinates	2	3		1			6
		Sub CPMK 3	Hour Angle	2	2	1				5
		Sub CPMK 4	Daily Motion and Horizontal System of Coordinates	8	4	1				13
		Sub CPMK 5	Sextant and Altitude Corrections	4	3	10				17
		Sub CPMK 6	Amplitude	1		2	1			4
		Sub CPMK 7	Time and Equation of Time	3	4	3				10
		Sub CPMK 8	Nautical Almanac		3	3	2			8
		Sub CPMK 9	Latitude by Meridian Altitude		4	4				8
		Sub CPMK 10	Pole Star Observation	3	3	1	1			8
		Sub CPMK 11	Position Fixing		1	4		1	1	7
			TOTAL	25	35	29	5	1	1	96
			PERSENTASE	25	36	29	4	1	1	

Sumber: data yang diolah

The table above shows that cognitive depth and study material from astronomy navigation courses are more dominant in cognitive domains at levels 1, 2 and 3, namely remembering, understanding and applying. Particularly for levels 3, 4, 5 and 6 in the astronomical navigation course, it will be carried out face-to-face in the laboratory.

From the results of the identification of the verbs as shown in Figure 3 and the depth of the cognitive domain as shown in Table 2, then according to the best practice (good practice) carried out by Andrew Churces (2009) a good method of using LMS is determined, including:

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Table 3. The relationship between Bloom's verbs in the cognitive domain and learning activities developed in the LMS

Ranah Kognitif	Kata Kerja Bloom	Aktivitas Pembelajaran Pada LMS Menurut Andrew Churces (2009)
1 = Mengingat	Names, states	Online quizzes, Q&A discussion forums, flash cards, searching for facts (googling)
2 = Memahami	Describes, explain	Commenting, discussion forums, learning journals and annotating, comparing googling data / wikipedia.

Sumber: data yang diolah

3. Implementation and Evaluation of Learning

The implementation of learning is carried out according to a modified schedule where during theoretical learning with cognitive levels only up to level 2 in Moodle LMS. The LMS of the Barombong Shipping Polytechnic can be seen at the link https://elearning.poltekpelbarombong.ac.id/course/view.php?id=249. However, from one sample of marine education and training institutions it can be seen that what is included in the LMS is only limited to material taken from textbooks and assignments and practice questions so that it can be one of the main factors in reducing student interest in learning. The Moodle LMS itself has many options that can be used to meet students' cognitive levels according to the Model Course as shown below:

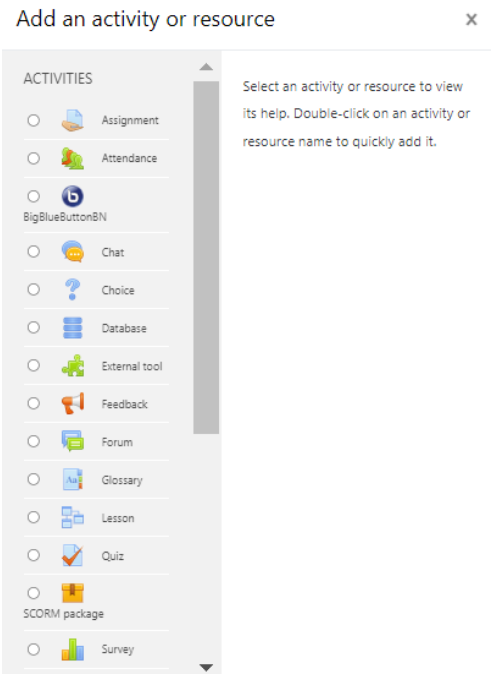

Figure 4. Snippet of the Barombong Poltekpel LMS – Incorporating Learning Activities

Figure 5. Footage of the Barombong Poltekpel LMS

Figure 6. Snippet of the Barombong Poltekpel LMS – Courses and Lecture Materials

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Data on student interest in learning were obtained from the results of an interest in learning questionnaire given to students before and after learning by using blended learning through the LMS at the Barombong Shipping Polytechnic. Based on the results of data analysis, it was found that the average student interest before learning blended learning was 65.70%. While the average score of interest in learning after being given learning by utilizing blended learning is 85.70%. Thus, there is an average increase in student learning interest of 20.00%. The following describes a description of student interest in learning before and after learning using blended learning.

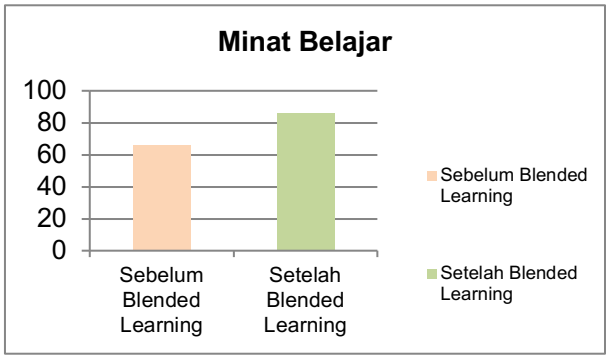

Figure 7. Student learning interest

The following is an interpretation of each indicator of student learning interest using blended learning.

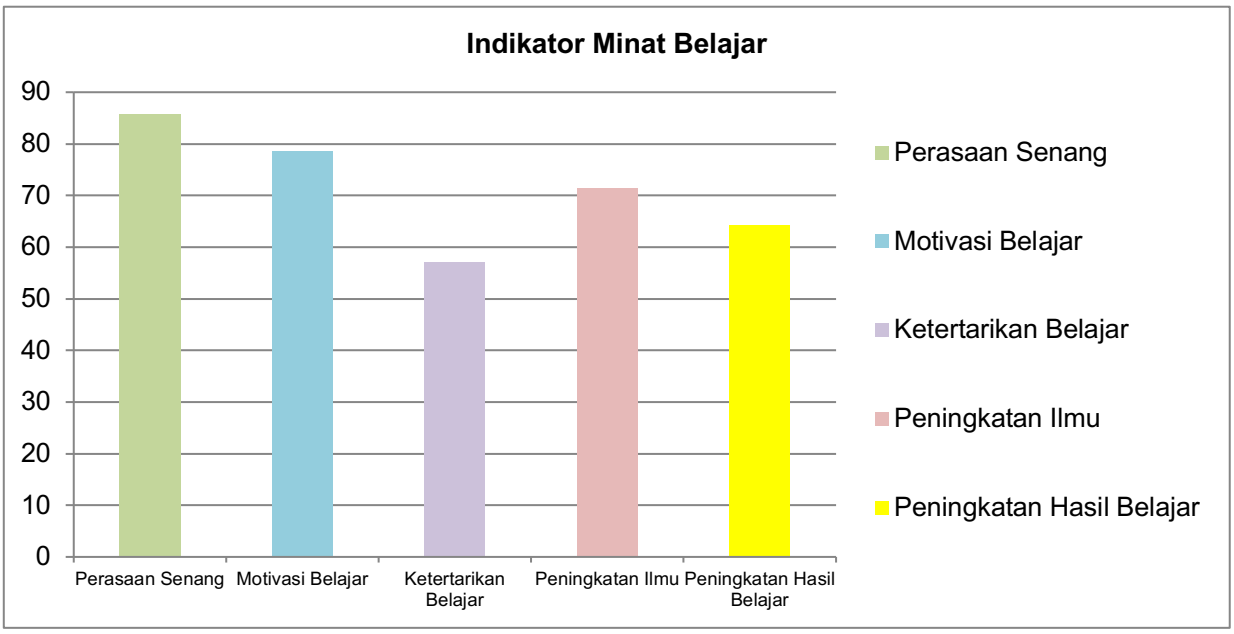

Figure 8. Student learning interest based on indicators

Based on the table above, it can be seen that the results indicator for the percentage of feelings of pleasure is 85.70%, attention or motivation to learn is 78.60%, learning interest is 57.10%, knowledge improvement is 71.4% and learning outcomes is 64.30% . The biggest indicator is students' feelings of pleasure in learning by using blended learning. This shows that a person's interest in learning will be awakened or formed if he likes an activity he is engaged in with great pleasure and without coercion from others so that he is comfortable when learning.

Indicators of attention or motivation to learn also get a large percentage value of 78.60%. This means that when students feel happy, they will pay more attention to learning, especially with the demands to do assignments online.

There are interesting things from the indicators above where interest in learning gets the lowest percentage. Interest in learning gets a value of 57.10%. This shows that the process of switching from offline to online classes is very influential. Therefore, time plays an important role here because the necessary adaptations cannot be underestimated. There are several ways such as scaffolding or choosing a student who has the intellectual advantage of being class leader or group leader so that he can guide and encourage other students to complete assignments and or have discussions where the lecturer becomes the facilitator.

4. Conclusion

The conclusion of the above study is a derivative of the Maritime Safety Committee session 102, agenda 22 (MSC 102/INF.25) which was held on 14 October 2020 with the title "The Impact of COVID-19 on Maritime Education and Training ". Everything that was recommended at the meeting was "temporary" in nature, but actually if we look at the effects of the COVID-19 pandemic from a more distant perspective, all changes from LMS and distance learning are a future need. Can you imagine a magnificent shipping institute with dormitories and office buildings as well as expensive simulators being deserted due to changes in the learning and teaching process. It is said that now is the 4.0 era and even the 5.0 era is in sight, so it is appropriate for us to reflect for a moment on the strategic steps that must be taken by decision makers related to preparing superior Maritime HR, competitive and utilizing artificial intelligence, cloud computing, internet of thing and all other basic things that must be immediately "established" "as soon as possible" because if this is not done, it will be very difficult to realize the vision of INDONESIA GOLD in 2045 where there is a demographic bonus (population of productive age is abundant) and even if we are willing to are people of productive age just spectators? Being a spectator due to not being able to utilize technology.

When viewed from interest and motivation to learn, it needs to be studied from an emotional perspective where according to Mlodinow (2022) there is a very fundamental difference between wanting something and getting something so that we can separate and direct an ideal learning atmosphere to increase interest and increase student learning motivation. The suggestion is that if we discuss more deeply about how learning can be fully implemented in the network (online) it is necessary to consider investing fully in learning technology such as e-simulation for practical learning while for theoretical learning in order to further enhance learning activities in accordance with the good practices of Andrew Churches.

E-simulation is a learning process using electronic methods using the cloud which was developed to work simultaneously with the e-learning platform of each tertiary institution. To address the delivery method constraints as described in the background above, third parties such as Wartsila developed online-based learning systems and methods with cloud e-simulation supporting infrastructure. Basically the e-simulation concept is a very innovative idea from Wartsila who at the same time actually developed it to face the Maritime Autonomous Surface Ship (MASS) era. Wartsila offers micro-learning, enabling education to be carried out anytime and from anywhere and on-demand training as well as e-learning supported by remote tutoring. They offer video game-like training, taken from real-life situations and reinvented by making them more engaging for individual learning or for skill building and teamwork in multi-role mode. In the future, this technology with new content will make it possible to reach seafarers on every platform, with options for virtual reality, augmented reality and mixed reality.

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