An overview of Maritime English teaching and its principles, with a focus on practical applications and best practices online

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Abstract. The paper is devoted to using innovative technologies in the professional training of future ship engineers. It highlights the need for tutors to make lessons interesting and exciting and to create a situation where every cadet can be active. The research emphasises that the main target of maritime education today is not just to accumulate knowledge and skills but to prepare cadets as independent subjects of educational activity who can learn and upgrade their knowledge. The article describes the benefits of digital technologies for online maritime education and training, including various videoconference services. It also discusses the psychological theory of learning based on the psychology of human relationships, which is crucial to interactive learning technologies. The paper concludes by describing various technologies for information visualisation, such as cloud technologies and gamification, and recommends tools like Mentimeter, Aha Slides, and Poll Everywhere for collaborative work and knowledge exchange. The research also suggests that using whiteboard resources during Maritime English lessons can serve cadets as a visual platform for displaying essential Maritime English vocabulary, supporting interactive discussions, conducting simulated exercises and role-playing scenarios.

Keywords: seafarers · Maritime English · digitalization · Moodle · e-learning

1 Introduction

The world of education is undergoing a radical transformation, driven by the rapid advancements in technology and the increasing availability of information. Students today are no longer passive recipients of knowledge but active and engaged learners who seek to explore and discover new things. How can teachers keep up with this change and provide students with effective and meaningful

learning experiences? This is the challenge teachers face in the 21st century, especially in maritime education and training (MET). Every modern teacher dreams that students would work voluntarily and creatively at their maximum level during the lesson [8].

The field of MET is influenced by the new organisation of society and the new attitude to life, which makes new demands on educational institutions. For example, the globalised and interconnected world requires students to develop intercultural and communication skills and the ability to work in teams and solve problems. The fast-changing and dynamic maritime industry requires students to be adaptable and flexible and constantly update and upgrade their knowledge and skills. The main target of education is not only to accumulate a certain amount of knowledge and skills for the student but also to prepare them as an independent subject of educational activity, the education of a creative, active person who knows how to learn and upgrade his/her knowledge.

One of the ways to achieve this goal is to use modern technologies, particularly information visualisation tools, in the context of Maritime English teaching. Information visualisation tools are visual aids or techniques that help to present, organise, and analyse information clearly and attractively. They can enhance the teaching and learning process by making it more interactive, engaging, and fun. Our research hypothesises that training future ship engineers in learning Maritime English will be productive if the following information visualisation tools are used: video conference services, online surveys, whiteboards, and gamification. The article contains information about using Zoom, Skype, Google Meet, Webex, BigBlueButton video conference platforms, Mentimeter, Aha Slides, Poll Everywhere, Slido online surveys, Miro and Whiteboard.fi platforms, and gamification elements.

The subject of our research is the professional training of future ship engineers in English. This topic is necessary and relevant for the current and future development of the maritime industry and education. How can we use modern technologies to enhance the quality and effectiveness of Maritime English teaching and learning? How can we motivate and inspire our students to become proficient and confident users of Maritime English? How can we prepare our students for the challenges and opportunities that await them in their future careers? These are some of the questions that we aim to answer in this paper. Our paper will showcase the diverse and innovative ways modern technologies can be employed to enhance the teaching and learning experience in Maritime English.

2 Literature review

Due to digitalisation, it has become easier to provide education and training for future marine engineers online through different e-learning platforms. Many scholars pay attention to this problem. They made a significant contribution to the study of "digital literacy" (Audrin and Audrin [2], Peng and Yu [17]), "digital competence" (Cabero-Almenara et al. [6]), "digital culture" (Kergel [12], Mihelj

et al. [15]). They define their structure and specific features that are associated with the development of modern digital technologies. Peng and Yu [17] note that there is of vital significance to increase both the basic digital skills and those skills by which people understand and use online content. Sandorova and Betak [20] consider digitisation as a managerial, cultural, behavioural and infrastructural component of the educational process. Audrin and Audrin [2] provided an overview of the research field of digital literacy in education; their results provide research avenues and offer a framework for digital literacy in education. Cabero-Almenara et al. [6] define digital competence of higher education students as a predictor of academic success or function of their academic performance, the researchers highlight that digital competence influences the learning of the students and their posterior class promotion. Mihelj et al. [15] refers to digital culture as the intersection of digital technologies and cultural participation.

Digital technologies have become an integral part of society's life. Therefore, students are easily integrated into the learning process [22], as they are accustomed to using various electronic means in their personal lives. Hence, it facilitates their work with various electronic tools, allowing them to perceive information and learn the material more easily. Innovative technologies include interactive learning technologies, project learning technology and computer technology. In the psychological theory of learning, interactive learning is based on the psychology of human relationships in modern society (in its professional aspect). Interactive learning technologies are considered ways of mastering knowledge and developing skills and abilities in relationships and interactions between the teacher and the student as subjects of educational activity [9].

Such technologies differentiate the learning process, provide tasks that correspond to the level of each student's training, and therefore improve the quality of education. Using digital tools contributes to creating conditions in which students are active participants in the educational process. They move from passive perception to active actions, performing tasks [14].

Due to the usage of digital technologies, there is an opportunity for the most convenient and productive collaborative work and knowledge exchange. Thus, students can exchange material remotely, work on a project in groups or pairs, complete tasks at a convenient time, write a test and immediately find out their grade.

3 Methods

The development of digital technologies in the educational space is the leading goal of professional training, which provides an opportunity to develop the competitive qualities of a student on the way to becoming highly qualified specialists. These are the main methods used in our work to do it. The first one is experimental research. The experiment was designed to answer a research question: *What are the benefits and challenges of using innovative technologies in the professional training of ship engineers?* Variables were manipulated and controlled, and data was collected and analysed to conclude. The next is Surveys. Data was

collected from many individuals (93 cadets of the ship engineering department of Kherson State Maritime Academy, Ukraine) through LMS Moodle and Google Forms questionnaires. Case studies were also used. Special cases were created on LMS Moodle (Lesson, Assignment activities). The questionnaires and observations were an important part of the research. The data can be quantitative or qualitative. Statistical analysis was done by the end of our research. They use statistical techniques to analyse and draw conclusions from data, such as calculating averages. The last one is Data visualisation. This method visually presents data and information (e.g., charts, graphs, and histograms).

4 Results

Today, there are many modern technologies for information visualisation: cloud technologies, gamification, virtual laboratories, web quests, mind maps, etc. Such information visualisation tools can help learners to better understand complex concepts and data by presenting information in a visually appealing and easy-to-understand format. They can also engage learners by providing a more active and participatory learning experience. This can improve retention and motivation, making learners more likely to stay engaged with the material [5].

Visualisations support different learning styles, as some learners find it easier to understand information presented visually rather than in text form. Information visualisation tools can enable self-paced learning, allowing learners to explore and interact with information at their speed [10].

Collaborative information visualisation tools can allow learners to work together to solve problems or explore complex topics, promoting teamwork and collaboration.

4.1 Video conference services

Videoconference services in education refer to online platforms that enable educators and learners to engage in real-time, virtual communication and collaboration. These services allow live video and audio interactions, screen sharing, chat features, and other tools to facilitate remote learning [29]. The most effective and free for communication and creating collaborative work are Zoom, Skype, Google Meet, Webex, BigBlueButton and others.

Zoom is a cloud-based video conferencing platform that allows users to connect and communicate with others over the Internet through video, audio, and chat. It was launched in 2011 and has become a popular tool for remote work, online education, and virtual meetings [3].

Zoom is effective, especially for the practical part of Maritime English lesson, when it is necessary to divide the group into pairs and subgroups in "session rooms" in which learners can reflect and express their thoughts about the given professional situation and then discuss it all together and make a conclusion. Also, these services allow a teacher to display a screen with text and a task, in which the student can write, print, or draw right in class; show a short video or a

fragment of a film or program [4]. The survey conducted among Maritime English teachers shows Zoom's advantages to teaching English for Special Purposes, Maritime English or General English. Teachers highlight the option to use the implemented whiteboard – Miro as it helps to conduct group work (e.g. projects, post-reading activities, cases), which is necessary for future ship engineers.

Skype is a communication tool that allows users to make voice and video calls, send instant messages, and share files online. In MET, Skype can be used for online communication and collaboration between teachers, students, and experts worldwide. Skype allows students and teachers to communicate in real time, facilitating immediate feedback and interaction. It is free and can be scheduled at a convenient time for both the teacher and the student, allowing for greater flexibility in scheduling. Skype allows for sharing of multimedia resources, including videos, images, and presentations, which can enhance the learning experience and make lessons more engaging. The survey conducted among Maritime English teachers shows the disadvantages teachers face while using Skype: limited interactive features, lack of specialised tools, limited record-keeping, etc.

Google Meet is a robust video conferencing tool that has become increasingly popular in the education sector due to its ease of use, accessibility, and integration with other Google tools (e.g. Google Classroom and Google Calendar). While Google Meet is a reliable and popular video conferencing service for education, it does have some disadvantages when compared to other similar services: it lacks some features that are available in other video conferencing services, such as virtual backgrounds and breakout rooms; it has a limit of 100 participants, which may be insufficient for larger classes or events and requires a Google account [7]. In the survey, Maritime English teachers highlight the dependence of Google Meet on Google Services. Google Meet also has limited features for managing virtual classrooms, tracking attendance, or organising assignments.

Webex is another video conferencing and online meeting platform used in education to facilitate remote teaching and learning. It provides various tools for educators to connect with students, share materials, and collaborate in real time. With Webex, educators can hold virtual classes, host interactive webinars, and share content such as presentations, documents, and videos. The platform also allows for real-time chat and messaging between students and teachers and the ability to record sessions for later review. This videoconference service also offers features such as breakout rooms, polls, and hand raising, which are particularly useful for interactive and engaging online learning experiences [25]. However, it is only partially free: Webex's free plan is limited regarding the number of participants and the duration of meetings. For longer meetings or larger groups, a paid plan is necessary. While Webex does integrate with various third-party tools and services, it may have different integration options than other videoconferencing services. The teachers and cadets who participated in the survey find the Webex interface and features complex and challenging.

BigBlueButton is an open-source web conferencing system designed specifically for online learning (figure 1). It provides real-time audio and video conferencing, presentation sharing, screen sharing, chat, and other collaboration

tools. BigBlueButton is designed to integrate with various learning management systems, such as LMS Moodle, Canvas, and Sakai, and can be used for online classes, virtual office hours, and online tutoring sessions [27].

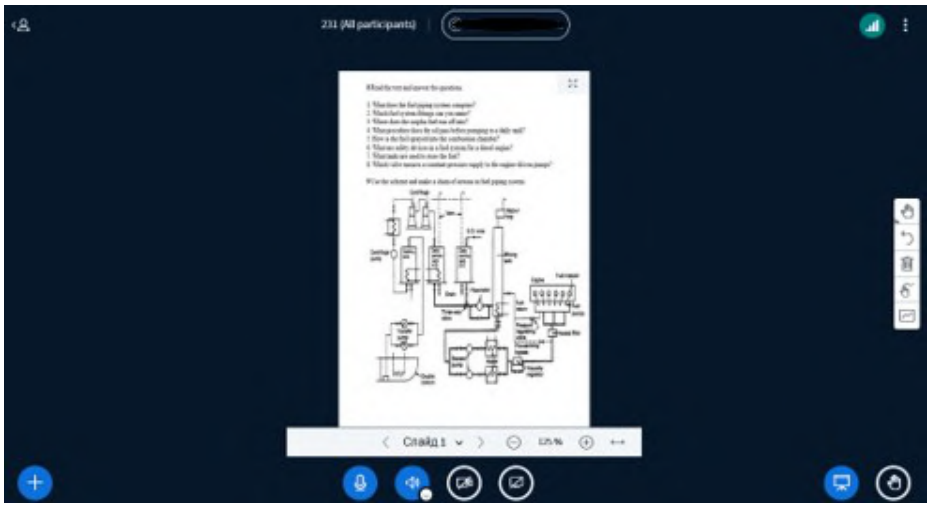

Fig. 1. A part of the online lesson while using BigBlueButton, LMS Moodle.

One of the key advantages of BigBlueButton is that it is open-source software, which means that it is free to use and can be customised to fit the needs of different educational institutions. It should also be mentioned that BigBlueButton is designed to be highly scalable and can support large classes with hundreds of participants [26].

We chose it to be used in the research because BigBlueButton complies with many requirements for special seafarers' MET (e.g. accessibility, collaboration features, security measures, recording capabilities, and cost-effectiveness).

4.2 Online surveys

Online surveys are another valuable tool of e-learning that helps teachers assess students' needs, gather feedback, evaluate learning outcomes, identify issues, and monitor progress. By using them effectively, teachers improve the presentation of their materials and the design of their courses. It can lead to a more effective and engaging learning experience for learners. The learners can use any personal device, and the teacher can see the results graphically and in real time. The teacher can create different types of questions (multiple choice, rating scale, star rating, slider scale, ranking, matrix choice, etc.) to vary their lesson stages [18] (figure 2).

Mentimeter is an online service a teacher can use to create and conduct instant surveys in classrooms, online education or during meetings. To participate

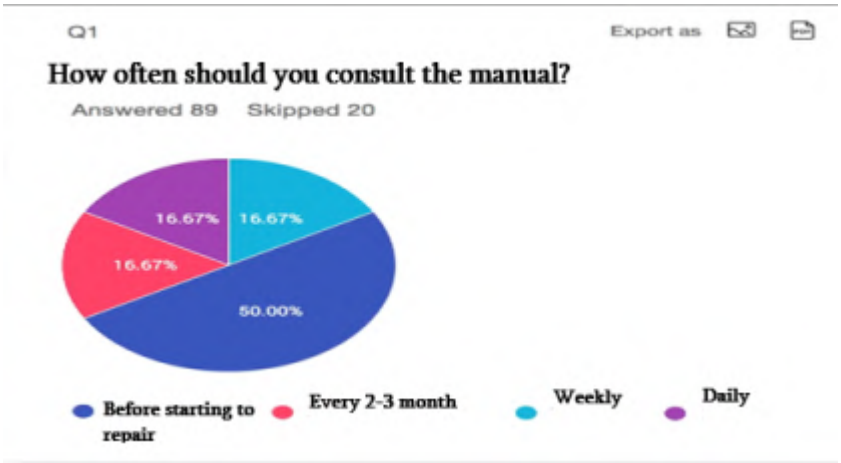

Fig. 2. An example of using online surveys.

in the surveys, participants must log in from their device (mobile phone, tablet, computer) to the https://www.menti.com/ website or enter the digital survey code into the pre-downloaded app. They can do it in real-time and see their voting results, or do it offline [28]. Advantages of using Mentimeter are: the teacher can create an unlimited number of polls of various types for different access codes and organise them in his/her profile into folders; the teacher can create an online presentation with an unlimited number of slides (add images or links, video or polls); no limit on the number of students participating in surveys. The main features and limitations of the free version of the service are the following: one access code can give students access to no more than two general or advanced type surveys; uninterrupted internet access is required to create and demonstrate surveys or slides [11] (figure 3).

In practice, Mentimeter is used by Maritime English teachers while discussion starters (e.g. open-ended questions related to maritime scenarios or case studies – cadets can submit their responses anonymously, promoting honest and diverse input), as interactive icebreakers (e.g. "Quick Slides" feature to present fun maritime-related questions), as a tool to collect feedback (Mentimeter's survey options).

Cloud-based presentation platform Aha Slides (https://ahaslides.com/) is easy to use. It can excite and engage the students of different courses via interactivity. The teacher can turn the presentation step by step from one-way delivery into a compelling interactive conversation. To start using the Aha Slides platform, teachers do not need to download or set up but start creating immediately. The teacher can begin the lesson with brainstorming, opinion polls, quizzes, Questions and Answers, etc. The students can quickly join the teacher's presentation using their devices (online, personal or both). It can be easy to grab

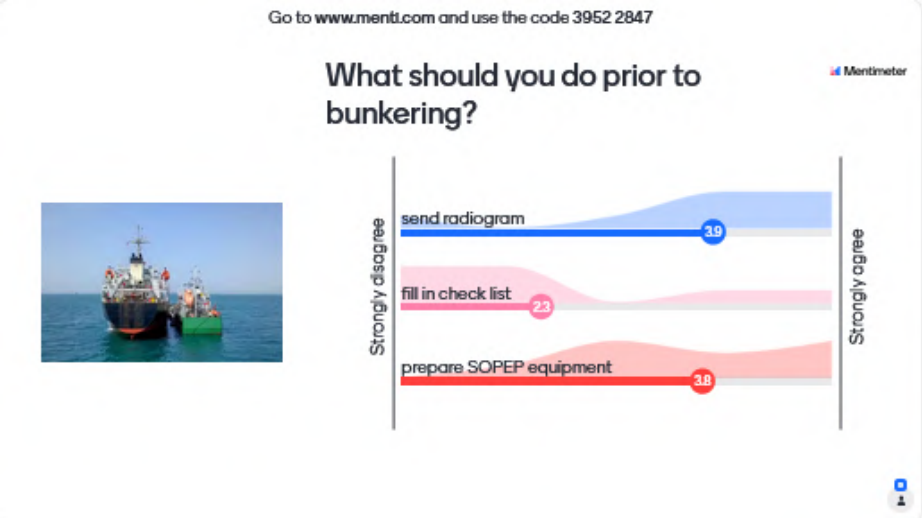

Fig. 3. An example of using Mentimeter at the beginning of the lesson.

the student's attention, energise the virtual class, combine education with fun, and inspire group discussion.

In practice, Aha Slides is used by Maritime English teachers while vocabulary learning (interactive flashcards with maritime-related terms turned into a quiz game), grammar quizzes (to assess students' understanding and use of grammar), scenario-based exercises, etc. (figure 4).

Slido is a platform which a teacher can use for online lessons (meetings and events). It is free for up to 100 participants and guarantees engagement at the next lesson/meeting. With Slido, it is easy to get the most out of lessons by bridging the gap between the teacher and his/her students. To display Slido to students, click on the mode button. Jointing details will be shown on a new screen, and students can join the event by going to https://www.slido.com/ and typing in the event code or scanning the QR code with their phones.

With the Slido platform, teachers can set up events, contribute ideas to brainstorming, ask questions, vote in live polls (share opinions or demonstrate your knowledge), and provide feedback. Teachers can display Slido during virtual lessons/meetings (for example, in Zoom) using PowerPoint presentation [21]. It is comfortable to use PowerPoint presentations and not jump between the files; you can collect all information in one place. Moreover, to get some precious feedback, drop into the Answers and Questions session, which allows you to ask questions (give them the ability to ask anonymously) about what they think about your presentation during the online lesson.

In practice, Slido is used by Maritime English teachers to create live polls for vocabulary building, questions and answers sessions for clarifications, feedback on language proficiency, opinion polls on maritime topics, etc. (figure 5).

Fig. 4. Using Spinner Wheel as a starter.

Poll Everywhere (https://www.polleverywhere.com/) is another helpful variant to engage your students in work. When you have an online lesson, some students are shy, others are afraid to answer in auditory, or your students start to answer simultaneously. So, the teachers can involve their students with such live interactive activities as Poll Everywhere and create questions (multiple choice, yes/no, open-ended), making it easy for everyone to participate [13]. Students can answer online or by text; the results are available instantly in real-time, and you can share the results on your screen. Also, the teacher can monitor what his/her students are retaining and what topics need more explanation. To increase participation, the teacher can even send the survey link in advance [16]. In practice, Poll Everywhere is used by Maritime English teachers to conduct interactive whiteboard activities, collect questions from students, and address queries related to language use in maritime contexts and others. So, with Poll Everywhere, it is easy to identify important topics and have better conversations.

4.3 Whiteboard resources

Whiteboards provide a visual platform for educators to explain concepts and ideas. Using a whiteboard helps to break down complex ideas into simpler, more easily digestible parts, making it easier for learners to understand.

Miro (https://miro.com/) is a collaborative whiteboard platform, a workplace like a "white sheet" of paper on which a teacher and students can work together in real-time. It can help them sketch their ideas, take notes, and use creativity while working on them. During the lesson, a teacher and students can write or type something, work in teams, and share mind maps or posters with another team to get their feedback.

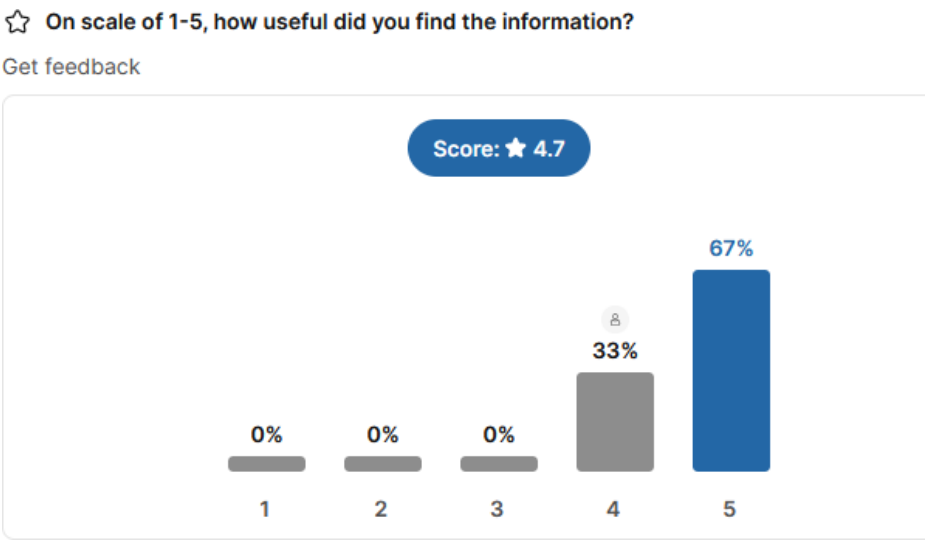

Fig. 5. The use of Slido to get feedback from cadets.

The service interface is in English only; during its utilisation, the pop-up windows with hints will help work quickly. Miro is one of the best ways to make studying interactive and diverse. Making a fresh start is unnecessary, and you can use one of the proposed templates. Also, you can download any material you need (pictures, texts, study materials, video, textbook) and give a link to your students. You can download board games and make four fields for four teams if you work in teams. Give students their links to their playing board and monitor each team.

In practice, Miro is used by Maritime English teachers to highlight the most important information, utilise regular shapes and sticky notes instead of hand-drawn sketches, make writing or drawing with different colours and pen settings, share brainstorming and ideas; create wireframes (prototypes of web pages). One of the exercises examples is using Miro's features for simultaneous editing and commenting on Engine Room's log books to enhance collaborative writing skills and learn more about ship engineer's duties while watchkeeping (figure 6).

Free online Whiteboard.fi is a board where teachers and students can work, do tasks, share ideas and collaborate. The teacher can provide instant feedback to every student in real-time.

When you create a new class, a new page shows you a different option for sharing the board with your students. You can either copy a link and share it with the students in the chat rooms of Zoom, or you can copy the QR code and have the students log in that way, or if the students go to the https://whiteboard.fi/ they can also log in the room code. Every student gets a whiteboard that only the teacher can see, while all students can see the teacher's whiteboard. For example, you can upload an image and make it appear on all students' whiteboards. In

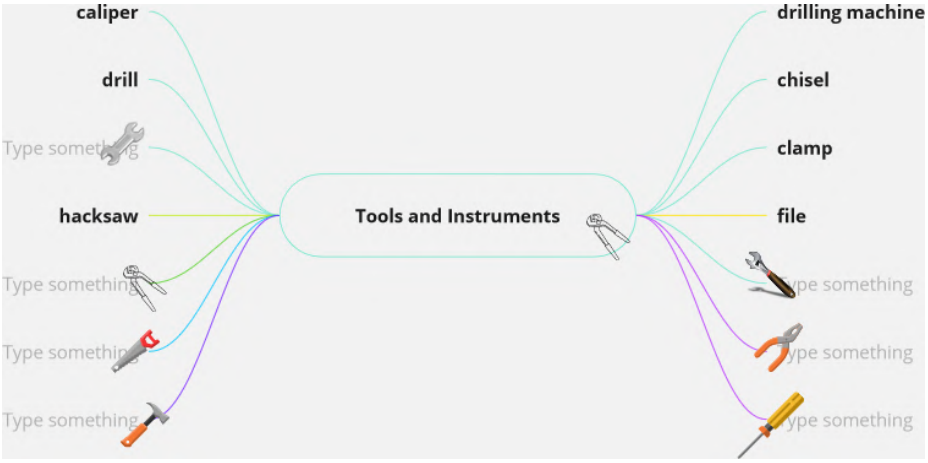

Fig. 6. The task "Label the pictures" was created on Miro.

addition to text notes, they can insert and annotate images and add PDFs, emojis, shapes and math symbols. Starting a whiteboard from scratch in your next class is unnecessary! Save whiteboards to your library, organise them in folders and reuse them when needed [1].

With Whiteboard.fi, it is easy to create an environment where everyone is comfortable to participate and share; include every student and let everybody share notes and answers on their boards; observe students' input to their whiteboards in real time; assess learning and identify knowledge gaps; provides a compelling visual for diverse learners; provide targeted feedback on an individual level to help them master learning content.

In practice, Whiteboard.fi is used while individual work, especially with Engine Room's machinery schemes. To learn new terms (machinery parts), cadets have time to label them while the teacher has an opportunity to check every scheme individually and to provide his/her comments (figure 7).

Overall, the mini-whiteboards on Whiteboard.fi can be a helpful teaching technique tool for engaging students, allowing teachers to quickly assess the understanding and progress of all their students at once.

4.4 Gamification

The process of adding game elements to the learning process is called gamification [19, 23]. Many students like to play different games, and with their help, they travel to different cities to communicate with participants from different countries. Hence, the main idea of gamification during the learning process is to study and have fun.

Students learn best when they have goals and the opportunity to receive rewards to achieve those goals. With gamification, the learning process becomes more interesting and exciting, and the students become more motivated and

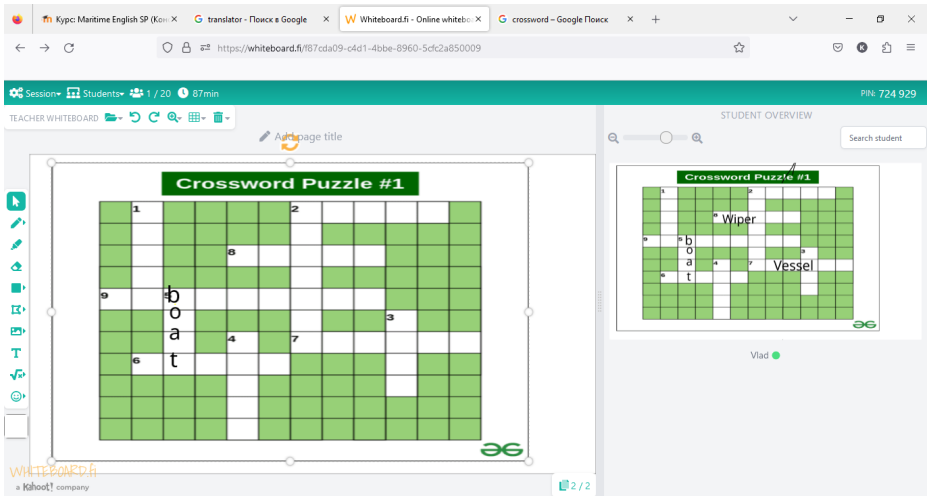

Fig. 7. Solving crosswords (teacher's and student's boards).

better involved in participation. Game-based learning can be conducted both in the classroom and virtually. Games naturally attract and motivate participants (because the game has a clear goal that we strive to reach); have a very positive effect on the level of memorisation; practice applying new skills and knowledge in a safe environment; develop critical thinking and decision-making (make decisions very quickly, think both logically and creatively); help the team learn to work together (understand each other's strengths, and begin to trust each other more).

The content of gamification should be simple and understandable. It should include the following: division of students into groups that will compete in completing tasks; ability to earn points for tasks and then receive rewards for these points; thematic worksheets or other materials used in training; badges that show job completion or skill mastery; throwing the dice to determine the order of answers or assignment of tasks [24]. In practice, while studying on LMS Moodle, cadets receive digital badges for completing various tasks. They first receive the badge with engine cadet's epaulettes; after the next activity, they receive the next epaulettes – Fourth Engineer and so on. By the end of the online course, cadets receive Chief Engineer's epaulettes.

5 Discussion

The use of short videos in the lessons of Maritime English also helps to work on the pronunciation of words and correct intonation, but also to observe how the mechanisms and equipment on board the ship work, to be a participant in the situation that can occur, give an assessment, indicate the reason and decide what to do. Such tasks provide students with an opportunity not only to look

into a fragment of their future profession but also to think, analyse, and express their opinions.

Online classes can be implemented in two forms: synchronous and asynchronous training. By synchronous, we mean the teacher's classes with the group at a specific time according to the schedule, and asynchronous is the training of students at a convenient time for them when they can find and complete the tasks or tests developed by the teacher on LMS Moodle or find a link (to the video) on this platform and do the exercises. Based on his abilities, the learner can devote as much time to studying the material as is necessary for understanding and return at any time to repeat it.

Most students learn best through visual or tactile perception, so information and communication technology can help them "understand" information rather than simply reading or hearing it, for example, according to the graphic interactive scale ("timeline"), which contains labels with information about the event, process, phenomenon in chronological order. After studying it, the learner can speak about various processes (work of a 2- or 4-stroke engine, compressor, etc.). To structure ideas, plan your time, remember information, etc., you can use a "mind map", which consists of keywords or phrases, unlike a "timeline".

The advantages of using digitalisation include less routine work and no paperwork for both the teacher and the student; simplifying the teacher's work, providing information for a separate group instead of calling everyone; controllability: the teacher can correct the educational process at any time; education becomes more focused on the individual (selection of educational material by levels, the pace of learning following the needs of an individual student of education, taking into account his capabilities); automatic evaluation of written works; the optimal combination of group, individual and pair work; expansion of information when using the Internet; increasing motivation and cognitive activity due to the performance of exercises of increased complexity (the possibility of including a game moment, receiving honours).

However, along with the advantages, there are also disadvantages of the digitalisation of the educational process, namely technical "failures" in the operation of the program or equipment, incorrect data storage, hacker attacks on servers, and, as a human factor, the student can get tired of education, due to the constant performance of monotonous tasks with various subjects.

Therefore, innovative teaching methods contribute to developing cognitive interest among students; they teach to systematise and generalise the material being studied to discuss and debate. By comprehending and processing the acquired knowledge, students acquire the skills to apply them in practice and gain communication experience. The feasibility of using information and communication technologies in distance learning to visualise educational/professional information is undeniable. Digital transformation should change the process of acquiring knowledge and knowledge, i.e., form the digital competencies of future graduates.

Thus, using innovative technologies in MET significantly expands the possibilities for modernising the training of future maritime specialists.

Cadets find many benefits of e-learning with additional online tools: materials are adapted based on their professional needs; theoretical knowledge is applied in practical situations and maritime scenarios; learning becomes more engaging and enjoyable, etc. While there are many benefits to incorporating videoconference services, online surveys, whiteboards, and gamification into Maritime English teaching, it is also essential to be aware of potential disadvantages. Technical issues such as poor internet connectivity, hardware problems, or software glitches can disrupt the learning experience. Cadets and teachers find it the most significant disadvantage of e-learning.

6 Conclusions

Nowadays, the lessons must be completely transformative and exciting and compete with games or media entertainment that students can be distracted by. Educational content should be more dynamic. That is why our research proposes to use digital technologies for online maritime education and training, including various videoconference services, online surveys, whiteboards and gamification. The research showed the use of e-learning tools, which allow teachers to track the nature of the student's mistakes, automatically determine the type of assistance required, engage, etc. The educational environment with additional digital tools adapts to the student's knowledge level, needs, acquired knowledge, experience and speed perception of new material. Students should have a sufficient understanding of learning management capabilities in a virtual educational environment. Videoconference is the primary tool for using and demonstrating theory during the lesson. Additional programs (online surveys, whiteboards, gamification) will help the teacher illustrate how theoretical knowledge can be used in practice and provide the direction of the learning trajectory. Also, this will help students find the necessary knowledge and be attentive to details. The teacher and students act as members of one team. With the help of online surveys, polls, and whiteboards, it is easier to organise project activities and implement team activities, which is especially needed while learning Maritime English. Cadets found learning with additional digital tools more dynamic, interactive, and tailored to their professional needs, ultimately better preparing them for maritime industry challenges.

The prospects of our further research can be seen in developing innovative teaching methodologies (e.g., VR and AR) that can enhance the learning experience for future maritime professionals.

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