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***KAHOOT! AS A TOOL TO GAMIFY LEARNING PROCESS  
AT MARITIME HIGHER EDUCATION***

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*The article is devoted to the use of Kahoot! as a game-based learning platform at a higher education institution. This paper has analyzed the influence of Kahoot! on learning outcomes of future maritime professionals. The process of the “Feedback” tool use in the educational process at a higher maritime education institution is described.*

*The article reviews the scientific literature on gamification in learning, e.g., the study of other researchers and their approaches to using the tools such as Kahoot!. The paper emphasizes the fact of limited opportunities for the Kahoot! free use despite the company's commercial interests.*

*The paper describes the usage of Kahoot! as an interactive tool in both synchronous and asynchronous modes. The synchronous mode enables teachers to conduct quizzes in real time, and students to take part in them using their devices, which promotes active participation and healthy competition. In asynchronous mode, teachers can assign independent study tasks to students, who can perform them with Kahoot! at their own convenience, allowing for flexibility in learning.*

*The study presents the results of an experiment conducted at Kherson State Maritime Academy, where Kahoot! has been used in teaching Maritime English and humanities. The data analysis has identified positive changes in the level of students' professional competence, which confirms the improvement of the learning material understanding.*

*The research analyzed the role of Kahoot! in the organization of feedback between teacher and students during classes. Its specifics and features are determined precisely as a pedagogical toolkit for quickly conducting a section of students' acquired knowledge during any form of education and various forms of educational classes. In general, the research and implementation of novel approaches in gamification and game-based learning give access to creating an effective learning environment.*

*Further research prospects include the study of the use of other gamification tools and game-based learning at maritime higher education institutions (e.g., Mentimeter, Miro).*

**Keywords:** Kahoot!, gamification, e-learning, LMS MOODLE

**Introduction.** The modern educational process increasingly uses elements of e-learning. This became especially relevant during the years of the spread of the COVID-19 pandemic throughout the world. For Ukraine today the use of e-learning has gained considerable relevance for almost a year now. The system of higher education must work for the future. In addition, the ease of use of this type of training is relevant for the educational space around the world.

At the same time, we should also note that the use of various tools in the educational process creates non-standard conditions for learning. The student immediately masters several competencies and becomes more “open” to using various means to obtain new knowledge, skills and abilities. It is the use of Kahoot! as a “Feedback” tool in the educational process of a higher maritime education institution, creates all the opportunities for the implementation of the above-mentioned aspects of the educational process as a whole [1]. At the same time, Kahoot! is so versatile in application and use that



it is suitable for all disciplines and forms of learning. Despite the fact that Kahoot! is a commercial tool there is still limited number of functions everyone can use for free [2].

A modern student is a student who is prone to the so-called clip-on thinking, he is characterized by the constant use of various gadgets in various contexts of his own activity, so the BYOD (bring your own device) approach is relevant in the educational process today, i.e. smartphones become a tool, and not a distracting gadget for work.

The research questions of the paper are following: investigating the effectiveness of Kahoot! as a gamification tool in maritime higher education; assessing the impact of using Kahoot! on student engagement and motivation in maritime-related courses.

**Scientific literature review.** Many researchers investigated gamification of learning among whom are the following: M. Sailer, L. Homner [1], A.N. Saleem, N.M. Noori, F. Ozdamli [2], L. Aloia, A. A. Vaporciyan [3], Q. Zhang, Z. Yu [4], M. C. Prieto, L. O. Palma, P. J. Blázquez Tobías, F.J.Molina León [5] and others. M. Sailer and L. Homner proved in their experiment gamification might in fact be effective when it comes to learning [1]. A.N. Saleem, N.M. Noori and F. Ozdamli showed that the most common gamification elements used in e-learning and have a powerful effect on the students are points, leaderboards, badges, and levels [2]. L. Aloia and A. A. Vaporciyan listed e-learning trends and applied them into medical education [3]. Q. Zhang and Z. Yu analyzed Kahoot! as a game-based student response system [4]. M. C. Prieto, L. O. Palma, P. J. Blázquez Tobías and F. J. Molina presented positive results of a study based on of the application Kahoot! with students of secondary education, in the subjects of mathematics and biology [5]. However, the use of Kahoot! at maritime education and training hasn't been fully investigated yet. Scientific literature review played a critical role in establishing the significance, novelty, and rigor of our research. It provided a comprehensive understanding of the existing knowledge in the field and guided our research objectives and questions.

**The aim of research.** The paper aims at studying possibilities and efficiency of the Kahoot! using as a gamification tool in maritime higher education.

**The main material.** Kahoot! is a service for creating quizzes, tests and didactic games. Its use is a quick and interesting way of receiving feedback from students during any form of educational activity. At the same time Kahoot! as the "Feedback" tool reflects the BYOD system, where smartphones become a tool, just like a chalk, a blackboard, or anything else. Tasks can be created in the form of surveys, quizzes or tests on the site for work in an offline classroom or online classroom. Students in the classroom use their smartphones or tablets as a "remote control" for answers. Kahoot! is universal, as for checking grammar, vocabulary, history, technical science or any other disciplines. Kahoot! can be used both synchronously and asynchronously, offering flexibility in how it is incorporated into teaching and learning. In a synchronous setting, teachers can use Kahoot! to conduct real-time quizzes or assessments in the classroom. Students can participate in the Kahoot! quiz simultaneously, either individually or in teams, using their devices. The teacher can display the questions and students can submit their answers within a set time limit. This promotes engagement, healthy competition, and active participation. Kahoot! also can serve as an interactive review tool during synchronous review sessions.

In an asynchronous setting, teachers can assign Kahoot! quizzes as self-paced learning activities. Students can access the Kahoot! quiz and complete it on their own time, allowing for flexibility in their learning schedule. Teachers can set deadlines for completion or use Kahoot! as a formative assessment tool to track student progress. Teachers can choose the most appropriate mode based on their instructional goals, class dynamics, and the availability of students.

In order to show the teachers different e-learning tools Kahoot! was also presented in e-course "The effective use of additional tools while e-learning" on LMS MOODLE. The course has some specific features (e.g. exploration of diverse digital tools, practical application and hands-on experience, strategies for efficient online learning). The main objective of this e-course is professional development of pedagogical and academic staff in terms of organizing e-learning. The tasks of the course are the following:

- 1) to provide theoretical knowledge and form practical skills on the use of additional tools during e-learning;
- 2) to develop the ability to create and use additional tasks during e-learning;
- 3) to improve digital competence.

The course contains different modules devoted to various additional tools while e-learning (e.g. tools to create surveys: Mentimeter, Aha Slides, Slido, Poll everywhere; tools to use online whiteboard: Whiteboard.fi, drawp for school, Miro). Separate module is devoted to games for students. Part of the course can be seen in Figure 1.

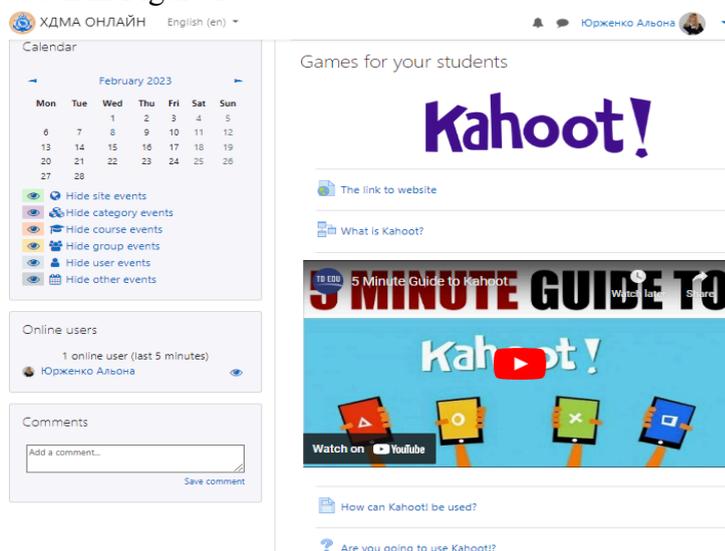


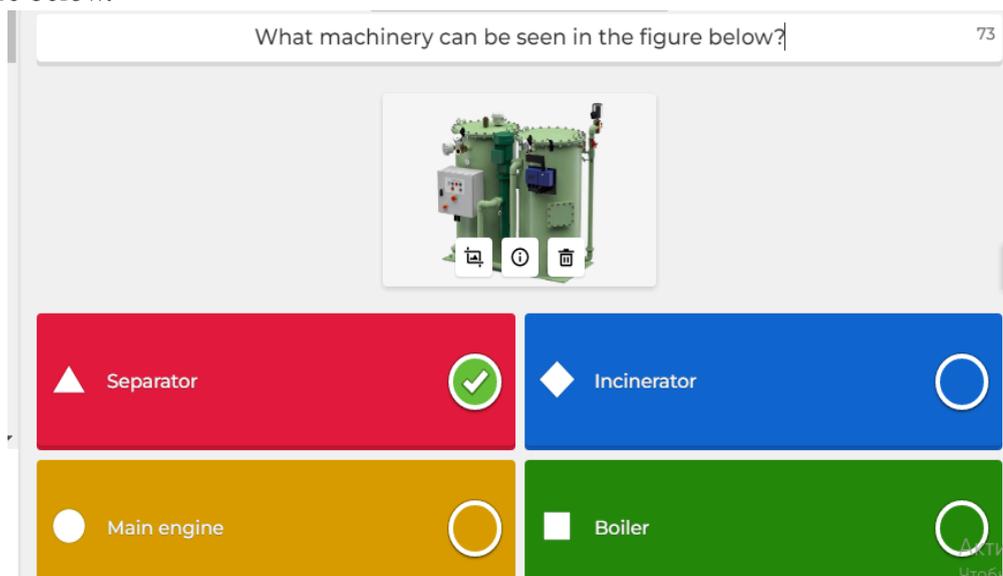
Fig. 1. Part of a module devoted to games for students while e-learning on LMS MOODLE

This module contains links, videos, instructions, surveys and quizzes on Kahoot!. The first link is the link to original website – <https://kahoot.it/>. The next activity is in the form of a lesson (module enables a teacher to deliver content and/or practice activities in interesting and flexible ways). In this lesson course participants find out more about what Kahoot! is. This lesson includes five types of questions: multichoice, essay, matching, short answer and true/false. The next activity of e-course is 5-minute video guide on Kahoot! use. The video was added to LMS MOODLE course with the help of Label activity (html source from YouTube). The next is instruction on how to use Kahoot! in e-learning. The last activity of the module devoted to Kahoot! is a survey on participants' plans (Are you going to use Kahoot!? [6, 7, 8]) with three possible answers: yes, no or I don't know. The statistics is given by LMS MOODLE automatically after each answer.

Kahoot! is a platform that has a web version. However, it is more convenient to use the mobile application for Kahoot! while studying offline. While e-learning both versions can be used by tutor and students [9]. The main task of Kahoot! is, first of all, creating quizzes or test tasks. Educational material created on the platform is also called Kahoot. There are several ways to use Kahoot. Separate Kahoot can be created for any topic. One of the interesting work options is the creation of a task, where the student must answer the questions by his own. The student in the "Flashcards" mode must answer the question without having any answer options. To check the result, the card needs to be turned over and only then this mode will allow student to get the correct answer. Thus, the student must independently search for answers, having no options, but relying only on the general topic of the task and his own knowledge. This mode of operation can be used as a "lead-in" of a new topic or as a "quick check" of the material of the previous lesson [10, 11].

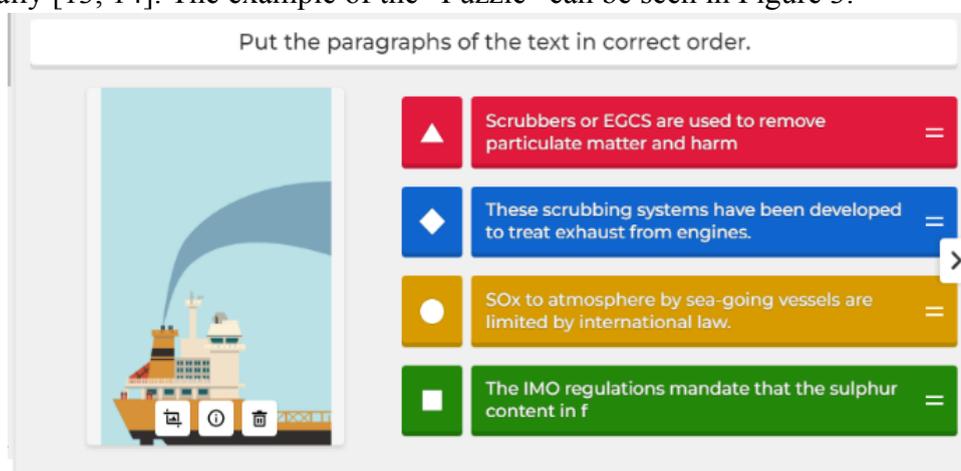
"Quiz" mode is a mode similar to "multiple choice": the task is done in the form of a test – from two to four answer options are given to the question. This is a good mode to get a "quick check" on a new topic. When working on a new topic, it is possible at any stage to check the level of students' mastering the material. The mode does not have a timer for choosing the correct answer, so the student experiences less stress and gets more time to think about the answer. After completing the tasks, the

system offers to process errors immediately [12]. The example of Quiz question in Kahoot! can be seen in the figure below.



*Fig. 2. The question of quiz created in Kahoot! for Maritime English subject*

The “Continue later” button has been added to the program recently. Moreover, it makes it possible to return after a pause and continue without starting all the Kahoot! tasks again. However, this format can be adjusted to set a time limit for the work. “Puzzle” mode allows tutor to create a task where the student can arrange terms, names, etc. in the correct order. “Open-ended” mode gives students the opportunity to ask questions, and they have the opportunity to answer them. The answer is limited in terms of time and the number of characters, which forms the ability to express one's opinion clearly and logically [13, 14]. The example of the “Puzzle” can be seen in Figure 3.



*Fig. 3. “Puzzle” created in Kahoot! for Maritime English subject*

Kahoot! also gives the possibility to hold competitions on busy days. There are two modes on the platform for this – Challenge and Host live. Working in the Challenge mode requires students to be sent a link to go to and join the challenge. Tasks appear on the screen, which must be solved within a certain time. Competition participants see each other's results and this gives them additional motivation to quickly and efficiently complete the task. The game can be played in real time, which makes the lesson live and interesting [15, 16].

In order to check the effectiveness of Kahoot! activities used at higher maritime education institution pedagogical experiment was held on the basis of Kherson State Maritime Academy (Ukraine). Teachers and students were chosen from Navigation department. The number of experiment

participants is 64. Three teachers of the courses of the humanitarian and social cycle and 47 cadets (male, 19–21 y.o.). The teachers were trained on LMS Moodle e-course. Their task was to find more about Kahoot! and other e-learning tools. The course contained theoretical material and practical tasks (Assignments). As a result, course participants (Maritime English teachers) created 5 Kahoot! activities on different topics to use them synchronously and asynchronously while e-learning (on LMS Moodle and while Zoom meetings).

Two groups were created: experimental group (EG) and control one (CG). EG contained 23 cadets and CG contained 24 cadets. Randomization procedure of their division was used to minimize bias and ensure that any differences between the groups are due to chance rather than preexisting characteristics. We believe in such case each student has an equal chance of being assigned to either group. EG's cadets were receiving Kahoot! tasks while 2022–2023 academic year (first semester) and CG was not. Kahoot! tasks for EG were given in LMS MOODLE and while Zoom video conferences. After the experiment data analysis was performed by teachers [17]. The results of quizzes (final tests on LMS MOODLE – Quiz activity with 23 questions) has shown positive changes in the state of professional competence formation [18, 19, 20]. The statistics on LMS MOODLE final test (Maritime English subject) can be seen in the Figure 4.

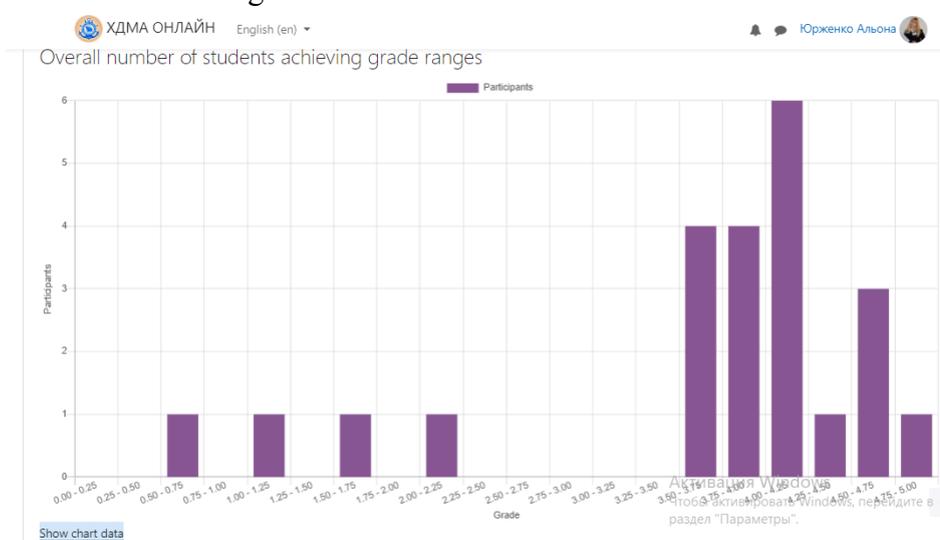


Fig. 4. The statistics on final test of Maritime English subject from LMS MOODLE (EG)

It says that final test has shown the following levels:

- sufficient level of Maritime English – 4 cadets,
- good level – 14 cadets,
- excellent level – 5 cadets.

The statistics of CG cadets has shown the following results:

- sufficient level of Maritime English – 12 cadets,
- satisfactory level – 7 cadets,
- good level – 4 cadets.

To check if there is a significant difference between the mean performance of the two groups descriptive statistics was used: EG has more cadets with good (10) and excellent level (5) than CG which has more cadets with sufficient (8) and satisfactory (7). According to the findings of experiment the use of Kahoot! has resulted in improved knowledge retention and understanding of Maritime English concepts and vocabulary by cadets. The platform's repetitive and interactive nature, combined with immediate feedback, can reinforce learning and help cadets consolidate their understanding of the language. The experiment has also assessed the impact of using Kahoot! on learning outcomes, such as improved language proficiency, increased vocabulary acquisition, and enhanced communication skills.

Graphical representation of final test's results from LMS MOODLE e-course for CG cadets can be seen in the Figure 5.

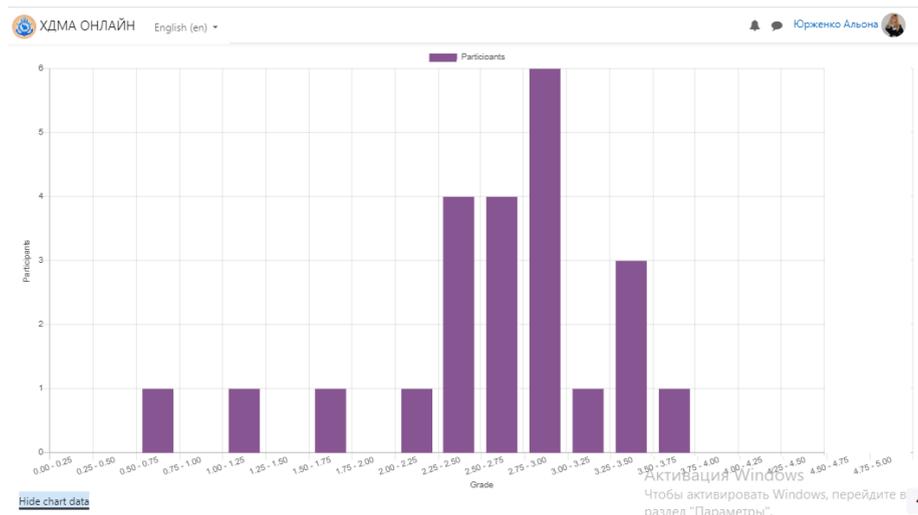


Fig. 5. The statistics on final test of Maritime English subject from LMS MOODLE (CG)

To receive feedback from EG participants (23 cadets), a survey was created using Google Forms. The cadets were asked questions regarding the evaluation of work with Kahoot!.

The following questions were created in the survey:

- Convenience of working with Kahoot! activities (rating from 1 to 5, where 5 is the highest mark);
- Availability of work with Kahoot! (rating from 1 to 5, where 5 is the highest mark);
- Interestingness of working with Kahoot! activities (rating from 1 to 5, where 5 is the highest mark);
- Efficiency of work with Kahoot! tasks (grade from 1 to 5, where 5 is the highest mark).

The results of Google survey can be seen in the following figures:

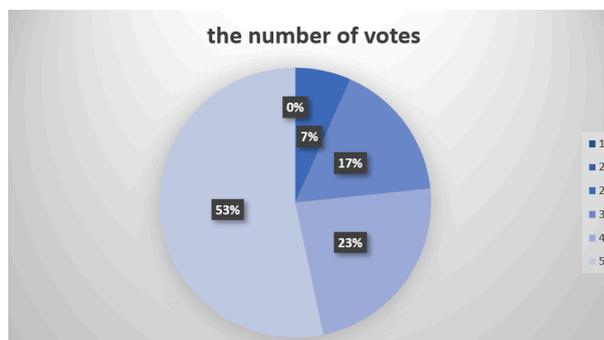
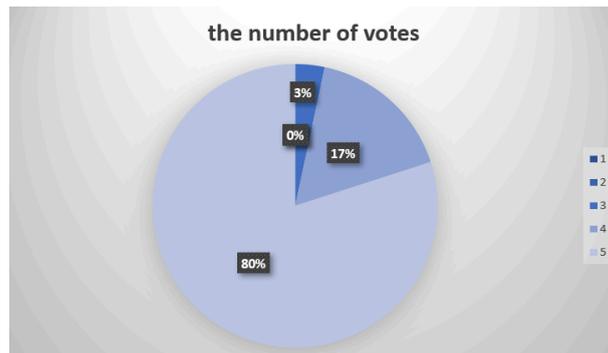


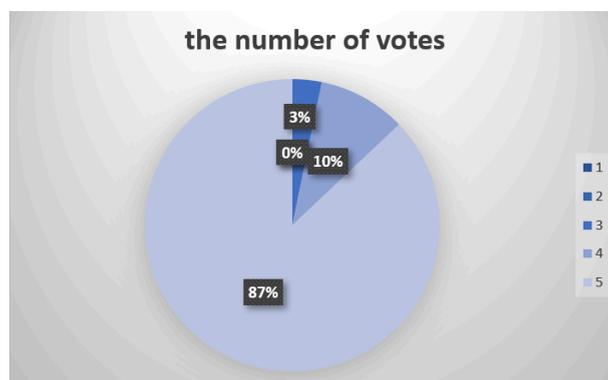
Fig. 6. Cadets' answers to the survey question: Convenience of working with Kahoot! activities

Thus, 53% of the cadets rated the work with the tool as high as possible, 23% rated it as good, and 17% rated it as satisfactory, the tool did not receive lower scores. Cadets noted fairly high level of convenience of work with Kahoot! activities.



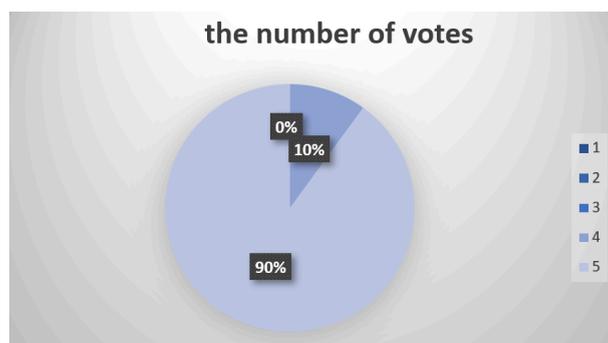
*Fig. 7. Cadets' answers to the survey question: Availability of work with Kahoot!*

83% of cadets found the tool to be the most accessible to use, 17% believe that the tool has a good rating, and 1–3 points received zero votes.



*Fig. 8. Cadets' answers to the survey question: Interestingness of working with Kahoot! activities*

90 % of cadets found the tool to be the most interesting in their work, 10% believe that the tool has a good rating, and 1–3 points received zero votes.



*Fig. 9. Cadets' answers to the survey question: Efficiency of work with Kahoot! tasks*

90% of cadets confirmed the undeniable effectiveness of working with Kahoot!, 10% rated the work as good, and 1–3 points were not used.

**Conclusions.** Using Kahoot! as a “quick check” tool in the educational process at the maritime higher education institution is justified, as it creates conditions for active tasks during any form of education including e-learning. Increases interest and motivation to study, the teacher can obtain the results of assimilation of both new and previously completed material in the shortest possible time. After receiving the results, you can immediately fill the gaps in the acquired knowledge.

Kahoot! was used during the teaching of Maritime English and courses of the humanitarian and social cycle, which made it possible to assess the quality of its work and the effectiveness of its

application. So, having passed the approbation, the tool can be used in other cycles of disciplines, especially interesting results were obtained during the competition: memorization of information increased by about 50 percent, as different types of memory were included in the work.

So, using Kahoot! as a "quick check" tool in the educational process in a higher education institution can serve as the newest tool for obtaining learning results and can be used to increase the student's interest and motivation in learning. It's important to note that while Kahoot! can enhance maritime higher education, it should be used as a complement to comprehensive instructional strategies and curriculum design. Instructors should align the use of Kahoot! with the specific learning objectives, content, and assessment methods of maritime education programs. High convenience and availability (53%), accessibility (83%) and efficiency (90%) of working with the Kahoot! tool during classes were also confirmed by cadets, and 75% considered its use interesting, which accordingly increases the effectiveness of work during classes.

Thus, the introduction of the principle of BYOD into the educational process of a higher maritime institution fully justifies the use of gadgets during work in foreign language classes as well as in social and humanitarian disciplines in the online/offline/blended system and has significant advantages. In particular, active and fast communication with the teacher regardless of the location of the student or teacher is considered as one of the advantages. The next advantage is the work with various types of didactic material in the gadget at anytime and anywhere. The advantage is also great variability of different tasks (e.g. watching video films). Performing tasks, current and final controls and quickly obtained results for the completed test, final work, using various electronic tools and their combination makes the educational process rich and active. Quick exchange of information between the teacher and the audience, as well as the possibility of instant grouping of students in working groups according to the assigned task makes e-learning more interesting and exciting.

The prospects of our further research can be seen in the use of other gamification and game-based learning tools at higher maritime education institutions (e.g. Mentimeter, Miro).

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**КАНООТ! ЯК ІНСТРУМЕНТ ГЕЙМІФІКАЦІЇ ОСВІТНЬОГО ПРОЦЕСУ  
В МОРСЬКІЙ ВИЩІЙ ОСВІТІ**

Стаття присвячена використанню Kahoot! як ігрової навчальної платформи у закладі вищої освіти. У цій статті проаналізовано вплив Kahoot! на результати навчання майбутніх морських фахівців. Описано процес використання інструменту «Зворотній зв'язок» в освітньому процесі вищого морського навчального закладу.

Проведено огляд наукової літератури щодо гейміфікації в навчанні, зокрема досліджень інших вчених та їх підходів до використання інструментів, таких як Kahoot!. Зроблено акцент на тому, що навіть за умови комерційного характеру Kahoot! існують обмежені можливості для безкоштовного використання.

Описано можливості використання Kahoot! як інтерактивного інструмента як у синхронному, так і в асинхронному режимах. У синхронному режимі викладачі можуть проводити вікторини в реальному часі, а студенти можуть брати участь у них, використовуючи свої пристрої, що сприяє активній участі та здоровій конкуренції. В асинхронному режимі викладачі можуть давати завдання на самостійне вивчення студентам, які мають можливість працювати з Kahoot! у зручний для них час, що сприяє гнучкості в навчанні.

Представлено результати експерименту в Херсонській державній морській академії, де Kahoot! був використаний для навчання морської англійської мови та гуманітарних курсів. Після аналізу даних виявлено позитивні зміни у рівні сформованості професійної компетентності студентів, що підтверджує покращення розуміння навчального матеріалу.

У дослідженні проаналізовано роль Kahoot! в організації зворотного зв'язку між викладачем і студентами під час занять. Саме його специфіка та особливості визначаються як педагогічний інструментарій для швидкого проведення зрізу знань, набутих студентами під час будь-якої форми навчання та різних форм навчальних занять. Загалом дослідження і впровадження новаторських підходів у сфері гейміфікації та ігрового навчання відкривають шлях до створення ефективного освітнього середовища.

Перспективи подальших досліджень ми вбачаємо у дослідженні використання інших засобів гейміфікації та ігрового навчання у вищих морських навчальних закладах (наприклад, Mentimeter, Miro).

**Ключові слова:** Kahoot!, гейміфікація, електронне навчання, LMS MOODLE

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