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Alona Yurzhenko*
PhD in Pedagogy, Associate Professor
Kherson State Maritime Academy
73000, 20 Nezalezhnosti Ave., Kherson, Ukraine
https://orcid.org/0000-0002-6560-4601

Olena Kononova
Lecturer
Maritime Applied College of Kherson State Maritime Academy
73000, 14 Nezalezhnosti Ave., Kherson, Ukraine
https://orcid.org/ 0009-0007-1386-6590

Valerii Svyryda
Lecturer
Kherson State Maritime Academy
73000, 20 Nezalezhnosti Ave., Kherson, Ukraine
https://orcid.org/0000-0003-2415-4461

Exploring the role of gamification in enhancing engagement of maritime professionals to study

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Abstract. Digitalisation and higher training demands make it increasingly important to enhance maritime students' engagement. Gamification is considered an innovative approach that contributes to the intensification of educational activities and increases the effectiveness of professional training of maritime specialists. The objective of research was to explore the role of gamification in enhancing engagement in seafarers' training online courses. The research methodology was based on a combined set of interconnected theoretical (analysis, synthesis, generalisation, comparison) and empirical methods (pedagogical experiment, observation, survey, testing), which provided a comprehensive study of the process of training future ship mechanics in a digital learning environment. The study analysed the possibilities of using gamification in e-learning for future maritime specialists on the LMS Moodle platform. It was found that the introduction of gamification elements, in particular maps, scores, leaderboards, digital badges, game exercises, task performance indicators, levels and missions, helps to increase the interest and involvement of cadets in the educational process. A gamified online course on the discipline "Life Safety" was developed, which contains educational materials on personal safety, firefighting, survival and first aid. The practical experience of creating gamification elements both in the LMS Moodle environment and on external web resources, with their subsequent integration into the educational course, was described. It was found that the use of gamification forms a more dynamic educational environment and has a positive effect on the motivation and educational activity of students. The study proved that gamified online courses increase learning efficiency and improve the overall educational experience of future maritime professionals. The results of the study can be used by teachers of maritime educational institutions to implement gamified approaches to increase the motivation and involvement of future maritime professionals in the learning process

Keywords: maritime establishments; personalised space; digital surroundings; e-learning; ship engineers

*Corresponding author

INTRODUCTION

Ukrainian Maritime Education and Training (MET) is going through hard times due to the state of martial law in the country. The use of e-learning became more needed than ever. Almost every higher education institution has its own Learning Management System (LMS) which is an essential instrument to organise e-learning. One of the most widely used LMS is MOODLE. It is freely available for use and can be customised to suit specific needs without licensing costs. This makes it a cost-effective solution for organisations with budget constraints (Dewan & Godina, 2024). The MOODLE is also chosen because it's very flexible and provides a framework which can be adapted to different learning styles, content types, and organisational structures. The platform's design is geared towards simplicity and supports various content types (e.g. text, multimedia, quizzes, forums, and assignments) (Yurzhenko *et al.*, 2022).

Despite MOODLE's advantages e-learning can become boring to students due to the limited set of tools and instruments on LMS. The challenges in motivation and engagement influence cadets' overall e-learning experience. To enhance it and find the solution it was decided to use gamification approach. Gamification approach is an innovative trend of education in 2026. It uses mechanics of computer games and can be used while e-learning. To adapt it to maritime education and training LMS MOODLE was used as a source of all materials to study. Gamification is considered to be an easy tool to use and engage cadets to study more. There are some gamification tools which involve cadets to challenge with each other (e.g. Leaderboards) (Kotsifakos *et al.*, 2022).

The researchers A.H. León & M. Peña (2021) used gamification tools in the learning of shipbuilding in the undergraduate marine engineering education in the Universitat Politècnica de Catalunya, BarcelonaTech. Kahoot!, Mentimeter, and Socrative gamification web tools were used in the research. The best results were shown by Socrative web tool. The authors were using external tools only and didn't provide any information on the use of gamification elements LMS MOODLE proposes. K. Kraft (2025) and K. Mizrak (2025) investigated the effectiveness of safety training through gamification, focusing on the analysis of game attributes and the design of training prototypes. As part of their work, a series of applications was developed to improve safety training. The results of pilot testing showed a high level of user engagement and satisfaction with the training process.

The following researchers had analysed the use of gamification in maritime education and training: T.T. Türkistanlı (2023) analysed the use of gamification in maritime education and proved that a digital gamification model increased the effectiveness of transforming cadets' digital readiness into a powerful factor of learning motivation. The researcher emphasised that the integration of game mechanisms (scores, levels, competitions) into the educational process did not deprive interest, but also contributed to the formation of self-regulation and active participation of students. In addition, the author emphasised that gamification acted as a tool for the transition from passive knowledge acquisition to an interactive, effective learning model, which is especially relevant for the training of maritime specialists in a digital environment. T. Cheng *et al.* (2026) investigated the application of gamification in the field of maritime cybersecurity. In particular, they identified significant gaps in the training of logistics specialists in terms of awareness and response to cyber threats. Their study, conducted at the University of Plymouth, tested virtual game-based training that simulated real-world cyber incident scenarios in the maritime industry. The results showed that the use of game-based virtual environments significantly increased participants' success rates, facilitated better development of practical skills, and built sustainable cybersecurity competencies necessary for digital maritime industry.

C. Christodoulou Raftis *et al.* (2025) focused on the use of serious games in maritime education and training. They demonstrated that such games have significant potential to bridge the gap between theoretical knowledge and practical skills. The results of the study highlight the innovative nature of this approach and its effectiveness in the professional training of future maritime professionals. A large number of researchers have studied the use of gamification elements in education but the use of them while Basic Safety training online for future seafarers remains an unsolved issue. The main goal of the research was to explore gamification's role in the raise of cadets' engagement while MET, particularly Basic Safety.

MATERIALS AND METHODS

The study employed a combination of interconnected theoretical and empirical methods, which is due to the interdisciplinary nature of the issues, which combines pedagogy, digital technologies and professional training of maritime specialists. The use of theoretical methods, in particular analysis, synthesis, generalisation and comparison of scientific sources, made it possible to determine modern approaches to the organisation of e-learning, the features of the use of gamification in the educational process and its potential for increasing the motivation of students. For this purpose, scientific publications, methodological recommendations, as well as electronic resources dedicated to the use of LMS MOODLE, gamification and digital educational technologies were processed. The empirical part of the study involved conducting a pedagogical experiment that was organised based on the Kherson State Maritime Academy (KSMA), Kherson, Ukraine, which was relocated to Odesa on the base of Odesa Agrarian University under martial law. The choice of this research base was due to its specialisation in the field of training maritime specialists, as well as the active use of e-learning in the educational process. The study was conducted in the first semester of the 2025-2026 academic year.

The study involved first-year cadets of Marine Engineering Faculty, who studied under the abridged program in the speciality "Operation of Marine Power Plants". The total sample consisted of 120 cadets. The distribution of cadets into the experimental group (EG) (58 people) and control group (CG) was considered randomly (random sampling) based on an assessment of the initial level of English proficiency and compliance with the specified selection criteria. The selection of participants was carried out according to the following criteria: first-year study, availability of the results of the entrance exam in English, voluntary consent to participate in the study, and an appropriate level of English proficiency. The participants were ship engineering cadets 17-21 years old.

To determine the initial level of preparation of the participants, the results of the entrance English test were used, which included testing in the LMS Moodle and an oral interview on the Zoom platform. The testing allowed for assessing the level of development of audio, reading, writing and grammar skills, while the interview was aimed at determining the level of oral speech. The level of preparation was determined according to the Common European Framework of Reference for Languages (CEFR) scale at level B1. To clarify the initial level of development of foreign language competence of the cadets, a preliminary test was conducted in the LMS Moodle, which covered the main language competencies (listening, reading, grammar) according to level B1 of the CEFR. Oral competence was additionally assessed during a short interview. The test structure included the following types of tasks: listening to dialogues with a choice of different correct answers, determining the correctness of statements (True/False), reading texts with answers to questions, choosing the correct grammatical form, and filling in the gaps (Fig. 1).

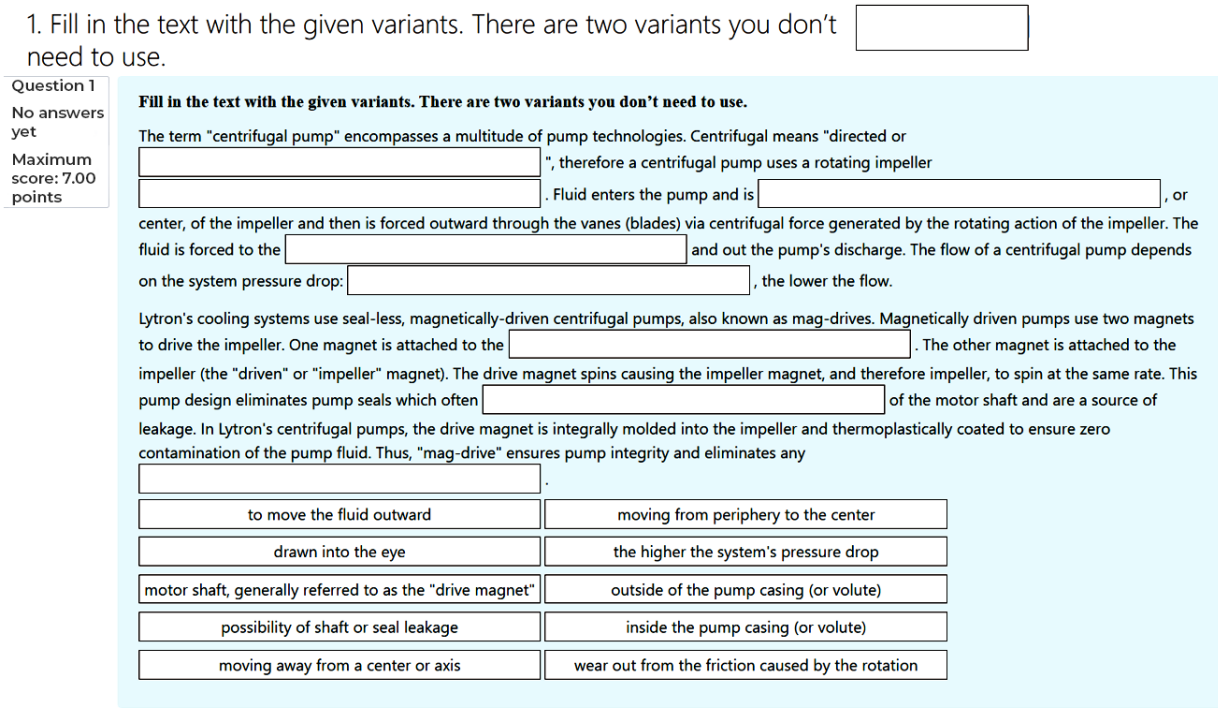

Figure 1. Example task
Source: Online learning at the Kherson State Maritime Academy (n.d.)

The data collection during the pedagogical experiment involved a combination of pre-testing and post-testing, questionnaires, interviews, and pedagogical observation. To determine the initial level of English-language competence, pre-testing was conducted in the LMS Moodle before the implementation of the experimental methodology. After the intervention, post-testing was carried out in the same environment to assess the dynamics of learning outcomes and measure the effectiveness of the applied approach. To evaluate the motivation and engagement of cadets, questionnaires were administered via Google Forms, enabling the identification of their attitudes towards the use of digital and gamified tools in Maritime English learning. Interviews complemented the quantitative data by providing deeper insights into students' perceptions and experiences.

Pedagogical observation was used to record the characteristics of cadets' learning activities during the use of e-learning, in particular the level of activity, independence, and engagement. The collected data were processed using both descriptive and inferential statistical methods, which ensured a comprehensive analysis of the effectiveness of the implemented approach. Figure 2 shows some sample questionnaire questions to assess students' attitudes towards gamification and their level of learning motivation.

1. How often do you use digital platforms (Moodle, earningApps, etc.) for learning Maritime English?
   - Always
   - Often
   - Sometimes
   - Rarely
   - Never
2. Do game-based activities help you better understand professional vocabulary?
   - Yes
   - Rather yes
   - Not sure
   - Rather no
   - No
3. Which type of tasks do you find most engaging?
   - Vocabulary exercises
   - Grammar tasks
   - Interactive games
   - Speaking tasks
   - Case studies
4. Do you feel more motivated when using gamified elements (points, badges, leaderboards)?
   - Yes/No (explain why)
5. How confident do you feel using Maritime English in professional situations?
   - Very confident
   - Confident
   - Not very confident
   - Not confident
6. What difficulties do you face when learning Maritime English? (open-ended question)
7. In your opinion, do digital tools help you learn independently? (open-ended question)

Figure 2. Questionnaires
Source: Online learning at the Kherson State Maritime Academy (n.d.)

These questions made it possible to collect both quantitative data (on a scale, for example, from 1 to 5) and qualitative responses (open-ended comments), which provides a deeper analysis of the learning process. The choice of these methods was due to the need to obtain both quantitative and qualitative data for a comprehensive analysis of the phenomenon under study. The study materials consisted of training courses developed in the LMS Moodle, as well as gamification elements integrated into the e-learning structure. It should be noted that all screenshots presented in the article, as well as the general demonstration of the website interface, were obtained while using a personal account of one of the authors. Additionally, external electronic resources were used to create interactive tasks with further integration into the learning platform, including LearningApps.org (n.d.) for designing interactive exercises, Kahoot! and Quizizz for gamified quizzes, and H5P for developing multimedia learning content (interactive videos, presentations, and quizzes).

The study was conducted in accordance with established ethical standards for research involving human participants. In particular, the research adhered to the principles of voluntary participation, informed consent, confidentiality, and anonymity of respondents. All participants were informed about the purpose, procedures, and expected outcomes of the study and provided their voluntary consent to participate. The confidentiality of the collected data and its use exclusively for scientific purposes were ensured. The study was conducted in compliance with the ethical principles outlined in the guidelines of The European code of conduct for research integrity (n.d.) and the General data protection regulation (2018). The research also respected the principles of academic integrity, including honesty, transparency, and respect for the dignity and rights of all participants.

RESULTS AND DISCUSSION

KSMA was temporary relocated to Odesa, Ukraine due to the occupation of region by russian militaries and later due to severe bombing after de-occupation. The Academy lost its possibility to conduct offline learning and has chosen the only way to continue its activities – e-learning mode. LMS MOODLE was chosen as one platform where all online courses are settled. Basic Safety course is one of the essential courses for future maritime professionals as it provides the knowledge on personal safety, basic firefighting, personal survival techniques and elementary first aid. The marks (course points) were chosen as the main quantitative indicators of EG and CG. To motivate cadets more in achieving higher scores gamification approach was chosen as one of the main key elements. As one of the gamification elements the course has map at the beginning so that every user can check the lists of course topics (Shortt *et al.*, 2023). Map also serves as a visual or detailed overview of the structure, content, and objectives of the course.

All course participants receive points for the activities they complete during the learning process. These points serve as an indicator of students' progress and encourage active participation in course tasks. The full list of activities and the corresponding number of points for each

task are indicated in the Gradebook, which functions as a transparent system for monitoring learning achievements. Before the course begins, the tutor must properly set up the Gradebook by defining the types of activities, their weighting, and the maximum number of points that can be obtained for each task.

Cadets can access information about the grading system through the course map, which provides a clear overview of the course structure and assessment criteria. By reviewing the map, students can see the types of activities included in the course, such as quizzes, assignments, discussions, or collaborative tasks, as well as the number of points they may receive after successfully completing them. This approach helps cadets better understand the expectations of the course, plan their learning activities, and monitor their own progress throughout the training process. Moreover, the use of a structured Gradebook (Fig. 3) promotes transparency, fairness in assessment, and motivates learners to complete all tasks in order to achieve higher results.

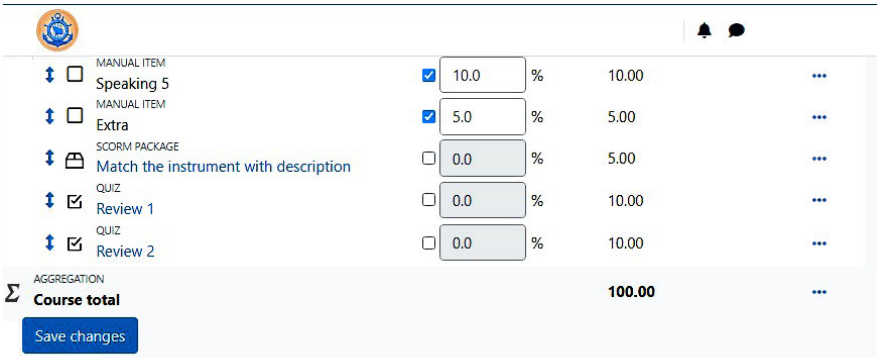

Figure 3. Gradebook on LMS MOODLE with points setup
Source: Online learning at the Kherson State Maritime Academy (n.d.)

To enhance engagement and foster healthy competition among learners, leader boards are also used as an effective gamification element in online learning environments. Leader boards display the results of participants and allow cadets to compare their achievements with those of their peers, which can increase motivation and stimulate active participation in course activities. In the MOODLE, tutors could create leader boards automatically based on the results of assessed activities. This feature allows instructors to visualise students' progress and highlight the most active or successful participants in the course (Gurbuz & Celik, 2022).

To create a leader board, the tutor first turns on the editing mode in the course. After that, the instructor adds the Activity results block, which is responsible for displaying students' performance data. Once the block is added, it must be configured according to the course requirements. During the configuration process, the teacher selects the specific activity or assessment item from which the results will be displayed, such as a quiz, assignment, or other graded task. In addition, the teacher can determine how many students will appear on the leader board, for example by showing those with the highest or lowest marks. This flexibility allows tutors to adapt the leader board to the pedagogical goals of the course (Walker *et al.*, 2025).

MOODLE supports the use of badges as a gamification element to recognise and reward learners for their achievements. To add new badge tutor needs to choose in the Administration block – Badges – Add new badge. When cadets complete particular activities well they can automatically or manually receive the badges (Wahyuni & Iing, 2021). In order to collect all the possible badges on the course cadets try to do all the activities as best as they can. For example, the badge illustrated below is given by the end of First Aid module when cadets make their presentations on "First aid kit on the vessel" topic and teacher mark them (Fig. 4).

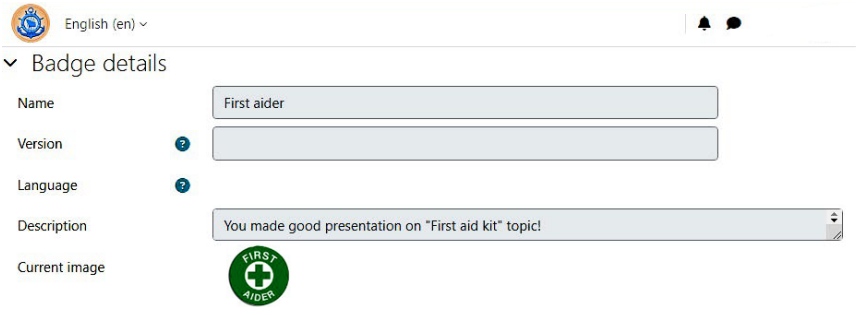

Figure 4. "First aider" badge details set up section opened by tutor
Source: Online learning at the Kherson State Maritime Academy (n.d.)

Game-based activities are mostly transferred from external websites (LearningApps.org, n.d.) which provide interactive tasks and exercises. In the MOODLE learning management system, such activities can be added using a special activity type called a SCORM package. This tool allows teachers to import ready-made interactive learning materials into the course and make them accessible to students. To add this activity, the teacher first turns on the editing mode in the course, selects Add an activity or resource, and then chooses the SCORM package option. After that, the instructor prepares the interactive activity by exporting it as a ZIP file from the external platform and uploading it to the MOODLE course. Once uploaded, the activity becomes available for students to complete directly within the learning environment. Game-based activities can also include multimedia elements, such as videos, images, and animations, which make the learning process more engaging and interactive (LearningApps.org, n.d.) (Fig. 5). The use of such activities helps increase students' motivation, supports active participation in learning tasks, and contributes to better understanding of the educational material.

Figure 5. Game based activity from external website on the topic "First aid"
Source: LearningApps.org (n.d.)

MOODLE provides flexibility in tracking and displaying learner progress, including the use of progress bars or circles, which allow both teachers and students to monitor the completion of course activities. These progress tracking tools are connected with the activities and resources within the course and help learners clearly see which tasks have already been completed and which still need to be done. Such visualisation of learning progress increases students' motivation and encourages them to complete tasks on time (Markopoulos *et al.*, 2020).

The LMS MOODLE also gives tutors the possibility to transform the course structure by integrating gamification elements, such as levels, missions, and sequential tasks. Teachers can rename course topics or modules according to the logic of the game and connect activities through specific settings. While editing the activity settings, the options Activity completion and Restrict access can be activated. In this way, a learner must successfully complete one task before gaining access to the next one. This approach creates a structured learning path that resembles game progression and stimulates cadets to continue their learning activities (Autsadee *et al.*, 2023). The use of gamification elements in the online course had a positive impact on students' engagement and learning outcomes. Questionnaire data showed that 78% of cadets reported increased interest in learning, while 71% demonstrated higher levels of intrinsic motivation.

By integrating elements such as points, leader boards, progress indicators, and sequential tasks, the learning process became more interactive and motivating for cadets. Cadets can clearly track their progress, compare their results with their peers, and see how each completed activity contributes to their overall performance in the course. This encourages them to participate more actively in learning activities and complete tasks more responsibly (Simanjuntak, 2024). Moreover, the use of various game-based platforms not only during classroom activities but also while completing home assignments further increased students' involvement in the learning process. Interactive tasks created on different digital platforms allowed cadets to practise professional vocabulary, grammar, and communication skills in a more engaging format outside the classroom. Such activities provided additional opportunities for independent learning and reinforced the material studied

during lessons. As a result, cadets remained actively involved in the course both during and after classes, which contributed to a deeper understanding of the content and more consistent development of their Maritime English skills (González Vallejo, 2024). According to Moodle analytics, overall learning activity increased by 37%, task completion rates by 42%, and independent work engagement by 29%.

In addition, gamified course design enables cadets to progress step by step through the course structure, completing tasks and unlocking new activities as they advance. This approach helps sustain learners' interest and supports their continuous involvement in the educational process. To evaluate the effectiveness of these pedagogical approaches, a comparative analysis of students' performance was conducted through pre-testing and post-testing stages. Students' motivation level (measured via questionnaires) and their improvement in test results are connected. Using correlation and regression analysis it can be said that motivation score and test results' improvements have strong positive correlation (with a correlation coefficient of r = 0.64, indicating a strong positive relationship between motivation and learning outcomes.). Cadets of EG became more independent and involved in educational process while experiment. In Figure 6, pre-testing has practically the same results in both the control and experimental groups. This indicates that the initial level of students' knowledge and skills in both groups was approximately equal before the implementation of the experimental methodology. Such similarity in the results confirms the comparability of the groups and creates reliable conditions for conducting the pedagogical experiment. Therefore, any further changes observed during the post-testing stage can be attributed to the influence of the applied teaching methods and pedagogical conditions introduced in the experimental group.

The results within the experimental group were homogeneous. The comprehensive analysis of both performance and motivational data provided a reliable basis for evaluating the overall effectiveness of the implemented pedagogical approach at the next stage of the study. After repeated testing, a comparison of the results with those of the initial assessment revealed a clear improvement in the participants' performance. The post-experimental test demonstrated higher scores among the cadets (from 62.4 to 81.7 points in the experimental group; +30.9%, compared to +12.8% in the control group), indicating that the integration of gamification elements into the learning environment contributed to a better understanding of the educational material and increased motivation to complete course activities (Fig. 7).

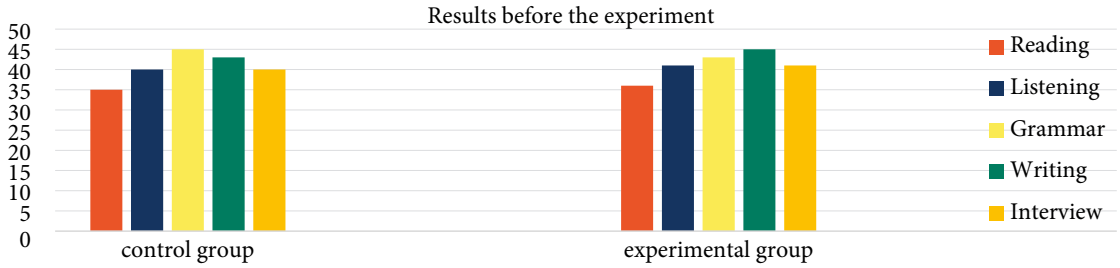

Figure 6. The results of both groups

Source: created by the author

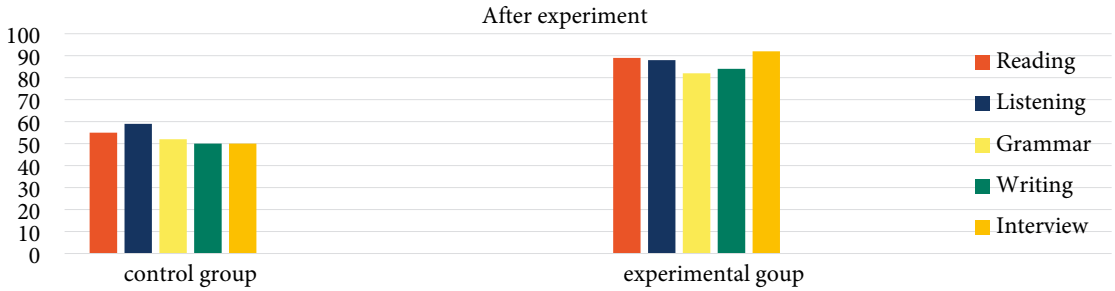

Figure 7. Post-experimental results of the control and experimental groups

Source: created by the authors

Almost all cadets of EG have received the improvements of their marks after the experiment. As shown in Figure 7, the experimental group demonstrates significantly higher results in all assessed language skills compared with the control group. The most noticeable differences can be observed in Reading, Writing, and Interview, where the experimental group achieved results close to 85-90 points, while the control group remained at approximately 50-55 points. Similar differences are also evident in Listening and Grammar, where the experimental group reached around 70-75 points, whereas the control group scored about 45-50 points. The most significant improvements were observed

in speaking (+34%) and listening (+31%) skills. The proportion of cadets who showed no improvement was lower in the experimental group (6.9%) compared to the control group (14.5%).

Making learning enjoyable gamification has shifted students' motivation toward extrinsic rather than intrinsic. The greatest impact on the development of individual language skills were done by Leaderboards and Missions with Levels. The feedback about this and explanations of the obtained results was received by the teachers involved. The implementation of gamification positively influenced on students' results as it had increased students' sense of competence and gave them more control over learning process. According to teachers' observations gamification elements like Leader boards, Missions with Levels, Map and Scores had the biggest influence on students' engagement.

Such results indicate that the cadets in the experimental group showed a substantial improvement in their language skills after the implementation of the proposed teaching approach, while the control group demonstrated only moderate progress. The findings suggest that the integration of innovative teaching methods and digital tools, particularly gamification elements and interactive learning activities, had a positive impact on cadets' engagement in the learning process. In addition, these tools supported the development of their communicative competence in Maritime English, encouraged more active participation in course tasks, and contributed to the overall effectiveness of training within the framework of maritime education.

Despite all the advantages listed above gamification has a list of disadvantages and challenges associated with its implementation. In some cases, cadets may become overly focused on earning rewards rather than engaging with the content for its intrinsic value. This can lead to superficial engagement and a lack of deep understanding. Gamification might initially boost engagement, but the novelty can wear off over time. If the gamified elements are not consistently updated or if learners lose interest, engagement levels may decline (Fazio, 2024). According to the researcher J. Xiao (2022) who investigated potential negative impact of gamification education it was also found that short-term gamification teaching with a total duration of less than 21 days and gamification teaching with rewards may be disadvantageous to some student groups, which are mainly introverts. By the end of the experiment conducted by teachers of KSMA it could be approved as the questionnaire also had some questions about students' traits of character and it is connected to their study results.

Scientist S. Liberty (2023) made a research of when and how is gamification harmful.The researcher concluded that it can easily do more harm than good because it is important to use it properly. Teachers of KSMA had the training in the Lifelong Learning Center (courses "E-course development on LMS MOODLE using e-learning tools and services" and "Blended learning as an innovative form of organising the educational process at educational institutions" which included modules on gamification). In case of incorrect use of gamification its effect can harm students' motivation, scores etc. The course "E-course development on LMS MOODLE using e-learning tools and services" is bilingual (for English teachers it is in English and in Ukrainian for others). The part of the course is shown below (Fig. 8). The module about gamification is called "Course gamification – missions, badges, leaderboards, maps, levels etc".

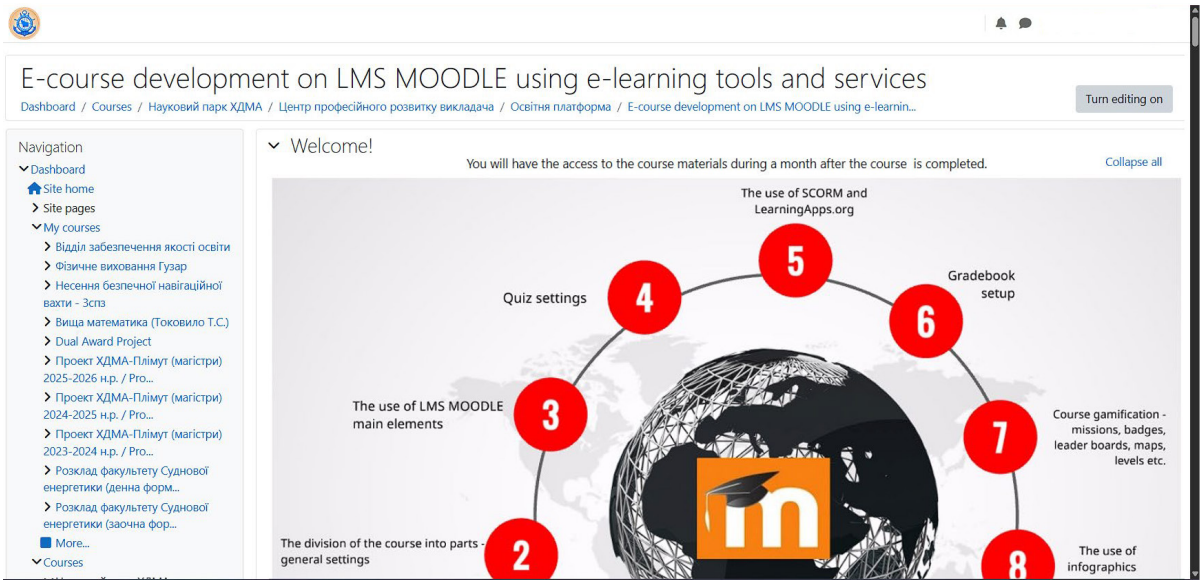

Figure 8. E-course development on LMS MOODLE using e-learning tools and services
Source: Lifelong Learning Center (n.d.)

The obtained results demonstrated consistent positive dynamics across all measured indicators, including motivation, activity, and academic performance, which confirms the effectiveness of gamification in the

educational process. Pros, cons, and practical insights of gamification in education were investigated by J. Ladouceur (2024). The author concluded with the following cons of gamification in learning: risk of extrinsic motivation over internal motivation; potential for competition-induced stress. The results of KSMA's teachers experiment hare the same because in Maritime English cadets may also focus on "getting points" instead of mastering communication skills critical for their safety on board vessel.

Scientists J. Rokhmat *et al.* (2025) revealed the weaknesses of applying gamification in science learning and overcoming it: a systematic review. They concluded that gamification has to be applied enticingly and thrillingly to students and contains game mechanics that apply to the situation matter. The same approach was used while pedagogical experiment at KSMA, the results of which confirmed the conclusions of the mentioned above scientists.

Negative effects of gamification in education software were studied by C. Almeida *et al.* (2022). The group of scientists proved that the gamification, when improperly applied, can have negative effects on education/learning software. Although positive effect of gamification after the experiment at KSMA have been also proved. Other gamification problems were identified by J. Jenkins (2025). The researcher described four main problems and ways of their avoiding. Teachers of KSMA involved in the experiment have used the tips on gamification problems avoiding while experiment and in their teaching on regular base. One of the most popular is considered to be not connecting the game to a learning objective of the lesson/module.

The Master Thesis on the negative effect of gamification in e-learning in the eyes of university students was written by Q. Dung Phung (2020). The following negative effects were analysed (demotivation, stressful, etc.). The researcher also agreed that gamification could be a meaningful way to increase student motivation and improve the educational effectiveness of online courses. Another challenges of gamification in enhancing student learning outcomes were analysed by D.R. Wulan *et al.* (2024). They concluded that gamification can be a powerful tool for improving student learning outcomes when applied thoughtfully, with attention to the diverse needs of learners and the educational context. The results of this study agree on D.R. Wulan's findings and prove the positive results in case of appropriate use of gamification by teachers. The ways on how gamification can hinder genuine learning were analysed by B. Jose *et al.* (2024). The following risks were analysed by group of scientists: surface-level engagement, stress, and inclusivity challenges. To mitigate these risks scientists, propose to use regular assessments of student engagement and wellbeing. In the experiment conducted at KSMA regular assessments are also an important part of learning process.

In the application of digital gamification approaches in teaching and learning the following challenges were highlighted by K. Muruga & K.A. Jamaludin (2025). The unequal digital access, varying levels of motivation, and differing cognitive readiness were analysed by explorers. They concluded that the digital access gap, differences in learning preferences, varying cognitive maturity levels, and uneven motivation negatively impact the effectiveness of gamification in enhancing student engagement and academic achievement. The same barriers were described by E.B. Sabornido *et al.* (2022). They reinforced the idea that knowing the challenges and barriers will help implementors of gamification to strategise in overcoming these obstacles. The authors agreed on the conclusions of the scientists mentioned above.

CONCLUSIONS

The results of the study confirmed that the integration of gamification elements – such as maps, points, leader boards, digital badges, game-based activities, progress indicators, levels, and missions – constitutes an effective pedagogical strategy for creating a dynamic and engaging learning environment for cadets during Basic Safety training on LMS Moodle, particularly under the challenging conditions of martial law in Ukraine. The implementation of these elements significantly enhanced the interactivity of the learning process and increased cadets' motivation. In particular, questionnaire results indicated that 78% of cadets reported increased interest in learning, while 71% demonstrated higher levels of intrinsic motivation. Moodle analytics further confirmed a 37% increase in overall learning activity, a 42% increase in task completion rates, and a 29% increase in independent work engagement.

The findings also demonstrated a positive impact of gamification on both learners' engagement and academic performance. The average post-test score in the experimental group increased from 62.4 to 81.7 points (+19.3 points; +30.9%), compared to a smaller improvement in the control group (+8.1 points; +12.8%). The most significant gains were observed in speaking (+34%) and listening (+31%), indicating the effectiveness of interactive and scenario-based learning activities. Cadets were able to monitor their progress, compare their achievements with peers, and maintain sustained motivation throughout the course. A positive correlation ($r = 0.64$) between motivation levels and learning outcomes further confirms the relationship between engagement and performance. Additionally, the proportion of cadets who showed no improvement was lower in the experimental group (6.9%) compared to the control group (14.5%), which indicates a more consistent learning effect.

Furthermore, the study highlighted the considerable potential of gamification within maritime education, particularly in safety training contexts, where maintaining attention, engagement, and practical readiness is of critical importance. Overall, the integration of gamified online courses ensures a more effective, interactive, and learner-centred educational experience for future seafarers in a modern digital learning environment, providing both measurable academic gains and sustainable motivational outcomes. The prospects for future research lie

in expanding the use of advanced digital learning technologies, such as virtual reality, augmented reality, and mixed reality, in the training of future maritime professionals, including navigators, ship engineers, and electrical engineers. These technologies may further enhance the realism of training scenarios, improve practical skill development, and strengthen the overall effectiveness of maritime education.

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CONFLICT OF INTEREST

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Альона Юрженко
Кандидат педагогічних наук, доцент
Херсонська державна морська академія
73000, просп. Незалежності, 20, м. Херсон, Україна
https://orcid.org/0000-0002-6560-4601
Олена Кононова
Викладач
Морський фаховий коледж Херсонської державної морської академії
73000, просп. Незалежності, 14, м. Херсон, Україна
https://orcid.org/ 0009-0007-1386-6590
Валерій Свирида
Викладач
Херсонська державна морська академія
73000, просп. Незалежності, 20, м. Херсон, Україна
https://orcid.org/0000-0003-2415-4461

Дослідження ролі гейміфікації у підвищенні залучення морських фахівців до навчання

Анотація. Цифровізація та вимоги до навчання роблять дедалі важливішим підвищення залученості студентів-моряків. Гейміфікація вважається інноваційним підходом, який сприяє інтенсифікації освітньої діяльності та підвищує ефективність професійної підготовки морських спеціалістів. Метою дослідження було вивчення ролі гейміфікації у підвищенні залученості до онлайн-курсів підготовки моряків. Методологія дослідження ґрунтувалася на поєднанні комплексу взаємопов'язаних теоретичних (аналіз, синтез, узагальнення, порівняння) та емпіричних методів (педагогічний експеримент, спостереження, анкетування, тестування), що забезпечило всебічне вивчення процесу підготовки майбутніх судномеханіків в умовах цифрового навчального середовища. У дослідженні проаналізовано можливості використання гейміфікації в електронному навчанні майбутніх морських фахівців на платформі LMS Moodle. Встановлено, що впровадження елементів гейміфікації, зокрема карт, балів, таблиць лідерів, цифрових бейджів, ігрових вправ, індикаторів виконання завдань, рівнів і місій, сприяє підвищенню зацікавленості та залученості курсантів до навчального процесу. Розроблено гейміфікований онлайн-курс з дисципліни «Безпека життєдіяльності», який містить навчальні матеріали з особистої безпеки, пожежогасіння, виживання та надання першої медичної допомоги. Описано практичний досвід створення елементів гейміфікації як у середовищі LMS Moodle, так і на зовнішніх веб-ресурсах з подальшою їх інтеграцією у навчальний курс. Встановлено, що використання гейміфікації формує більш динамічне навчальне середовище та позитивно впливає на мотивацію і навчальну активність здобувачів освіти. У результаті дослідження доведено, що гейміфіковані онлайн-курси підвищують ефективність навчання та покращують загальний освітній досвід майбутніх морських фахівців. Перспективи подальших досліджень вбачаються у використанні інших цифрових інструментів електронного навчання (наприклад, віртуальної реальності, доповненої реальності, змішаної реальності) під час вивчення дисципліни «Основи безпеки життєдіяльності» майбутніми морськими фахівцями (судноводіями, судновими механіками, електромеханіками)

Ключові слова: морська освіта; персоналізований простір; електронне середовище; електронне навчання; суднові механіки