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THE IMPACT OF LABOUR MARKET ON ESP COURSES FOR MARINE ENGINEERS

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Abstract: The paper is devoted to the analysis of the modern maritime labor market (e.g., crewing agencies, shipowner companies) on the development of ESP courses for future ship engineers on LMS MOODLE. The technologies and concepts that are central to the Fourth Industrial Revolution were listed in the research. It was highlighted that the requirements for ESP are growing. An analysis of recent research and publications has been done. The research was conducted on the base of Kherson State Maritime Academy, Ukraine. The results of the research proved Artificial intelligence is playing an increasingly important role in the maritime industry. It was also proved that ESP programs constantly change from time to time due to the changes in the labor market.

Keywords*:* ESP curriculum design, digital transformation, AI in maritime education, MOODLE-based instruction

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1. Introduction

The rapid development of innovative technologies characterizes a new stage of the technical revolution and entails changes in the labour market. The use of artificial intelligence, robots, cyber-physical systems, 3D printing, and the launch of Smart Factory significantly creates a conflict of interest between the labour force and business. Every year, the number of professions is partially or completely transformed due to the increase in automation of workplaces. Elements of Industry 4.0 will change the nature of work, establish new requirements for employee qualifications, and affect the reduction of the labour force.

The shipping industry, due to objective factors, became one of the first to create and effectively use an open labour market, turning into a global, transnational shipping industry. In the global market for goods, services, labour, and capital, the shipping industry is experiencing significant structural changes related to ownership, financing, and crewing issues. These changes are due to the globalization of the world economy, particularly the economy of the Navy, whose role is growing in the global production cycle.

Maritime educational institutions of Ukraine continue to train maritime specialists, focusing on modern challenges of the labour market and the requirements of Industry 4.0 (Dou, 2025). The latest technologies, such as automation, Artificial Intelligence, the Internet of Things (IoT), and big data, are actively being implemented in the maritime industry, which creates new opportunities but also requires future specialists to have the appropriate competencies. Considering the trends of digitalization, maritime education institutions are adapting their curricula to train specialists who possess not only traditional technical knowledge, but also skills to work with digital systems. Particular attention is paid to the development of professional English (Malki, 2025), critical thinking and problem-solving skills (Šliogerienė et al., 2025), which are key in the conditions of the fourth industrial revolution. Cooperation with international companies and the integration of benchmarking approaches allow educational institutions to meet world standards and provide graduates with competitiveness in the global labour market. Industry 4.0 requires future ship engineers to have a high level of digital literacy, the ability to adapt to rapid changes and work in conditions of integration of modern technologies into the maritime environment (Diahyleva et al., 2024).

Shipping companies place high demands on the professional training of ship engineers, in particular, on the proficiency of English in specific areas. Mastery of technical terminology, adherence to communication protocols, and understanding of safety procedures are key skills that affect the efficiency of work and safety on board. So, the relationship between the level of English language proficiency and the success of future ship engineers in the labour market is an important component. According to the results of a survey of employers, cadets with a higher level of language proficiency are better oriented in an international environment, interact more effectively with colleagues and adapt to work protocols faster. In Ukraine, educational programs are often focused on the academic, rather than the professional-communicative component. Therefore, the importance of implementing ESP is integrated into training, which improves the professional readiness of graduates.

In the context of Industry 4.0, the requirements for English for Specific Purposes (ESP) are also growing, especially in the maritime sector. New devices, automated systems, remote monitoring and control technologies bring with them new terms that require deep understanding and correct use. In addition, crews are increasingly requesting to discuss technical issues in English, as well as to use specific maritime terminology.

However, it is important not only to respond to current challenges but also to anticipate future needs. Industry 4.0 is constantly evolving, and educational institutions must prepare specialists to work with technologies that are just beginning to be used. This requires

systematic updating of training materials, integration of new topics into ESP programs, and development of skills to adapt to rapid changes in professional communication.

Automation and digitalization in shipping impose new requirements on cybersecurity. The use of Big Data and artificial intelligence helps to predict malfunctions of ship mechanisms, but at the same time creates risks of cyberattacks on the navigation and engine systems of ships. Therefore, maritime institutions are increasingly including disciplines related to cybersecurity in their curricula, which prepares future ship mechanics to work in conditions of digital threats.

The following scientists have studied the issue: M. Kaptan, C. Faggioni, K. Wróbel, K. Formela, M. Gil, S. Heirs, M.E. Manuel, I. Bartusevičienė, E. Valionienė, Z. Cheng, B.Z. Wang, Z. Jiang, L. Taksa.

2. Literature Review

The impact of the labour market on the skills needs of maritime officers has been studied by Kaptan (2022), who has produced comprehensive recommendations for improving human resource management practices in the maritime sector. In his work, he has examined in detail the factors determining the competitiveness of maritime professionals, including the need for continuous professional development, adaptation to new technologies, and the impact of automation on traditional crew duties. He has also highlighted the role of Industry 4.0 in transforming maritime training and stressed the need to integrate digital competencies into curricula.

The maritime labour market in transition has been studied by the Italian scholar Faggioni (2024), who has conducted a thorough analysis of the changes in employment caused by digitalization and automation. His research focused on the relationship between the spread of digital technologies and the demand for new professional skills among seafarers. The scientist emphasized that shipping companies increasingly prefer specialists who possess not only technical knowledge but also skills in working with digital ship management systems, cybersecurity, and remote monitoring of ship mechanisms.

A comprehensive study of maritime employment and retention policies was conducted by Wróbel, Formela and Gil (2022). They analyzed the main challenges that shipping companies face when recruiting crews, including the growing shortage of qualified specialists and the need to adapt to new safety standards. One of the key conclusions of their study was that digitalization processes affect not only the technical training of seafarers but also their ability to quickly adapt to changes in the professional environment.

Hers and Manuel (2021) examined the structure of maritime education and proposed a model for training maritime specialists at the intermediate level, which takes into account modern challenges in the industry. They pointed out the need to implement flexible curricula that combine traditional technical disciplines with modern technological aspects, such as the use of digital simulators, big data analysis and remote control of ships.

Another interesting case related to the reform of maritime education was studied at the Lithuanian Maritime Academy. Bartusevičienė and Valionė (2021) analyzed changes in the curricula of this academy and found that the main challenge remains the compliance of educational standards with the real needs of the labor market. They proved that modern maritime education should take into account digitalization processes, which is especially relevant for future marine engineers who will work in the conditions of Industry 4.0.

An important aspect of the training of future seafarers is the knowledge of English, as it is the only official language of international shipping. A group of Australian scientists, which included Cheng, Wang, Jiang and Taksa (2021) investigated the impact of English language proficiency on the professional development and early integration of seafarers into the labor market. Their results proved that a high level of English language proficiency is a critical

factor for successful employment, improving career prospects and ensuring effective intercultural communication on board ships.

Based on the analysis, it can be concluded that the issue of the influence of the labor market on the formation of English for Special Purposes (ESP) curricula for future marine engineers remains insufficiently studied. Although numerous studies prove the importance of English in the professional environment, there is a need for further analysis of how ESP courses can be adapted to changes in the maritime industry associated with digitalization, automation and the integration of new technologies. This creates prospects for further research and the development of new educational approaches that will meet the modern requirements of the shipping industry.

3. Methodology

3.1 Context.

Nowadays the integration of innovation technologies into marine industry underscores the importance of English education as English is international language at sea. By aligning ESP courses with labour market demands, leveraging Learning Management Systems (LSMs), fostering industry collaboration, and ensuring continuous curriculum adaptation, modern maritime higher education institutions can equip future maritime professionals with the skills needed to thrive in a competitive and technologically advanced global environment. The efforts of such institutions (e.g. Kherson State Maritime Academy) will not only enhance employability of its graduates but also contribute to the overall modernization of the marine sector.

3.2 Participants.

Staff and students of Kherson State Maritime Academy (KSMA) and its structural subdivision– Maritime Applied College, Ukraine participated in the research. Ten ESP teachers of Marine Engineering faculty, English Language Department for Maritime Officers (abridged programme) and English Language Department for Marine Engineers; six ESP teachers from Maritime Applied College of KSMA, Ship engineering department. Total number of teaching staff participated in the research is sixteen persons. Students who participated in the research are first-year cadets of KSMA Marine Engineering faculty, mainly the graduates of Maritime Applied College of KSMA, 19-21 y.o., males. The total number of students is 178 persons. Informed consent has been obtained from all participants.

3.3 Procedures.

Students have been randomly divided into groups on the number they drew (even numbers - control group, uneven numbers - experimental group). The names of the groups are 211AP and 212AP, 211,212 and 213 where 2 is the name of the faculty (1 is for Navigation and 2 is for Marine Engineering); 1 is for the year of studying as all students are first-year cadets; AP means Abridged Programme. All groups conducted a survey before and after the pedagogical experiment. The survey was conducted on the LMS MOODLE of KSMA. Duration of experiment is the first semester of their studying – November 2024- February 2025 and second semester – February 2025- June 2025). The group which had blended learning – using Zoom with LMS MOODLE and offline studying in Odesa, Ukraine, for a month is called Control group (CG). CG is cadets from 212AP and 213 groups (80 cadets). Experimental group (EG) had remote learning using Zoom and LMS MOODLE only. EG is 211AP, 211 and 212. ESP sessions for EG had been directed mainly on crewing and shipping company demands to future ship engineers (e.g., Interview Questions were drilled as the starter of every lesson; real interview questions of V. Ships crewing company were taken from their official website).

3.4 Study limitations.

We confirm our study has several limitations. The first is the limited sample. The experiment participants (teaching staff and cadets) are from Ukraine. This may affect the generalizability of the findings to other geographical or socio-cultural contexts. There are also influences of the challenges in Ukraine's educational infrastructure on the attitude and experience of the participants (war in Ukraine). To our mind Ukraine's maritime industry challenges also influence findings as KSMA was conducting educational process in Kherson before March, 2022 but nowadays it's temporarily relocated to Odesa. Odesa also suffers from everyday air raids and often bombing. Thus, this research reflects a setting marked by crisis-driven adaptation rather than stable educational development. We also confirm the need for further research involving broader samples across different countries to validate the current findings in future.

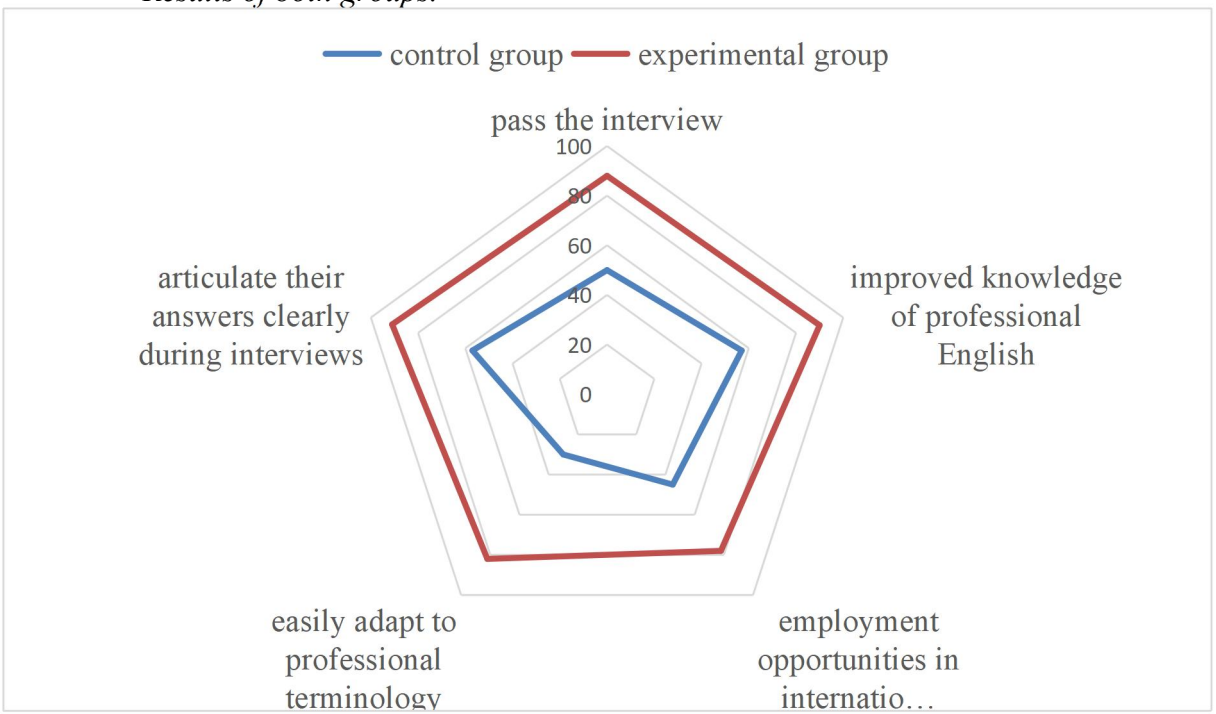
4. Results

The results of the pedagogical experiment confirmed the positive impact of (ESP) courses for students of EG. At the end of their training, 77 cadets successfully passed interviews at various companies and passed computer tests, receiving high scores. Some cadets were obtained places for their first shipboard practice, indicating a close connection between improving professional English skills and employment opportunities in international shipping companies. This indicates that the use of specialised language programs not only enhances the level of linguistic competence but also directly contributes to the competitiveness of graduates in the labour market (see Fig.1).

In contrast, 45 students from CG, who had limited exposure to specialized English training, managed to obtain placements during the same period (January-June 2025). This significant difference in the employment outcomes of the two groups demonstrates the effectiveness of targeted ESP training and its impact on the professional development of future ship engineers. The cadets who did not have sufficient English for Specific Purposes of training faced difficulties during interviews, especially in understanding technical questions and communicating fluently with potential employers.

Figure 1:

Results of both groups.



These results suggest that systematic and focused ESP training not only improves linguistic competence but also increases the cadets' confidence, their professional communication skills, and their ability to navigate effectively in a real maritime environment. The students who completed the ESP course were more easily able to adapt to professional terminology, were better prepared to maintain technical documentation in English, and were able to articulate their answers clearly during interviews.

The differences between the two groups highlight the crucial role of industry-specific language training in shaping the key competencies of future marine engineers. Furthermore, in addition, an analysis of employer feedback confirmed that cadets with a higher level of English for classes demonstrated significantly better adaptability during interviews, as well as confidence in applying language skills in real-world work situations. In particular, they demonstrated greater stress resistance and professional flexibility in communicating with representatives of international crews, demonstrating the ability to respond quickly to instructions in English and clarify technical details without additional translation.

Such students were better able to navigate the specific terminology used in technical documentation, equipment instructions, ship's logs and international regulations. This ensured a higher level of professional safety and reduced the likelihood of errors when performing critical tasks. They not only more easily established cross-cultural communication with colleagues, but also participated more actively in briefings, meetings and technical discussions.

Moreover, such cadets demonstrated faster integration into multinational teams, better adherence to STCW standards, and, thanks to their confident language skills, were able to more quickly master safety protocols, radio procedures, and reporting requirements. This demonstrates the practical value of advanced English training, which directly affects the quality of professional duties in the international maritime environment.

The results further highlight the value of ESP courses in maritime education. They demonstrate that integrating English for Special Purposes into the educational process not only improves language proficiency but also creates practical benefits for cadets, helping them to successfully integrate into the professional environment. Therefore, further development and expansion of ESP programs is strategically important to train highly qualified ship engineers who can operate effectively in the global maritime sector.

5. Discussion

Automation is gradually covering all aspects of shipping, from engine rooms to navigation systems. Future ship engineers must have knowledge of modern monitoring and control systems for ship power plants that track the performance of engines, fuel systems, and other key elements. Particular attention should be paid to remote-controlled technologies based on the operation of sensors and sensors for data collection and analysis. It is also important to familiarize cadets with the principles of autonomous ships, which are the future of the maritime industry.

In order to deepen the theoretical basis of the study, it is advisable to consider needs analysis as the basis for forming the content of the ESP course. According to the model of Hutchinson and Waters (1987), effective teaching of professional English should be based on taking into account both the target needs of students (target needs) and the needs of the learning process (learning needs). Target needs include what the student needs to know in order to function effectively in the future professional environment, that is, what language knowledge, skills and genres he will need for real communication on a seagoing vessel, in technical documentation or international briefing. For example, a future ship mechanic needs to be able to exchange messages in English in emergency situations, read equipment instructions or write technical reports.

Learning needs, in turn, relate to how students should learn to achieve these goals. This involves taking into account aspects such as previous language experience, level of English proficiency, learning styles, motivation, as well as the socio-cultural context in which the training takes place. Thus, an effective ESP course for marine engineers should be not only professionally relevant, but also adapted to the educational needs of a specific audience, taking into account the realities of the educational institution, the features of blended learning and the digital environment.

It is the systematic approach to the analysis of both groups of needs, as proposed by Hutchinson and Waters, that allows for the creation of ESP programs that are simultaneously practice-oriented, motivationally rich and didactically effective. ESP should include professional terminology related to automation, technical instructions in English, as well as case studies for the practical application of the knowledge gained. This will allow specialists to work confidently in the conditions of modern automation. Ship engineers must understand and apply specialized terminology related to the operation of power plants, fuel systems, hydraulics and automation. In addition, it is necessary to be able to read and analyse technical manuals, drawings, maintenance logs and fault reports. Ship engineers must also have correspondence skills, as most reports and communications onboard are in English.

Modern technological changes also affect language requirements. With the introduction of digital ship logs, automated monitoring systems and remote diagnostics, ship engineers must not only understand technical terms but also be able to correctly transmit information about malfunctions in electronic format. Based on the Canale & Swain (1980) model, classes are structured so that language is not just a grammatical object, but a means of action. Students use language for daily professional communications (carry out engine repairs, bunkering duties, actions during fuel spills, etc.).

The role of the teacher as a facilitator within the communicative approach involves deeper involvement of students in the learning process, where he does not simply transmit knowledge or "gives rules", but creates favourable conditions for independent discovery, practical assimilation and reflection. Such a teacher coordinates, directs and supports the cognitive activity of students, stimulates their speech activity, helps to overcome difficulties in communication, creates situations of success and encourages initiative.

Instead of imposing ready-made language structures, the facilitator helps students to understand the patterns of language themselves, experiment with it, and try out new speech strategies. In this approach, learning becomes learner-centered, and the teacher is the architect of the learning environment, which takes into account the needs, learning styles, interests and level of autonomy of students. It is thanks to the facilitating role of the teacher that an atmosphere of trust, creativity and interaction is formed - key factors for effective mastery of a foreign language in a modern educational environment.

Learning focuses on performing practical tasks (conducting an interview, describing actions in relation to a fire, etc.), which stimulate discursive and strategic competence. Tasks become “micro-ecosystems” of language use - real, functional, with the possibility of self-regulation.

Given the growing role of technology, ESP programs must adapt to new challenges, including working with digital systems and automated processes. Accordingly, English-language training should cover not only traditional technical vocabulary but also terminology related to digitalization, management of complex automated systems, and maintenance of intelligent equipment. One of the key aspects of updating ESP programs is the introduction of training materials that contain technical documentation of the latest ship systems, operating instructions for digital monitoring and diagnostic platforms, as well as simulation modules for practicing scenarios of interaction with autonomous technologies. For example, modern ship power plants include automated control systems that require not only technical expertise but

also the ability to work with digital interfaces, read analytical reports, and communicate in English in real time.

Artificial intelligence (AI) is playing an increasingly important role in the maritime industry, in particular in optimizing ship routes, predicting technical malfunctions, and automated control of mechanisms. For example, the use of AI allows for weather analysis, fuel savings, and human error reduction. The integration of special topics such as automation, AI and environmental standards into the curricula will contribute to the development of professional competence of marine engineers who will meet the requirements of the modern labour market and the challenges of the industry, thereby engaging them in distance STEM education (Kononova & Yurzhenko, 2020).In addition, maritime educational institutions should integrate interactive teaching methods to prepare cadets for work in a high-tech environment. This may include the usage of VR and AR simulators that simulate the operation of automated propulsion systems, remote control of systems via digital platforms, and processing large data sets that allow for the prediction of technical malfunctions.

International environmental standards set by organizations such as IMO have a significant impact on the maritime industry. ESP should integrate environmental terminology and practical tasks aimed at solving real environmental problems, training in everyday, technical and emergency communication to ensure proper understanding between crew members of different nationalities.

By studying cases in the class, students first of all learn to think critically, work in a team, discuss, listen to, and respect everyone's opinion, and take responsibility for the decisions made (see Fig. 2). One of the examples is the use of Assignment activity on LMS MOODLE. Teachers of ESP create case instructions using text and images. Case instruction in our example is “You work on LPG or LNG carrier. Write an e-mail message to your friend about her particulars and the peculiar storage tanks”. The picture of LNG tanker was added below. Students have the possibility to download their works in two ways: as a document or to type a text directly into the editor field. After submission teachers check the answer and provide their feedback: as a file/text/image. The student has the possibility to reply. Teachers grade the work by the end.

In the future, the demand for knowledge of specific technical terminology related to automated systems, cybersecurity, big data analysis, and remote control of ship mechanisms will increase. ESP should also include materials that teach how to quickly master new terminology, work with technical instructions in English, and communicate effectively in conditions of dynamic change. Thus, ESP programs should stay ahead of technological innovations, providing graduates with skills that will meet future needs, e.g. digital communication, teamwork, problem-solving in networked environments (Dyagileva et al., 2020).

Improving students` English language skills improve their job prospects by completing job interviews. Many shipping companies conduct job interviews in English, where candidates are required to demonstrate not only their technical knowledge but also their ability to communicate effectively with managers, other crew members, and shore personnel. Cadets who have studied ESP show greater confidence in expressing themselves, articulating their skills, and accurately understanding interview questions.

In addition to technical training, the modern job marketplaces high demands on soft skills, which are critical for working in multinational teams. In the maritime industry, ship engineers often interact with crews of different nationalities, which requires developed cross-cultural communication skills. Numerous studies and real-life examples highlight the positive impact of ESP training on employability and career development in the maritime sector. Studies conducted at maritime academies and training institutions consistently show that

cadets who undergo intensive ESP training are more likely to find employment than those with limited English skills (Asrifan et al., 2025).

The ability to adapt to cultural differences, avoid conflicts, and ensure effective cooperation are key to achieving teamwork on board a ship. Thus, adapting ESP to modern realities involves not only expanding the terminology but also introducing practice-oriented teaching methods that form digital literacy, critical thinking, the ability to effectively use English by future ship engineers in the context of the digital transformation of the maritime industry and mastery of modern digital tools (the learning process must include tasks that involve the use of these tools and the development of appropriate skills) and the ability to effectively use English to solve professional tasks.

The introduction of practice-oriented teaching methods is another important aspect of adaptation. Instead of traditional memorization of terms, students are offered practical tasks that simulate real situations that they may encounter on a ship. This allows them not only to learn the terminology but also to learn how to apply it in practice, develop digital literacy, critical thinking and the ability to use English effectively in the context of the digital transformation of the maritime industry. Therefore, the training process should include tasks that involve the development of oral and written communication skills in English.

6. Conclusion

Modern technological changes and globalization significantly affect the requirements for maritime establishments and maritime English for marine engineers. To ensure a high level of professional training, it is necessary to integrate topics related to automation, AI, digital innovations, and environmental standards into the training programs. At the same time, it is important to anticipate future market needs by implementing adaptive training materials that are ahead of technological progress.

In addition to technical training, soft skills such as intercultural communication, critical thinking, and adaptability, which are necessary for working in multinational teams, play a key role. The development of these skills, combined with a high level of English language proficiency, will allow graduates to successfully integrate into the professional environment, meet the challenges of Industry 4.0, and contribute to the sustainable development of the maritime industry. Thus, the adaptation of English for Specific Purposes to new realities and market requirements is a necessary condition for training competitive specialists who are able to work effectively in a globalized world.

The results of the study are of great importance for higher maritime education institutions in Ukraine. They confirm the need to strengthen the communicative component in teaching English for Special Purposes (ESP), especially for marine engineers. Other Ukrainian HEIs can introduce adapted ESP courses taking into account the specifics of the industry and the requirements of employers. Such an approach will allow to strengthen the professional language training of students, increase their competitiveness and readiness for the internationalized labor market. Such approaches to the formation of curricula, the introduction of authentic materials (such as technical documentation, real instructions from ships), as well as the use of simulations of real professional situations in the educational process, can be integrated into training programs in IMO (International Maritime Organization) member countries that are interested in unifying the standards for training maritime specialists.

We can see the prospects of further research in analyzing the impact of the labour market on ESP courses for the development of other marine industry workers (e.g., ship navigators, and electrical engineers). Our plans for triangulating feedback in future research include: feedback from cadets; educators' insights; learning analytics at different stages of the educational process.

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Appendix

Figure 2:

Case study on LMS MOODLE