

Boosting student attendance in Maritime Education and Training: insights from the ASAP-UPC project

Marcella Castells-Sanabra^{1,*}, Elisabet Mas de les Valls², Roger Castells-Martínez², Claudia Barahona-Fuentes³, Clara Borén¹, Rosa M. Fernandez-Canti⁴, Anna Muijal-Colilles¹, Roser Capdevila²

ARTICLE INFO

Article history:

Received 21 May 2026;
in revised form 01 Jan 2026;
accepted 15 Jan 2026.

Keywords:

Student Absenteeism; Maritime Education and Training (MET); class attendance; active learning methodologies; higher education.

ABSTRACT

Student attendance at classes is a key indicator of enthusiasm and academic performance when it is neither mandatory nor included in the evaluation criteria. Low attendance not only reveals issues that hinder learning but also challenges compliance with the standards established by the STCW convention. This study examines the academic impact, causes, and prevalence of absenteeism on students at the Barcelona School of Nautical Studies (FNB-UPC), and proposes evidence-based measures to address it. Findings reveal significant absenteeism in larger groups, particularly at the Bachelor's level, with students expressing dissatisfaction with the teaching methodologies and the balance between theoretical content and practical application. On the other hand, research shows a positive correlation between higher attendance and improved academic performance. The study suggests that aligning teaching and assessment methodologies, incorporating skills relevant for the maritime industry, and offering more problem-solving activities can increase class engagement and attendance. These results highlight areas for improvement so that students can benefit from a more successful academic experience. Thus, the outcomes of the present research are relevant for not only FNB-UPC lecturers but also decision-makers. Moreover, the findings have potential applications for other Maritime Education and Training Institutions, offering valuable insights into effective strategies for reducing absenteeism and improving learning outcomes.

© SEECMAR | All rights reserved

1. Introduction.

Student attendance at university has been related to enthusiasm and academic performance, provided that attendance is

neither compulsory nor part of the assessment criteria [1]. However, when reviewing the literature for specific absenteeism rates, relatively few studies are available. Reported absenteeism rates typically range between 30% and 50% across various academic contexts. For example, [2] reported such rates in an engineering college in India; similar figures have been observed in STEM and business programs in the United Kingdom [3], as well as in a chemistry degree program in Nigeria [4]. In contrast, significantly higher absenteeism rates have been recorded in an engineering degree in Spain, where rates increased from 70% to nearly 80% over the course of the 4-year program [5].

Numerous studies have explored the reasons of absenteeism in higher education institutions. [6] argue that various factors influence students' decisions to attend classes, including academic self-perception, attitudes towards lecturers, and academic performance. Other studies highlight additional context-

¹Department of Nautical Science and Engineering. Universitat Politècnica de Catalunya – BarcelonaTech, Spain; E-mails: marcella.castells@upc.edu, clara.boren@upc.edu, anna.muijal@upc.edu.

²Department of Heat Engines. Universitat Politècnica de Catalunya – BarcelonaTech, Spain; E-mails: elisabet.masdelesvalls@upc.edu, roger.castells.martinez@estudiantat.upc.edu, roser.capdevila@upc.edu.

³Department of History and Theory of Architecture and Communication Techniques. Universitat Politècnica de Catalunya – BarcelonaTech, Spain; E-mail: claudia.barahona@upc.edu.

⁴Department of Automatic Control. Universitat Politècnica de Catalunya – BarcelonaTech, Spain; E-mail: rosa.mari.fernandez@upc.edu.

*Corresponding author: Marcella Castells-Sanabra. E-mail: marcella.castells@upc.edu; Tel.: +0034 934010872.

specific influences. For instance, in a college in India, parental engagement and guidance were identified as the most relevant factors [2]. At a national university in Qatar, the main barrier to attendance was the difficulty of reaching the faculty [7]. In Canada, the main reason was the need to study and prepare for other courses, followed by psychological well-being challenges and inadequate sleep patterns [8].

A correlation between class attendance and academic achievement at university level has been identified [9,10,11]. But some debate exists regarding this relationship, with some researchers contesting that poor attainment can cause low attendance as well as vice versa [12]. A comprehensive global analysis of absenteeism worldwide is lacking, with only specific study-based absenteeism percentages currently available. According to [13], students regard the lecturer's teaching method and competence as the most influential factors of their absenteeism. Nevertheless, while low-quality lectures may foster absenteeism, higher-quality lectures do not necessarily guarantee increased attendance.

In the context of Maritime Education and Training (MET), the International Convention on Standards of Training, Certification and Watchkeeping (STCW), as amended, sets out the basic training requirements and competences that countries are obligated to meet or exceed by adapting standard models of competence-based training in accordance with the convention [14]. Therefore, Maritime Education and Training institutions (METIs) must respond to specific demands of internationalization and specialization by structuring their programs according to the International Maritime Organization (IMO) model courses and national implementations. These institutions must also provide aspiring seafarers with the skills and qualifications to pursue career opportunities in the maritime industry and serve safely and efficiently on board ships. Additionally, life-long training and certification help experienced seafarers keep up-to-date on new regulations, technologies and best practices, enhancing their employability and career prospects. The international nature of these standards ensures universal acknowledgment of minimum requirements, maintaining a consistent level of competency among seafarers regardless of their nationality or their vessel's flag.

In this context, effective classroom-based instruction plays a crucial role in ensuring that such competences are properly developed and consolidated. Accordingly, this paper presents the results of the teaching innovation project entitled "Active methodologies for face - to - face and participatory learning (ASAP-UPC)". This project seeks to quantify current levels of absenteeism, identify its main causes and propose initiatives to improve class attendance at the Barcelona School of Nautical Studies of Universitat Politècnica de Catalunya (FNB-UPC). The UPC is a Spanish public institution of research and higher education in the fields of engineering, architecture, sciences and technology. The UPC has 9 campuses and 17 schools among which is the Barcelona School of Nautical Studies (FNB). The FNB hosts 697 bachelor students and 117 master students (academic year 2023-24). The school offers three bachelor's degree programs: the Bachelor's degree in Marine Technologies (GTM), the Bachelor's degree in Nautical Science and Mar-

itime Transport (GNTM) and the Bachelor's degree in Naval Systems and Technology Engineering (GESTN). Additionally, the FNB offers three master's degree programs: the Master's degree in Nautical Science and Maritime Transport Management (MUNGTM), the Master's degree in the Management and Operation of Marine Energy Facilities (MUGOIEM) and Master's degree in Naval Architecture and Ocean Engineering - (MUENO). The GTM, GNTM, MUNGTM and MUGOIEM degrees are designed to train students to obtain the required STCW competences and certificates. All bachelor's degree programs are taught on campus while master's degree programs, with fewer applicants, are either taught on campus (MUENO) or in blended learning mode (MUNGTM and MUGOIEM). The reason why MUNGTM and MUGOIEM are taught using blended learning is the regulation of the STCW Convention by which maritime cadets must complete 12 months of on board training to be eligible for a Certificate of Competency (CoC). Many students in these masters' degrees are at the same time doing their on board training, which makes it difficult for them to attend classes. The general academic regulations of the UPC do not consider attendance compulsory and, therefore, do not establish rules in this regard [15]. At the FNB, the absenteeism rate has been steadily increasing, causing concern among teaching staff. The first attempt to understand the current situation and take action to implement measures was made in 2020-2021 through a general absenteeism survey distributed to all UPC students. Absenteeism was observed in all the centres surveyed, with an average of 39.76% [16]. Although the results were clearly influenced by the Covid-19 pandemic consequences, the underlying reasons for the high absenteeism rate indicated the need for further research.

The present study aims to assess the current absenteeism situation and to propose mitigation strategies by addressing the following research questions (RQ):

RQ1. What are the underlying causes of absenteeism at the FNB?

RQ2. What is the extent of absenteeism at the FNB, and which degree programs are the most affected?

RQ3. How effectively do students acquire transversal competences and skills according to maritime companies?

RQ4. What teaching methodologies do FNB lecturers and students consider most effective in improving class attendance?

RQ5. Is there a correlation between attendance and attainment at the FNB?

Following this introduction, Section 2 outlines the theoretical framework that supports study, providing the conceptual foundation for the research. Section 3 describes the research methodology employed. Section 4 presents the main results derived from a survey and tracking attendance analysis based on the research questions. Section 5 includes a discussion of the overall results and Section 6 the conclusions.

2. Theoretical framework.

Recent studies converge on teaching methodology as a determinant factor to improve students' motivation and attendance

[17,18]. Traditional teacher-centred approaches often have been associated with disengagement and higher absenteeism rates [19]. The design and development of learning activities directly influence not only cognitive outcomes but also affective and behavioural engagement [20]. Teaching methodology, beyond referring to how knowledge is transmitted, also depicts how learning environments are designed to promote active student participation. Biggs' theory [21] of constructive alignment emphasizes that meaningful learning occurs when learning outcomes, instructional activities, and assessment tasks are coherently integrated. This perspective aligns with engagement theory [22], which proposes that students learn more effectively when they are involved in purposeful, interactive and collaborative tasks. In recent years, higher education institutions have increasingly adopted innovative teaching methodologies to enhance student engagement, promote active learning, and respond to the evolving demands of the 21st-century learner [23,24]. These approaches foster critical thinking, autonomy, and deeper involvement with content, and serve as a basis for a range of innovative teaching strategies. Among them, the flipped classroom has shown strong potential to improve academic outcomes and learner satisfaction when combined with interactive in-class activities [25]. Recent studies have also emphasized the effectiveness of gamification, particularly when integrated into learning management systems, as a tool to increase motivation and participation across diverse disciplines [26]. Likewise, microlearning has gained attention for its adaptability to students' cognitive loads and attention spans in virtual formats [27]. [28] present an initiative from the University of Queensland, Australia, which addresses absenteeism by proposing a set of learning strategies designed to encourage class attendance and actively interact with lecturers, course material and students. To this aim, several changes are proposed, including: constructive alignment between course learning activities, the assessment and the learning outcomes; authentic learning; the enhancement of workplace skills; in-class active learning activities; the build-up of a professional network with mates; and testing students frequently, among other actions. These emerging methodologies, among others, reflect a broader shift toward student-centred learning, based on active participation, critical thinking, and formative assessment.

In the field of MET, the adoption of active and technology-enhanced teaching methodologies has demonstrated positive outcomes, particularly in fostering practical skills and operational decision-making. In this regard, [29] identified the main soft skills required for maritime professionals, highlighting the importance of integrating competency-based approaches into maritime training programs. The Special Issue Guest Editorial on Theory in Maritime Education and Training (MET) [30] presents a collection of MET research papers, including studies on simulator - based training, activity theory in digitalized workplaces, and formative assessment, each contributing to the advancement of teaching innovation in maritime education. [31] show that immersive VR training significantly improves navigator cadets' cognitive effort, memorization, and overall learning performance by about 26%, supporting safer professional operations. Similarly, [32] develops a virtual reality-based lifeboat

training system aimed at enhancing maritime safety education through interactive simulation. In addition, [33] develop a 3D real-time strategy game designed to train maritime professionals and students in navigational safety, embedding educational design principles to balance learning outcomes with engaging game play. Furthermore, [34] reinforcing the role of advanced simulation and targeted skill development in next-generation maritime education. These approaches exemplify the complex nature of maritime education and how to improve learning outcomes by boosting student engagement, motivation, and participation.

3. Methods.

To address the formulated research questions, this study adopts a research approach based on participatory action research (PAR) to collaboratively find a solution to a problem in a local setting and, in this way, transform a shared situation [35,36]. In education, PAR is not only socially responsive but also empowering as it enables practitioners to join forces to transform their practices. More specifically, the project team members are active participants in the research and are therefore responsible for choosing the research topic, deciding, collecting and analysing data on action and measures to be taken, which aligns with Participatory Insider Action Research (PIAR) [37,38,39].

The research methods applied in this study include surveys, interviews and document analysis, which serve to analyse and quantify the current level of absenteeism as well as its main causes and the relationship between attendance and attainment within the nautical field. The aim is to determine the impact of absenteeism on students.

The study was implemented in different stages (see Figure 1). Initially, to assess absenteeism within the area of MET, the methodology employed involved surveys and in-person interviews. These methods were used to gather insights on students' and lecturers' perceptions of student attendance and effective acquisition of professional maritime skills according to the expectations of maritime companies. In parallel, daily attendance was tracked and analysed together with students' grades, as part of the document-analysis method. This study is part of an educational innovation project funded under the UPC Teaching Innovation Projects 2023 Call Resolution. Within this institutional framework, the collection of student data during the academic year in which the project is active is already anticipated and permitted for the purpose of improving teaching and learning processes. All data collected were anonymized and processed in accordance with the principles of the GDPR. Students were informed that their participation in surveys, interviews and tracking attendance, grades and feedback activities was voluntary and for academic improvement purposes only. The collected data were processed and analysed using descriptive statistical methods. This analysis enables the identification of the main causes of absenteeism, as well as the degree programmes most affected. Drawing on the literature on effective teaching methodologies and on the outcomes of surveys, interviews and document analysis, specific pedagogical strategies

were subsequently proposed in what is here named Redesign teaching methods (see Figure 1). This redesign should yield to practices that reduce absenteeism within these target groups and enhance the acquisition of the skills that, according to maritime companies, should be reinforced during the learning process.

Figure 1: Research methods. Hollow circles indicate in-person surveys or interviews whereas full circles indicate online surveys.



YEAR	Semester	Activity	Students	Lecturer	Industry
2022/2023	2nd Semester	Surveys	●		
		In-person interviews	○		
2023/2024	1st Semester	Surveys	●	●	
		Daily attendance	○		
2024/2025	2nd Semester	Surveys	●	●	○
		Daily attendance	○		
		Redesign teaching methods		●	

Source: Authors.

3.1. Surveys & Interviews.

To answer the above research questions, the project team designed and carried out five online surveys (three for students and two for lecturers), together with in-person interviews and one paper-based survey for maritime companies, over three semesters. These surveys were developed by the project's teaching team through an iterative process. Initial drafts were designed based on the project's objectives and were then revised and refined in response to preliminary findings. This approach allowed the instruments to remain closely aligned with the focus of the research and the practical insights gained during implementation. The following research instruments were developed:

- **Online Students' Surveys:** Questionnaires were distributed to students participating in the ASAP-UPC project to gather data on absenteeism, strategies to reduce it, and the skills students considered most important, among other topics. The survey went through three iterations, with the final version simplified. It was anonymous and conducted online via a link shared through the academic platform.
- **In-person Students' Interviews:** Semi-structured interviews were conducted with students who had low attendance, using the same questions as the student survey. These interviews followed a flexible format, allowing for the exploration of emerging topics during the conversation. To preserve anonymity, interviews were done by non-teaching lecturers.

- **Lecturers' survey:** Two surveys were designed. The first, distributed to all lecturers, gathered insights on current or planned measures to improve teaching quality, including perceptions of student absenteeism. The second targeted ASAP-UPC lecturers specifically, aiming to identify planned actions within each course to boost student attendance.
- **Industry survey:** maritime companies were asked to fill out a questionnaire evaluating their satisfaction with employability skills acquired by students.

First, a survey, which targeted undergraduate students enrolled in the second semester of the 2022-23 academic year, was created to identify the factors behind students' absenteeism (RQ1), explore strategies that could improve attendance (RQ4), and determine the skills they consider most crucial for their profession (RQ3). During the same semester, some in-person interviews were conducted with students who attended less than 25% of the classes, inquiring about the specific reasons for their non-attendance. Based on the analysis of the initial results, an improved version of the survey was administrated to students of Bachelor's and Master's degree programs described in Table 1 during the first semester of the 2023-24 academic year. In addition, during the second semester of the 2023-24 academic year, two specific surveys were conducted among students to gather specific actions on how to reduce absenteeism (RQ4) and analyse the skills that were worst rated by maritime companies (RQ3).

Two supplementary surveys were also conducted at the beginning of the second semester of the 2023-24 academic year: one targeted to FNB lecturers and the other targeted to maritime industries. The lecturers' online survey included basic questions regarding the type of the course, whether attendance was compulsory and the evolution of absenteeism over the years (RQ2), as well as more specific questions about potential actions to improve attendance (RQ4). The survey to maritime industries sought to determine if FNB students acquire the necessary skills to develop their professional career (RQ3). Thus, a paper-based survey was administered to the companies participating in the employability event that is held at the FNB every academic year (the so-called "Mota i Fusta" exhibition) with the aim of identifying the skills least effectively acquired by FNB students, from the employers' perspective. The last edition of this forum was held on March 20th, 2024. The companies and institutions that participated in this survey include the port authorities, various shipping companies and shipyards, energy generation companies and service companies. All of them hire or have hired FNB graduates in recent years. In the survey, the companies assessed FNB students' acquisition of skills from a list of 28 professional skills.

3.2. Daily Attendance record.

Tracking class attendance is essential for evaluating absenteeism for several reasons. First, it makes it possible to quantify the extent of absenteeism at the FNB and the most affected degree programs (RQ2). It also enables lecturers to identify

trends and patterns in student attendance, which can reveal potential issues such as disengagement, disinterest, or personal challenges that may be hindering students from attending class regularly. By understanding these patterns, lecturers can intervene at an early stage and provide the necessary support to help students stay on track academically. Moreover, when analysed together with students' grades, attendance records can indicate whether a correlation exists between attendance and attainment (RQ5); thereby allowing the academic impact of absenteeism to be quantified.

Daily attendance was tracked individually for courses taught by ASAP-UPC lecturers and analysed together with students' grades at the end of both semesters of the 2023-24 academic year. All data collected were anonymized. Students were informed that their participation in surveys, interviews and tracking attendance, grades and feedback activities was voluntary and for academic improvement purposes only.

3.3. Redesign teaching methods.

The redesign of pedagogical strategies was proposed to all ASAP-UPC lecturers building upon the literature on effective teaching methodologies and the findings throughout the surveys, interviews and document analysis.

The pedagogical approaches identified in the literature as evidence-based approaches focus on shifting instruction toward active, student-centred engagement. For instance, Project-Based Learning (PBL) and Challenge-Based Learning (CBL) are foundational approaches that structure instruction around complex, authentic tasks. These methodologies promote deep, significant learning and cultivate essential competencies, such as team collaboration. Another essential methodology is the Flipped Classroom model. This approach strategically moves direct instruction, typically delivered via traditional lectures, outside of scheduled class time. Consequently, the valuable in-person class time is dedicated to active, application-focused sessions, which include exercises, discussions, and collaborative work, maximizing practical engagement.

Furthermore, Practical and Simulation-Based Learning is crucial for increasing engagement. This involves incorporating real-life practical sessions, laboratory work, and advanced simulator-based training. The goal is to provide students with hands-on experience that is directly relevant to their professional future, bridging the gap between theory and practical competence.

Complementing these active learning strategies are approaches focused on inclusivity and equity. Feminist Pedagogy and Gender-Aware Course Transformation focus on developing equitable teaching practices that promote a holistic and ethical view of engineering, while actively working to address potential systemic biases within the curriculum and classroom environment.

Finally, maintaining Integrated Student Follow-up and Formative Assessment is vital. This involves the continuous monitoring of students and the strategic use of tools like in-class quizzes to ensure students are actively tracked and receive timely feedback, thereby fostering accountability and continuous engagement throughout the course.

ASAP-UPC lecturers applied these recommendations to redesign the teaching methods used in their lectures. Each lecturer documented the new design, the implementation process, and their observations in brief reports prepared according to a provided template. A document-analysis approach was then employed to identify trends and formulate additional recommendations.

4. Results.

4.1. Study sample and data collection.

The project team is composed of five lecturers involved in teaching both bachelor's and master's level courses. Data were collected from students enrolled in the courses delivered by this teaching team over the course of the project, which ran from the first semester of the 2022–2023 academic year through the second semester of 2023–2024. The courses analysed, along with their corresponding degree programs, teaching semesters, and student sample sizes, are summarized in Table 1, achieving a participation rate of 31.4%.

Table 1: Distribution of the sample of students, organized by degree program throughout the ASAP-UPC project.

Degree	No. courses	Year	Second semester 2022-2023	First semester 2023-2024	Second semester 2023-2024
GNTM	3	1st, 2nd, 3rd	151	41	114
GTM	2	1st, elective	-	25	6
GESTN	2	1st, elective	-	63	8
MUENO	1	1st	-	27	-
MUNGTM	2	2nd, 3rd	-	21	24

Source: Authors.

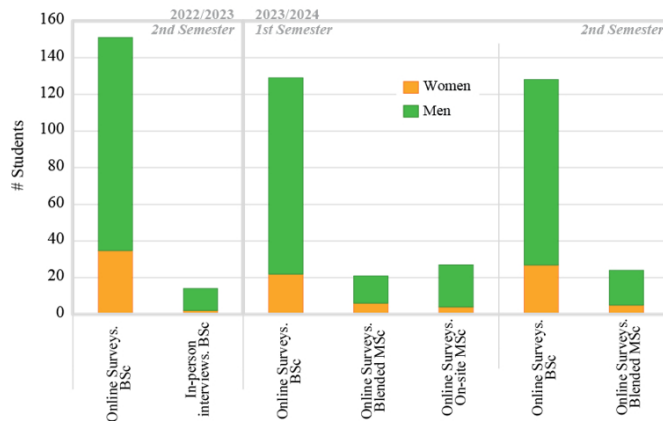
Figure 2 shows the number of targeted students involved throughout this entire period. A total of 480 students were surveyed over three semesters, with response rates of 37.1% for the first survey, 49.2% for the second, and 45.4% for the final survey. The percentage of enrolled male students was 79.3%, while female students represented 20.7% throughout the entire period considered. As shown in Figure 2, the participation rates are similar.

A total of 111 lecturers were surveyed in the first semester of the 2022–2023 academic year, yielding a 31.4% participation rate, and 12 of the 22 companies contacted responded to the survey, resulting in a 54.5% participation rate. Daily attendance was tracked across a total of 12 courses (six per semester), covering all disciplines taught at FNB.

4.2. Causes of absenteeism.

One of the objectives of surveys and interviews was to underlie causes of absenteeism at FNB (RQ1). In the first online survey, bachelor's students were asked about the reasons for not attending class. A high percentage (41.7%) responded "others," without specifying what these other reasons were in the open-ended question that followed. Consequently, the research team decided to conduct personal interviews with students who had attended less than 25% of classes to gain deeper insights into the causes of this absenteeism. According to the

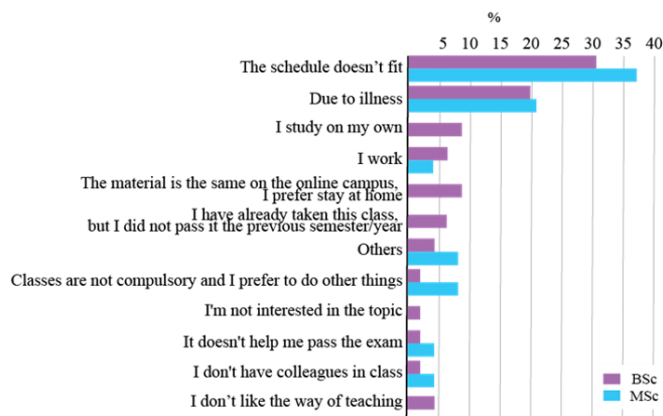
Figure 2: Online surveys and in-person interviews targeting MET students, disaggregated by sex.



Source: Authors.

responses, the main reason for not attending classes was work obligations (43%), despite acknowledging the importance of attending class. To get more insight in this “other” response, in the first semester of the 2023-24 academic year, the student’s survey was redesigned including more mandatory closed responses to this question to analyse it more effectively. The results show that 35% of students cannot attend classes due to time scheduling and 21% miss lessons due to medical reasons. It was observed that the percentage of “other” responses had decreased to 6%.

Figure 3: Participants’ main reasons for not attending classes, BSc: Bachelor’s students, MSc: Master’s students (First semester 2023-24 academic year).



Source: Authors.

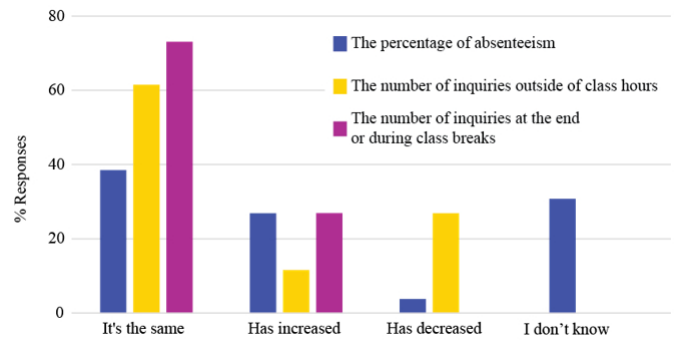
Figure 3 shows that, although the main causes of absenteeism are the same in bachelor’s (BSc) and master’s (MSc) degrees, students from bachelor’s degrees choose more reasons for non-attendance, while students from master’s degrees select fewer alternatives. In both cases, the main cause selected is that the schedule doesn’t fit and due to illness. With increasing academic pressures, mental health challenges, and the ongoing effects of the pandemic, students often find it hard to balance

their well-being with academic responsibilities. Other causes of absenteeism mentioned by students are that they don’t like the teaching methods, they prefer to study independently using available online resources, and that they would be more motivated to attend if they perceived that classes had greater value for their learning and are useful for passing their courses. For this study, we will focus on those responses directly related to the teaching approach to reduce absenteeism among students.

4.3. Extent of absenteeism.

From the first lecturers’ survey, we gathered information about lecturers’ perception regarding absenteeism after the COVID pandemic and how attendance has changed in various academic activities.

Figure 4: Lecturers’ perception regarding student’s absenteeism (First semester 2023-24 academic year).



Source: Authors.

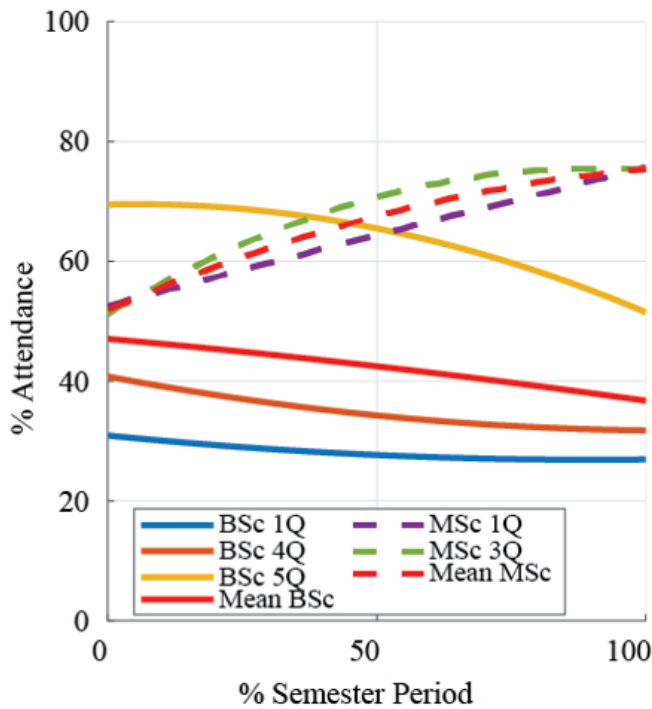
Figure 4 shows that, according to the lecturers’ perceptions, attendance has remained relatively stable across the different academic activities analysed. Between 20% and 30% of lecturers have observed a decline in both class attendance and the number of questions asked during office hours. However, there has been an increase in the number of questions raised at the end of lectures. It is important to highlight that a significant percentage of lecturers (30%) were unable to assess whether class attendance had remained stable, increased, or decreased.

On the other hand, one of the objectives of daily attendance records is to identify the extent of absenteeism at FNB by degree program and find what degree programs are the most affected (RQ2). Figure 5 presents the evolution of attendance rates for degree programs across both semesters (Q) of the 2023-24 academic year. In general terms, absenteeism tends to be higher in the case of bachelor’s degree programs, and attendance progressively decreases as the semester advances. However, attendance in bachelor’s programs shows a steady increase from the first-year semester (Q1) to the third-year (Q4 and Q5). In contrast, attendance levels in master’s programs remain relatively stable, with minimal variation between the first and second years and increases as the semester advances.

4.4. Professional Skills.

This section focuses on how well maritime companies perceive students’ acquisition of transversal competences and skills

Figure 5: Attendance rate evolution during 2023-24 academic year.



Source: Authors.

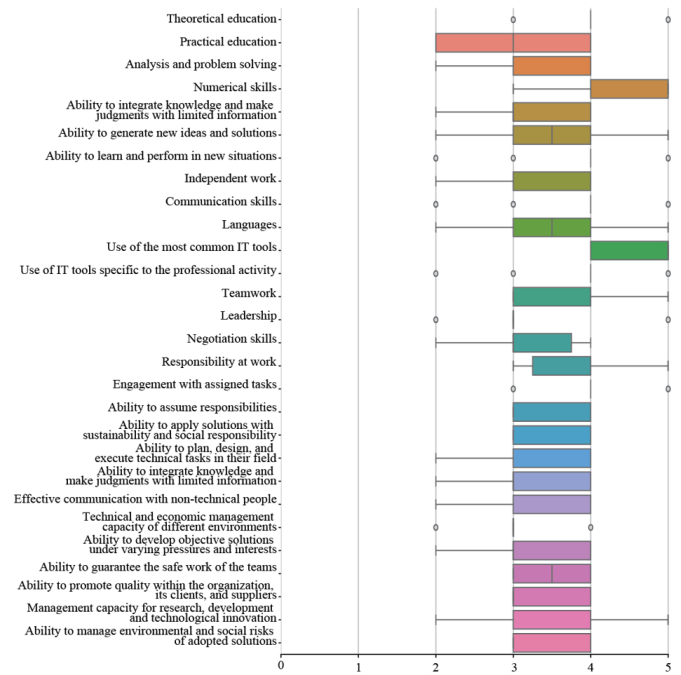
(RQ3). The insights gained from this analysis will contribute to enhancing maritime education programs to better meet both industry demands and student aspirations, which, in turn, may lead to greater engagement and increased attendance.

According to the results obtained from maritime companies, the training of FNB students across 28 professional skills has an overall satisfaction score of 7.6 out of 10. In addition, these companies are satisfied with the skills acquired by FNB students, as none of the assessed skills received a failing grade, and the average score was 3.6 out of 5.0. In Figure 6, skills have been graphically divided into hard and soft skills: upper and lower parts of the figure, respectively. Hard skills are rated with a 3.7 mean value and the lowest values are for “Practical Education” and “Ability to integrate knowledge and make judgments with limited information”. On the other hand, soft skills present a 3.6 average value and the worst rated abilities are “Leadership”, “Technical and economic management capacity of different environments” and “Negotiation skills”.

After analysing the competencies with the lowest ratings by FNB students’ employers, a survey was conducted among the students. The main goal was to analyse whether working on those skills worst rated by companies, would reduce absenteeism or not. The students were asked to rate their interest on the aforementioned skills on a scale from 0 to 5. Figure 7 presents the results of the survey related to the students’ interests.

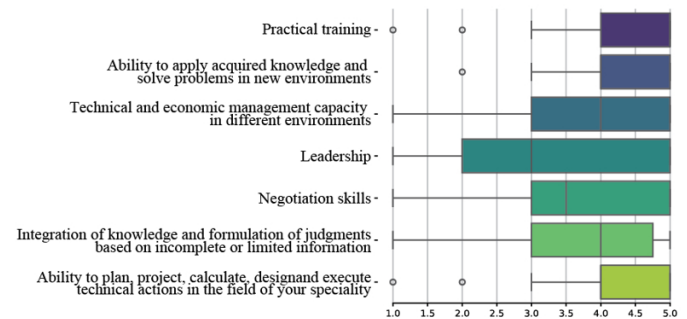
The overall insight of figure 7 is that both bachelor and master students show a clear preference for skills that focus on prac-

Figure 6: Boxplot of the “Mota i Fusta” maritime companies’ assessment of FNB students’ skills.



Source: Authors.

Figure 7: Results of the survey on skills’ rating interest.



Source: Authors.

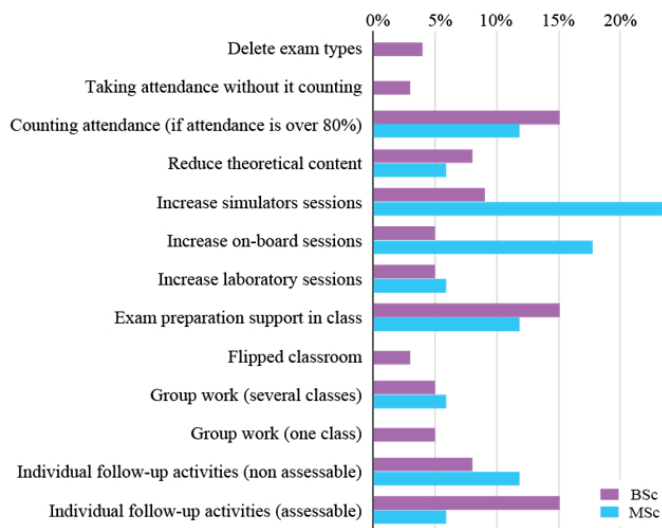
tical and technical skills, particularly when it comes to applying knowledge and gaining practical experience. Leadership and negotiation skills are seen as less crucial in motivating attendance. Consequently, results indicate a potential difference in the perceived importance of hard versus soft skills even though none of the competences included in the survey has received a grade below 3. These results could set the basis for improving class attendance if the selected skills are incorporated and thoroughly addressed in class.

4.5. Strategies for reducing absenteeism.

During the second semester of the 2023-24 academic year, new surveys addressed to students and ASAP-UPC project lecturers were conducted to identify the most effective strategies for reducing absenteeism (RQ4). In the student survey, only actions to prevent absenteeism are requested. As seen in Fig-

ure 8, the preferences of bachelor's degree students are much more varied, highlighting three actions of very different nature: assessable follow-up activities, assessable attendance tracking, and increased support for exam preparation. In contrast, the measures that master's students consider more effective for improving attendance are less diverse and more oriented towards practical knowledge, such as increasing on-board training and simulator-based sessions.

Figure 8: Actions preferred by students to improve class.



Source: Authors.

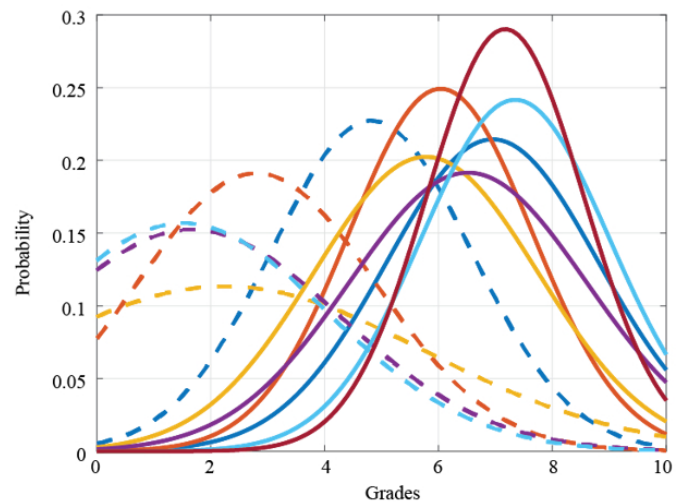
On the other hand, the main objective of lecturer's surveys is to find out those teaching strategies that FNB lecturers deem most effective in improving attendance. The first lecturer's survey conducted in the first semester of the 2023-24 academic year examined lecturers' involvement in implementing new methodologies to improve their teaching practices. Fifty-seven percent of lecturers had taken action to improve their teaching based on the feedback and comments from the general UPC student satisfaction survey conducted at the end of each semester. However, among those who had taken some action, 66.7% reported that they had not noticed any improvement in class attendance after implementing them. In the second lecturers' survey, they were asked for the actions they consider most effective in improving attendance and those they believe that could be incorporated in the future to further enhance attendance. The activities were categorized according to the teaching methodology: Project-Based Learning, In-class Assessable Activities, Flipped Classroom, Feminist Pedagogy, Laboratory or Simulator Practices, Student Monitoring Activities and In-class Exercises.

4.6. Attendance and attainment.

In order to detect if there is a correlation between attendance and attainment at FNB (RQ5), Gaussian curves were used. These curves represent the probability of achieving a particular grade based on attendance (see Figure 9). A typical Gaussian shape is obtained of those students attending at

least 50% of the classes (continuous line) indicating that students regularly attending classes achieve grades in the range of 5.5 and 6.5 in the bachelor's degree programs and higher grades in the master's degree programs. However, for students attending less than 50% of the lessons (dashed line), the mean grade is lower than 5. This illustrates how class attendance may correlate with attainment, showing that students with higher attendance tend to achieve higher grades compared to those with lower attendance, especially in bachelor's degree programs.

Figure 9: Gaussian curves of the students' grade base on their attendance (continuous line attendance higher 50%; dashed line attendance less than 50%; orange: GNTM, dark blue: GTM, yellow: GESTN, purple: MUNGTM, light blue: MUENO and dark red MUGOIE).



Source: Authors.

5. Discussion.

By addressing the research questions, we identified the root causes of absenteeism, analysed its impact, and determined the most affected student groups. To reduce absenteeism among these groups, we proposed effective mitigation strategies, including measures that maritime companies recommend during the learning process.

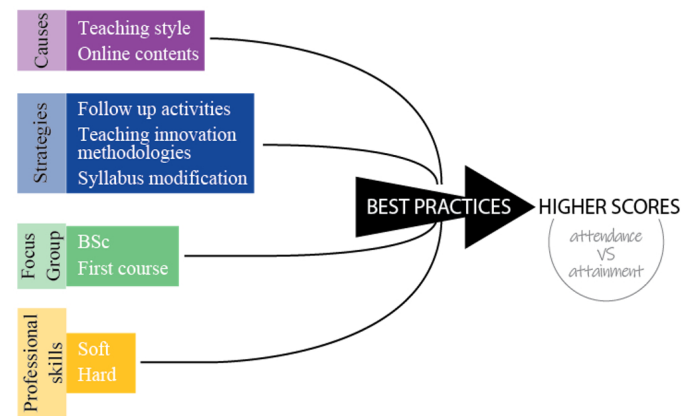
The main reasons students perceive as factors contributing to their absenteeism are: (1) schedule conflicts, (2) personal health issues, (3) the availability of online resources due to new technologies, and (4) teaching methods that lack added value. These results align with those obtained by [40], who identified illness, employment, work commitments, boring classes, new technologies, and the teacher as key factors affecting absenteeism. One of the reasons for the "schedule doesn't fit" response could be that they are likely already on-board or working especially if they are master's degree students. Health concerns, both physical and mental, have become another common reason for absenteeism. This reveals a broader problem: students find it difficult to maintain consistent attendance while coping

with personal health issues. Therefore, the reasons for not attending classes fall into three main categories: university (academic, organization and external variable), student (personal, familiar and social conditions, physical factors and emotional factors and motivational factors) and teacher (teaching methodology and attitude). Health-related issues, in particular, require more in-depth study and institutional-level strategies. Since the ASAP-UPC project focuses on actions that lecturers can assume, our emphasis is on scenarios where they can actively contribute to reduce student absenteeism. Students indicated that they would be more interested in attending class if they perceived that class held greater value for their learning and were useful in passing their courses. Therefore, the methodologies and new strategies to be implemented should align in this direction.

Attendance rates tend to increase from the initial years of bachelor's degree programs to the final years, with the highest attendance observed in the final years of bachelor's and master's degree programs. This trend can be attributed to specialized nautical courses in those final years, fostering motivation among students. However, absenteeism is alarmingly high even at the beginning of the course, when students lack enough information or experience to decide if they like attending classes. To address this issue, effective methodologies and strategies should be implemented across all programs, with particular emphasis on the early years of the bachelor's degree programs. Bachelor's degree students have highlighted three key actions that could improve their attendance: assessable follow-up activities, assessable attendance tracking and increased support for exam preparation. In contrast, master's students prioritize measures focused on practical knowledge, such as increasing on-board training and simulator-based sessions, aligning with the skills valued by maritime companies. Maritime companies have identified several skills that students could improve during their MET studies to advance in their professional careers, including "Practical education," "Ability to integrate knowledge and make judgments with limited information," "Leadership," "Technical and economic management capacity in different environments," and "Negotiation skills". These skills should, therefore, be incorporated into proposed methodologies and strategies. Lecturers at FNB have identified the most effective teaching strategies for improving attendance, including Project-Based Learning, In-class Assessable Activities, Flipped Classroom, Feminist Pedagogy, Laboratory or Simulator Practices, Student Monitoring Activities, and In-class Exercises. These strategies incorporate the actions most valued by both bachelor's and master's students, aligning educational practices with students' interests and industry expectations. The Redesign of teaching methods analysis (see Section 3.3) has allowed identifying best practices based on key findings on the causes of absenteeism, the most impacted degree programs, and the competencies to be incorporated into course content (see Figure 10).

One interesting best practice example implements a PBL approach into the first-semester MSc course Ship Dynamics. The objective was to enable students to estimate selected vessel parameters using the School's sailing vessel: (i) the roll damping coefficient, derived from forced-motion experiments con-

Figure 10: Overview of ASAP-UPC project results based on key research questions findings.



Source: Authors.

ducted while the vessel was moored, and (ii) the vessel's principal motions, obtained from measurements collected during navigation. For this purpose, the vessel was instrumented with an Inertial Motion Unit (IMU). Students performed a series of controlled forced-roll tests at the dock, after which the IMU remained installed during an entire sailing campaign. Throughout the trip, the vessel's six degrees of freedom were continuously recorded, providing the dataset required for subsequent analysis. Afterward, students were required to preprocess and analyze the acquired data using computational algorithms, and to produce a technical report documenting the methodology, results, and overall execution of the activity.

Another example of best practice is related to Simulator Practices. Although the simulators are originally designed to target specific STCW competencies, it was considered that lecturers could better leverage their potential by adapting them to the learning needs of each course. For example, practical exercises were proposed using the Loading Control System (LCS) module of the Liquid Cargo Handling Simulators (LCHS) to develop specific STCW competencies related to ship stability (competencies A-II/1-10.1, A-II/1-13.1, A-II/1-13.2, and A-II/2-15.2). The aim of these activities was to create learning experiences that reproduce realistic operational scenarios as closely as possible, to promote teamwork and peer collaboration as effective strategies for problem-solving, and to encourage reflection on decision-making processes and actions taken in potentially hazardous situations.

Each coordinating lecturer, with the collaboration of the teaching team, designed an improvement action based on identified best practices. Best practices to improve classroom attendance were categorized into three groups: (1) Specific follow-up activities, which include tasks such as quizzes, exercises, tutorials, group assignments and follow-up questionnaires; (2) Teaching innovation activities, which involve incorporating innovative teaching methods such as collaborative activities, the flipped classroom approach, and an increase in active laboratory or simulation learning practices and (3) Modification of the syllabus, a proposal for reducing some theoretical contents and

introducing more hands-on activities. The most common measure implemented was the introduction of additional exercises during lessons. Specifically, 71% of the ASAP-UPC members now integrate practical exercises to be solved by students as part of their teaching methods in their classes. Moreover, exercise resolution is included in the assessment system of 91% of courses, and many lecturers intend to strengthen this aspect. Active laboratory and simulator learning practices are incorporated in 65% of courses, and 77% of lecturers plan to increase their frequency. Another finding is that 35% of courses are adjusting the exam format to avoid standardized exams that can be answered without a deep understanding of the topic. By implementing these best practices, it is expected that attendance will increase, students will be better prepared, and they will achieve higher grades, as illustrated by the relationship between attendance and academic performance. It is worth mentioning that the proposed practices require only a manageable and affordable level of effort from lecturers, making them sustainable and feasible for long-term implementation.

6. Conclusions.

The main aim of this study is to provide a comprehensive understanding of the causes of absenteeism in maritime studies. To achieve this goal, different surveys, interviews and document analysis were conducted to explore the perceptions of lecturers and students on absenteeism in a higher MET institution. The findings indicate that the rate of absenteeism at FNB varies significantly across programs, with increased absenteeism in large groups of students at the Bachelor's degree level. Many students express dissatisfaction with face-to-face classes, mentioning a perceived lack of balance between theory, experimental practice, and problem-solving components. Additionally, they perceive that attendance is not helpful to pass exams. However, research has shown that there is a correlation between attendance and attainment, suggesting that increased attendance enhances the probability of obtaining higher grades in the FNB context. The review of the literature shows that aligning teaching and assessment methodologies may increase the perceived value of classes. Hence, adopting a more contextualized teaching approach, including those skills that students lack, which are considered essential by maritime companies, emphasizing problem-solving activities, and adapting exams to a non-standardized format seem to be feasible teaching solutions. On the other hand, all master's programs have a higher attendance and, therefore, higher grades even as the semester progresses. This could be due to the lower number of students, as well as the blended learning mode, where the in-person classes are particularly important (for practices, simulations, exams, and visits).

Building on these findings and guided by group reflections, best practices were formulated and integrated into an ad hoc database (<https://cremit.upc.edu/en/projectes/asap-upc/compilation>). These proposed practices are expected to serve as a turning point, not only in improving student motivation but also in fostering more meaningful learning experiences that can be

shared among Maritime Education and Training Institutions - (METIs). However, a period of implementation is necessary to assess the effectiveness of these measures. Future actions will focus on three main areas. First, we will continue to monitor absenteeism rates after the implementation of the new measures, assessing their impact over time. Second, we will conduct a more detailed analysis of health-related causes of absenteeism at the institutional level. Finally, we plan to compare our findings with similar studies from other universities to identify common patterns and explore opportunities for collaboration.

Funding.

This innovation-teaching project has received funding from the UPC Teaching Innovation Projects 2023 Call Resolution (Agreement CG/2023/02/30, of 21 February 2023).

Acknowledgments.

This section contains any acknowledgment or support that the authors concern essential to share with the audience.

Author Contributions.

Conceptualization, Marcella Castells-Sanabra, Elisabet Mas de les Valls; Data curation, Marcella Castells-Sanabra, Elisabet Mas de les Valls, Roger Castells-Martínez; Formal Analysis, Roger Castells-Martínez, Claudia Barahona-Fuentes, Rosa M. Fernandez-Canti, Roser Capdevila; Methodology, Claudia Barahona-Fuentes, Roser Capdevila; Software, Roger Castells-Martínez, Clara Borén; Validation, Roger Castells-Martínez, Rosa M. Fernandez-Canti, Anna Muijal-Colilles; Visualisation, Clara Borén, Anna Muijal-Colilles; Funding acquisition, Marcella Castells-Sanabra, Elisabet Mas de les Valls; Writing – original draft, Marcella Castells-Sanabra, Elisabet Mas de les Valls, Claudia Barahona-Fuentes; Writing – Review & editing, Clara Borén, Rosa M. Fernandez-Canti, Anna Muijal-Colilles, Roser Capdevila; Project administration, Marcella Castells - Sanabra; Resources: Elisabet Mas de les Valls

References.

- [1] Westerman J.W.; Perez-Batres L.A.; Coffey B.S.; Pouder R.W. The relationship between undergraduate attendance and performance revisited: Alignment of student and instructor goals. *Decision Sciences Journal of Innovative Education*. 2011; 9(1): 49-67; <https://doi.org/10.1111/j.1540-4609.2010.00294.x>.
- [2] Kousalya P.; Ravindranath V.; Vizayakumar K. Student absenteeism in engineering colleges: evaluation of alternatives using AHP. 2006;10.1155/JAMDS/2006/58232.
- [3] Summers R.J.; Higson H.E.; Moores E. Measures of engagement in the first three weeks of higher education predict subsequent activity and attainment in first year undergraduate students: a UK case study, *Assessment & Evaluation in Higher Education*. 2021;46(5):821-836; <https://doi.org/10.1080/02602-938.2020.1822282>.

- [4] Nja C.; Cornelius-Ukpepi B.; Chinyere Ihejiamaizu C. The influence of age and gender on class attendance plus the academic achievement of undergraduate chemistry education students at University of Calabar. *Educational Research and Reviews*. 2019;14(18):661-667; DOI: 10.5897/ERR2019.3805.
- [5] Vicéns Moltó J.L.; Hervás Avilés R.M.; Zamora Parra B. El absentismo escolar, un problema en la Enseñanza de la Ingeniería. *Análisis de la UPCT. Redes de investigación e innovación en docencia universitaria*. 2019; 556–563; <http://rua.ua.es/dspace/handle/10045/99074>.
- [6] Moores E., Birdi G and Higson H. Determinants of University Students' Attendance. *Educational Research*. 2019;61:1-17; <https://doi.org/10.1080/00131881.2019.1660587>.
- [7] Shaaban K.; Reda R. Impact of College Provided Transportation on the Absenteeism and Academic Performance of Engineering Students. *Eurasia Journal of Mathematics, Science and Technology Education*. 2021;17(3), em1944; <https://doi.org/10.29333/ejmste/9727>.
- [8] Al-Labadi L.; Kumar Advani H.; Holder B.; Lim K. Education Influential Factors of University Attendance. *Journal of Educational and Developmental Psychology*. 2022;13(1);29; <https://doi.org/10.5539/jedp.v13n1p29>.
- [9] Rendleman C.M. Do Attendance Policies Improve Student Performance? The Relationship among Attendance, Class Policies, and Grades. *NACTA Journal*. 2017;61(4):347–349; <https://www.jstor.org/stable/90021486>.
- [10] Keyser R. A Correlation Between Absenteeism and Course Grades in a Third- Year Industrial Engineering Class. *Research in Higher Education Journal*. 2019;37.
- [11] Deng P.; Jianjun Z.; Jing L.; Zitong Z. Assessing Attendance by Peer Information. 2021; <https://doi.org/10.48550/arXiv.2106.03148>.
- [12] Credé M.; Roch S.G.; Kieszczyńska U.M. Class Attendance in College: A Meta-Analytic Review of the Relationship of Class Attendance With Grades and Students. 2010.
- [13] López-Bonilla J.M.; López-Bonilla L.M. The Multidimensional Structure of University Absenteeism: An Exploratory Study. *Innovations in Education and Teaching International*. 2015; 52(2):185-95; <https://doi.org/10.1080/14703297.2013.847382>.
- [14] IMO. International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 2017 Edition. IMO.
- [15] Vicerectorat de Política Acadèmica. Universitat Politècnica de Catalunya. Normativa Acadèmica dels Estudis de Grau i Màster (NAGRAMA). 2023; Curs 2023-2024. https://www.upc.edu/sga/ca/shared/fitxers-normatives/NormativesAcadèmiques/NAGRAMA/normativa-academica-grau-i-master-2023--2024_acord-cg-23-05-2023.pdf. Accessed 26 June 2024.
- [16] Vicerectorat de Política Universitària, Gabinet de Planificació, Avaluació i Qualitat. Informe de resultats. Enquesta a l'Estudiantat de Grau sobre l'absentisme en el Curs 2021-2022. 2022; https://www.upc.edu/qualitat/ca/temes/enquestes-de-satisfaccio/enquestes-a-estudiantat-de-grau-i-master/estudi-absentisme-21-22/informe_enquesta-estudiantat-grau-absentisme-curs-2021_2022.pdf. Accessed 26 June 2024.
- [17] Triado-Ivern X.; Aparicio-Chueca P.; Guàrdia-Olmos J.; Jaría-Chacón N.; Però-Cebollero M.; Elasmri-Ejjaberi A. University student absenteeism: Factors and profiles. 2013;10.401-8/978-1-4666-4458-8.ch023.
- [18] Triado-Ivern X.; Aparicio-Chueca P.; Elasmri-Ejjaberi A.; Maestro-Yarza I.; Bernardo M.; Presas P. A Factorial Structure of University Absenteeism in Higher Education: A Student Perspective. *Innovations in Education and Teaching International*. 2018;57,2:136–147; <https://doi.org/10.1080/14703297.2018.1538896>.
- [19] Jiménez Hernández D.; González Ortiz J.J.; Tornel Abellán M. Metodologías activas en la universidad y su relación con los enfoques de enseñanza. *Profesorado. Revista de Currículum y Formación de Profesorado*. 2020;24(1),76-94; DOI: 10.30827/profesorado.v24i1.8173.
- [20] Fredricks J.A.; Blumenfeld P.C.; Paris A.H. School Engagement: Potential of the Concept, State of the Evidence. *Review of Educational Research*. 2004;74(1):59-109; <https://doi.org/10.3102/00346543074001059>.
- [21] Biggs J. Aligning teaching for constructing learning. 2021. The Higher Education Academy.
- [22] Kearsley G.; Shneiderman B. Engagement Theory: A Framework for Technology-Based Teaching and Learning. *Educational Technology*. 1998;38(5):20–23; <http://www.jstor.org/stable/44428478>.
- [23] Torrecilla J.; Gutiérrez-de-Rozas B.; Cancilla J. Thinking - Based Learning at Higher Education Levels: Implementation and Outcomes within a Chemical Engineering Class. *Journal of Chemical Education*. 2021;98(3):774-781; DOI: 10.1021/acs.jchemed.0c00283.
- [24] Jiménez-Sáez J.; Ramírez de la Piscina S.; Castellanos M.; Palacios P. Trends in university teaching in physics: Interaction and gamification. *Proceedings of EDULEARN19 Conference*: 2019p; 2831-2836; <https://doi.org/10.21125/edulearn.2019.0763>.
- [25] Lo C.K.; Hew K.A. critical review of flipped classroom challenges in K-12 education: Possible solutions and recommendations for future research. *Research and Practice in Technology Enhanced Learning*. 2017;12:1-22.10.1186/s41039-016-0044-2.
- [26] Sanchez-Mena A.; Marti-Parreño J. Drivers and barriers to adopting gamification: Teachers' perspectives. *Electronic Journal of e-Learning*. 2017;15:434-443.
- [27] Zhang J.; West R.E. Designing Microlearning Instruction for Professional Development Through a Competency Based Approach. *TechTrends*. 2020;64:310–318; <https://doi.org/10.1007/s11528-019-00449-4>.
- [28] Rutherford P.; McGrath D. Supporting student attendance Institute for Teaching and Learning, The University of Queensland, 2022.
- [29] Zheliaskov V.; Berezovska V.; Tymofeyeva O.; Chyzh S.; Turlak, L.; Soft skills in the professional competence of specialists in the maritime industry. *Pomorstvo*. 38. 141-152. 10.31217/p.38.1.11.
- [30] Sellberg C.; Viktorelius M.; Wiig A.C. Guest editorial. *WMU J Marit Affairs*. 2023;22:133–141; <https://doi.org/10.1007/s13437-023-00314-5>.

[31] Miyusov M.; Nikolaieva L.; Smolets V. Future Perspectives of Immersive Learning in Maritime Education and Training. *Transactions on Maritime Science*. 2022;11.;10.7225-toms.v11.n02.014.

[32] Thach, N.D.; Hung, N.V. Research and Design a Life boat Virtual Reality Simulation System for Maritime Safety Training in Vietnam. *Journal of Marine Science and Technology–Taiwan*. 2024;32: Iss. 2, Article 4; DOI: 10.51400/2709-6998.2739.

[33] Nikitakos N.; Sirris I.; Dalaklis D.; Papachristos D.; Tsoukalas V. Game-based learning for maritime education and training: the case of Trader of the World. *WMU Journal of Maritime Affairs*. 2016;16. 10.1007/s13437-016-0119-3.

[34] Lee, S.; Youn, I.H. Key Steering Characteristics for Training Remote Operators of Maritime Autonomous Surface Ships in Collision Avoidance. *Journal of Marine Science and Technology–Taiwan*; 2025;33:3,10; DOI: 10.51400/2709-6998-2782.

[35] Leedy P.D.; Omrord J.E. Practical research: planning

and design. 2005; Prentice Hall.

[36] Kemmis S.; Wilkinson M. Participatory action research and the study of practice. In B. Atweh, S. Kemmis, & P. Weeks (Eds.), *Action research in practice: Partnerships for social justice in education* 1998:1–350. Routledge.

[37] Gustavsen B. Action research, practical challenges and the formation of theory. *Action Research*. 2008;6(4),421-437; <https://doi.org/10.1177/1476750308094130>.

[38] Brannick T.; Coghlan D. In Defense of Being “Native”: The Case for Insider Academic Research. *Organizational Research Methods*. 2007;10,59-74; <https://doi.org/10.1177/10944-28106289253>.

[39] Humphrey C. Insider-outsider: Activating the hyphen: Activating the hyphen. *Action Research*. 2007;5(1),11-26; <http://doi.org/10.1177/1476750307072873>.

[40] Massingham P.; Herrington T. Does attendance matter? An examination of student attitudes, Participation, Performance and Attendance. *Journal of University Teaching & Learning Practice*. 2006;3(2); 10.53761/1.3.2.3.