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Level of Satisfaction with the Application of the Collaborative Model of the Flipped Classroom in the Sport of Sailing

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Abstract: The aim of this study was to assess student satisfaction levels when implementing the collaborative flipped classroom learning model in sailing-sports-related content. The sample consisted of eighty second-year students (21.9 ± 4 years old) pursuing a degree in Physical Activity and Sports Sciences. To evaluate student satisfaction levels, a validated self-assessment questionnaire was administered following completion of the various workshops. The language used was formal, objective, and clear, without biased or ornamental language. The survey comprised six questions, three of which were in the Likert format and three in the dichotomous format. These questions explored students' viewpoints on participation, usefulness, and satisfaction regarding the implementation of this pedagogical approach. The findings indicate a significant degree of satisfaction and usefulness associated with the employment of this model for teaching sailing sports content. Moreover, students demonstrated a strong sense of engagement with their peers. The implementation of the flipped classroom teaching model among higher education students enhances their satisfaction levels while acquiring knowledge on sailing sports content.

Keywords: flipped classroom; knowledge; satisfaction; higher education; sailing; ICT

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1. Introduction

Sailing is a sport practised in a natural environment, and the people who practise it have very different objectives, ranging from leisure to high performance. One of the main characteristics of this sport is its high degree of uncertainty. This uncertainty is caused by the large number of variables that occur during navigation [1]. Some of these variables are the presence of adversaries and the conditions of the environment (i.e., wind and sea state), the type of boat, the number of crew, and the environment (i.e., sea, lake or river). The context of sailing is characterised by the fact that athletes have to make decisions about their position, the position of the daggerboard, and the management of the rudder and the sail, all conditioned by the wind, the state of the sea, and the rules of the regatta [2]. This complex situation faced by the athletes has promoted the need for a change in the teaching of sailing, taking into account the needs, possibilities, and objectives of the athletes and the contextual characteristics of sport sailing [3]. The use of practice for academic purposes is therefore an important part of the academic curricula in sailing education.

There are four universities in Andalusia that offer a degree in Physical Activity and Sports Science. These are the Universities of Málaga, Huelva, Almería, and Cádiz. There is an optional subject of six credits called "Teaching and promotion of nautical activities" at the University of Huelva. The University of Almería has included the subject of "Nautical Sports" in its curriculum for the 2023–2024 academic year. This subject is compulsory,

consists of six credits and is taught in the third year. The Faculty of Educational Sciences at the University of Cádiz includes Sports Science in its curriculum, which includes three subjects related to sailing. Two of these subjects are optional and consist of six credits each. These subjects are: "Current and emerging water sports" and "Sailing sports". The third subject, "Fundamentals of Nautical Sports", is taught in the second year and is worth a total of six credits. In Spain, there are 34 universities that offer a degree in Physical Activity and Sports Sciences, although only 10 have a subject related to sport sailing [4].

The flipped classroom, or inverted classroom, is one of the pedagogical strategies of innovation in the classroom to achieve meaningful learning in the teaching–learning process. The term "flipped classroom" appeared in the scientific literature in 2000 and has become popular in compulsory and higher education [5,6]. It is a student-centred pedagogical approach which is designed to improve students' academic achievement [5]. In this model, the roles and functions in the classroom are reversed compared with the traditional model. The student is given greater importance through active participation [7] and autonomy [8], and collaborative learning is encouraged [9]. With this methodology, students have the opportunity to develop critical and independent thinking [10] and to enhance their own learning processes by working collaboratively with their classmates [11]. In this model, the student's responsibility and motivation is to own certain information and then transform it into knowledge through its theoretical–practical application [12]. In this methodology, one of the main functions of the teacher in the teaching activity is to design the educational practice in such a way that they are a mediator between the educational activities that take place inside and outside the classroom. In this way, the student will be able to optimise the understanding of each of the activities carried out in the teaching–learning process [13]. In the same line, the implementation of the flipped classroom methodology has been shown to enable better learning, helping to reduce the effect of individual differences in performance between students with different levels of prior achievement [14]. It has been shown that when applying the flipped classroom methodology, didactic methodological planning can be carried out so that all the activities performed are adapted to the learning outcomes in relation to the learning outcomes of the study programmes and with the application of information and communication technologies (ICTs) [12]. It should be noted that the flipped classroom method involves an increase in workload for both students and teachers, but the rewards for this effort are improvements in the teaching and learning process for students [15].

The transfer of knowledge and the construction of knowledge are phases that are usually included in the traditional teaching model, where the classroom is centred around the professor, who presents the content in a conference and ends by giving the students a series of tasks to perform after class [16]. It is during this phase that the transfer of knowledge occurs; the construction of knowledge takes place after class, when students are able to perform tasks or operations and real practices. However, in the flipped classroom model, the student has the material before the lectures so that the teacher can use class time to carry out learning activities that allow for student involvement and interaction. Therefore, the transfer of knowledge takes place before class with the support of ICT and the construction of knowledge takes place in the classroom with the help of the teacher and classmates. Passive learning activities take place outside of class time, while active learning activities take place in the classroom [17]. Learning technologies, especially multimedia, are the main source of material that students will have [6]. The advances in ICT open up new learning opportunities for students through the use of the World Wide Web and multimedia computers (and/or video recorders) that allow them to view content from their own homes.

The introduction of ICT has revolutionised contemporary society, as it has enabled the vast majority of the population to access and share information and knowledge. In the field of education, this technological progress has led to the development of new methodological and didactic strategies that increase the educational possibilities of the teaching and learning process [5]. It is therefore logical to think that it is necessary to analyse the

influence of information and knowledge in order to understand how contemporary society is composed and configured, since ICTs are a key tool in this process. Methodological and didactic strategies have been adapted and developed thanks to ICTs and have enabled improvements in the teaching and learning process in education. Currently, the availability and widespread use of ICTs, the availability of online videos, and the increasing access of students to technology have facilitated the implementation of the flipped classroom methodology [12].

The current higher education system is based on the implementation of the European Credit Transfer and Accumulation System (ECTS); this model tends to confuse and understand academic qualifications as a means of evaluation [18,19]. In higher education, the ECTS is intended to be a new methodology in which the student is at the centre of the teaching and learning process. In this system, non-face-to-face work by university students is key to the acquisition of generic and specific skills, and this work must be assessed by the students themselves [20]. This view of the model leads to a gap appearing between the credits that this subject has and the real number of credits that the student uses in their non-contact schedule [21]. Therefore, there is a deficit in the student's learning of skills during their time at university [22]. In response to these shortcomings in the teaching–learning process in higher education, models such as the flipped classroom are being proposed to encourage more active student participation in the parts of the credits devoted to the student's non-face-to-face work. Furthermore, studies have shown that in order to achieve an optimal teaching–learning process, adequate conditions must be provided for students to achieve self-learning [23]. Likewise, it has been shown that its application has been positive in different fields of knowledge in the university environment, such as the arts and humanities [17]. The assessment and teaching of 21st Century Skills aims to develop in students the skills necessary to succeed in today's digital society, where the full engagement of the student in the teaching–learning process is required [24–26]. If the students' commitment is effective, it will enable them to acquire the skills that will facilitate their subsequent integration into the labour market after graduation [27,28]. The effectiveness of the flipped classroom in the university context has been demonstrated in terms of acquiring knowledge and essential skills [15]. Prieto, Díaz, Monserrat, and Reyes demonstrated the possibility of changing the traditional methodology to a more active one, incorporating the flipped classroom, which had been used for four years with university students [13]. In terms of efficient time management, it has been shown that this teaching method is an appropriate option to use in this type of context [14].

As in compulsory education [29], ICTs are introducing new forms of learning in universities. Videos have been shown to be one of the most widely used learning activities in higher education prior to classroom teaching [30]. This is a learning resource that allows students to pause and view the content as many times as they need to. However, this type of resource requires more teacher involvement, as they need to consider important aspects such as the length of the video/digital material and the time needed to prepare it. Although the learning videos used in flipped classroom sessions may be available after the face-to-face session, it has been shown that improvements in knowledge retention are associated with watching the videos before the face-to-face session, not after [31].

Flipped classrooms or inverted classrooms are considered to be student-centred learning methods, characterised by their flexibility and adaptability to be combined with other types of active learning methods (such as debates, snowball, quescussions, buzz groups, or round table) and the use of digital and audio–visual media [17,32]. The components mentioned above connect emotionally with the so-called Generation Z, the students to whom higher education is currently directed [33]. This generation is characterised by the immediacy of satisfaction in the consumption of experiences, so it is crucial to take into account the level of satisfaction of students when using learning methods [15]. According to the same authors, this level of satisfaction has not been studied much in university students and, to the best of our knowledge, not in sailing content. Therefore, the aim of our study was to analyse the level of satisfaction with the teaching–learning process

when using the flipped classroom method with university students while working on sailing content.

2. Materials and Methods

2.1. Participants

The initial sample consisted of 89 students enrolled in the second year of the degree course in Physical Activity and Sports Sciences (GCCAFD) in the subject Fundamentals of Nautical Sports (FDN). In total, 80 students (18 females) completed the self-assessment questionnaire, which was administered at the end of the second semester of the 2020/2021 academic year. The age of these students ranged from 18 to 41 years. The inclusion criteria were as follows: (i) participation in at least 80% of the practical sessions; and (ii) correct completion of the questionnaire on perception of the teaching–learning process. None of the students were experienced in nautical sports.

The FDN subject is made up of a total of 6 credits, of which 1 is theoretical and 5 are practical. The theoretical credit consists of eight hours, while the practical credit amounts to a total of forty hours. Students are allocated ninety-three hours of individual study. The subject is taught in a series of fourteen sessions, divided into one session per week. The duration of each session is three hours, of which the first one and a half hours is for project implementation. This project involves a total of six sessions.

2.2. Implementation of the Flipped Classroom

This study was part of the Teaching Innovation Project carried out at the Faculty of Education of the University of Cádiz. In the FDN subject of the GCCAFD, six workshops were carried out in which different content was developed using the collaborative flipped classroom methodology. The project was an activity of complementary skills to prepare a boat for sailing (including the hoisting and lowering of the sails, the setting of the sheets, and the preparation of the boat for exit or entry to the pontoon or ramp) developed within the subject itself and during the practical part of the subject in the second semester of the academic year.

Firstly, prior to the practical workshop and the masterclasses given by the professor, the students had access to scientific articles, PowerPoint lectures, links to websites and, to a greater extent, links to websites with explanatory videos about the sailing educational contents that were going to be worked on. It was decided that these videos should be no longer than five minutes. In addition, during the weeks in which the activities were developed, they also had the opportunity to attend tutorials with the teacher responsible for the subject.

The workshops were developed through six practical sessions of one and a half hours each, with a frequency of one per week. The students were organised into working groups with a maximum of five and a minimum of three members. Before the start of each workshop, a representative of each group agreed with the teacher what content they would present to their classmates, trying to reduce as much as possible the number of repetitions of the same content between groups. Students were informed that they could develop teaching resources such as explanatory videos prior to the workshops to present their content. These videos could be uploaded to platforms such as YouTube or TikTok, sent by e-mail, or uploaded to the university website of the subject. During this part of the collaborative work, the teacher became a guide and had to move around the classroom to answer any questions raised by the working groups. Depending on the number of groups, a time limit was set for each group. Once all the groups had presented their content, a debate or discussion group was held to summarise the presentation experience of the day.

The first three practical sessions covered the following content relating to the preparation of a monohull boat: the hoisting and lowering of the sails, the setting of the sheets, and the preparation of the boat for exit or entry to the pontoon. In the following three sessions, the students worked on the same content, but for a double-hull boat. They also changed the entry and exit from a ramp. Each group of students was given a boat. They

had to prepare the boat and then sail it. Previously, the students had organised themselves to determine the order of the content that they would explain to their classmates in their group. The same organisation was established for both the departure and the arrival by boat. Half an hour was set aside to prepare for departure and half an hour for arrival. The remaining thirty minutes was divided into two fifteen-minute halves, during which the teacher shared with all the students, and they analysed the successes and mistakes they had found during the process. In the same way, the teaching resources they had used and their effectiveness in facilitating the teaching–learning process were analysed.

2.3. Data Collection

After completing the six workshops in the last week of the project, the students were provided with a self-assessment questionnaire through an online Google Drive form. This questionnaire was sent via the subject's virtual campus email after the last workshop. A period of seven days was given to complete the questionnaire. The students were informed that the questions would relate to the practical content of the subject, and specifically to the six sessions in which the application of the flipped classroom methodology was determined.

Participation was voluntary and anonymous, and students who agreed to participate signed written informed consent. The study was carried out as part of a Teaching Innovation Project that was approved by the Commission for Teaching Innovation and Improvement of the University of Cádiz.

The self-assessment tool developed and validated by Otero-Saborido, Sánchez-Oliver, Grimaldi-Puyana, and Álvarez-García was used [20]. The tool consists of eight questions, the first two of which were discarded because they related to the amount of time students spent working outside and inside the classroom. The following six questions were selected, in which the students had to reflect on the whole teaching–learning process, including their own participation, usefulness, and also their satisfaction with the teaching (Table 1). These six questions were actually three, because the same three questions were asked with two types of answers: on the one hand, a Likert-scale-type answer with four possible answers; and on the other hand, a dichotomous-type answer to justify this answer. In order to calculate the students' overall opinion of the teaching innovation proposal, the answers given to the three Likert-type questions about participation, usefulness, and satisfaction were added together, giving a maximum value of 12 and a minimum value of 1. It was assumed that between 1 and 3 the opinion would be "very bad"; 4 and 6, "bad"; 7 and 9, "good"; and 10 and 12, "very good".

Table 1. Items of the survey that were selected to analyse the students' perception of the teaching–learning process.

Items	Answer
Involvement of student	Yes/No
Involvement of student	Likert scale: Not at all involved to Very involved
Usefulness of student learning	Yes/No
Usefulness of student learning	Likert scale: Useless to Very useful
Satisfied with teaching	Yes/No
Satisfied with teaching	Likert scale: Dissatisfied to Very satisfied

The grade obtained in the FDN subject (exam grade) was used to assess the students' academic performance. This rating was on a scale of 0 to 10, with 10 being the highest rating they could achieve. The numerical rating was divided into the following ranges: $\geq$0 to <5, "Fail"; $\geq$5 to <7, "Pass"; $\geq$7 to <9, "Good"; and $\geq$9 to 10, "Merit".

2.4. Data Analysis

Qualitative variables were described by frequency distributions; quantitative variables by means and standard deviations (SD). The analyses were performed using the statistical package SPSS 20.0 (SPSS Lead Technologies Inc., Chicago, IL, USA).

3. Results

Table 2 shows the descriptive analysis for the total sample and the distinction according to sex. The results show that, in general, the students had a good opinion about the application of the collaborative model of the flipped classroom. In terms of sex, females had a 'very good' opinion, while males had a 'good' opinion.

Table 2. Means ± SD for the variables analysed in all students, in females and males.

	All (*n* = 80)	**Females (*n* = 18)**	**Males (*n* = 62)**
Age (years)	21.9 ± 4	22.1 ± 3.6	21.8 ± 4.1
General view	9.8 ± 1.5	10.2 ± 1.6	9.7 ± 1.4

In terms of student participation, including groups of females and males, 100% of the students felt that the rest of their classmates had participated in the activity. In the total sample, 55% of the students thought that their classmates were involved in the activity and 27.5% thought that they were 'very involved' (Figure 1). In terms of sex, 33.3% of the females felt that their peers were 'very involved', compared with 25.8% of the males. However, 56.5% of males and 50% of females considered their peers to be 'involved'. The sum of both perceptions ("involved" + "very involved") shows that both females and males perceived their classmates to be more than 80% involved in the activities. The results do not show a very negative perception of their peers' participation, as the percentage of responses in the 'not all involved' category did not exceed 17% in any case.

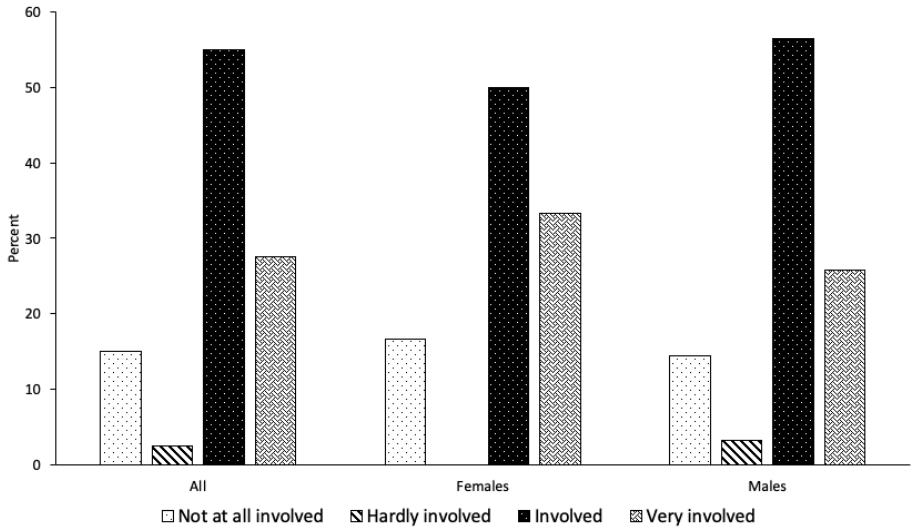


Figure 1. Percentage agreeing that the rest of the students participated in the flipped classroom activity.

Regarding the students' perception of the usefulness of the activities carried out, adding the responses "useful" and "very useful", 100% agreement was observed for the total sample, as well as for the groups of females and males (Figure 2). Comparing the results between the sexes, it can be seen that females had a higher percentage of the response "very useful" than males (66.7% vs. 50%). In the case of the 'Useful' response, the results

were reversed, as in this case males had a higher percentage than females (50% vs. 33.3%). The answers 'Hardly useful' and 'Useless' received 0% in all cases.

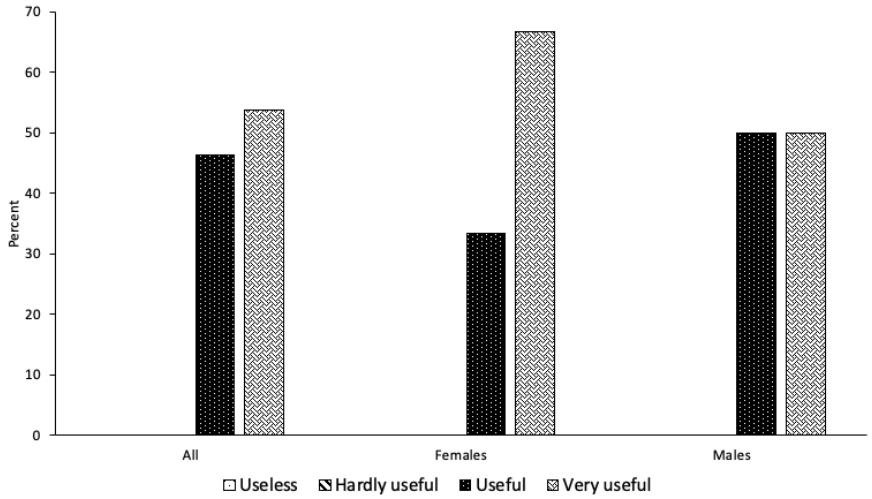


Figure 2. Percentage of students' opinions about the usefulness of the flipped classroom.

The level of satisfaction with teaching, taking into account the responses 'satisfied' and 'very satisfied', was very high in all cases, reaching values above 98% in all cases (Figure 3). In terms of sex, females had a higher percentage of 'very satisfied' responses than males (55.6% vs. 30.6%). In the case of the response 'satisfied', it was the males who obtained a higher percentage (67.7% vs. 44.4%) compared with females. The results also show that only 1.3% of the total sample responded 'dissatisfied', and 1.6% in the group of males. The response "hardly satisfied" was 0% in all cases.

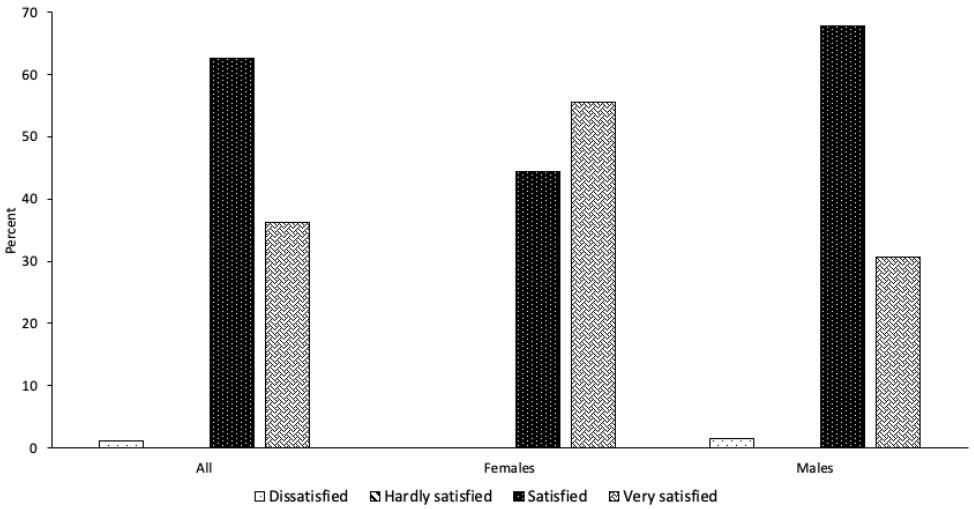


Figure 3. Percentage agreeing with the flipped classroom activity.

It was observed that only 18.8% of the total students did not pass the subject, while 81.2% did pass it (Figure 4). About 42% of the students obtained a grade of notable. Comparing females and males, only males received a merit rating, at 2.5%.

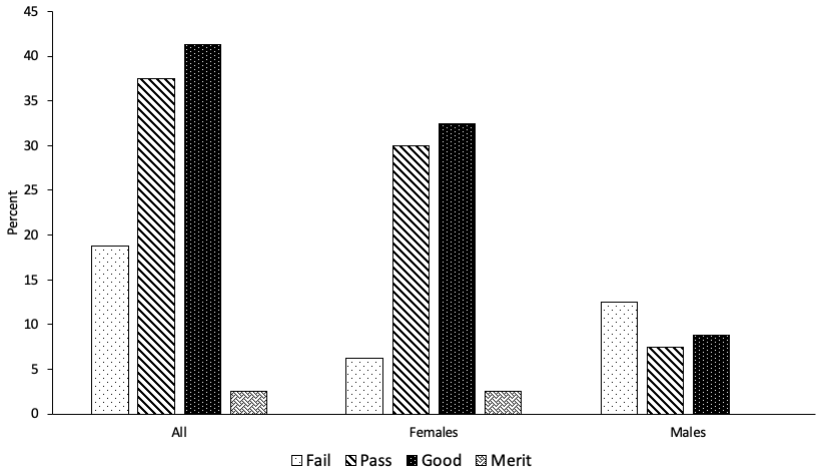


Figure 4. The grade obtained by the student in the examination grade.

4. Discussion

The aim of our study was to assess the level of satisfaction when using the flipped classroom model with university students to develop content related to sport sailing. The results of our study show that the application of a methodology based on the flipped classroom method has achieved a high level of affinity in terms of participation, usefulness, and student satisfaction in the current higher education system for teaching sailing content.

The student's overall satisfaction with teaching can be seen as a positive affective state that includes the teacher's evaluation, form, and ability to apply the teaching method and learning [34,35]. The sole purpose of this is to ensure that the student gains a greater understanding of the content, moving away from the traditional model in which the teacher plays a greater role. This is supported by the excellent results achieved by the students in the exams. More than 41% of the students achieved a grade of "good". Therefore, and on the basis of our results, it is logical to believe that the application of this teaching model in sailing content can enable excellent results to be achieved by focusing all attention on the teaching–learning process of the student. We must bear in mind that the level of satisfaction is positively related to the student's abilities [36,37]. Some studies have shown that the level of satisfaction of basic needs in class, together with behavioural commitment and academic performance, form a complex and dynamic system in students (Wang et al., 2018) [10]. Student engagement can take multiple forms, all of which are related to the desired outcomes of higher education, which must include satisfaction [38]. It has been shown that engagement is a construct that integrates elements such as time spent on tasks, social and academic integration, and teaching practices, all of which are related to student performance and satisfaction [39]. From this, we can conclude that our students' satisfaction was key when it came to achieving good academic results. Our results showed that the level of satisfaction of all our students was very high; therefore, this type of methodological resource seems appropriate to promote aspects such as the time devoted to homework and the social and academic integration of students. The satisfaction results were also supported by the good results in exam grades, with more than 80% of students passing the subject. It is logical to think that the higher the level of satisfaction of the students, the higher their level of motivation to participate in the teaching–learning process in the classroom, so the teacher would also have a greater potential for motivation when dealing with this group of proactive students [9]. Other studies have confirmed that the use of this methodology achieves significant learning and generates interest in the active learning of students [12]. The motivational factor is a key element to ensure that learning is meaningful for students. The flipped classroom methodology is a new way of transmitting information and generating knowledge, which manages to develop students' autonomy in learning and reinforces transversal skills. In this way, students acquire the necessary skills to carry out their professional activities. Likewise, this could give rise to a positive feedback process

that would promote the creation of a climate conducive to learning, in which the teacher would be perceived as an innovative agent, also facilitating the inclusion of new students and the creation of synergetic collaboration and making the educational process visible.

Based on the results obtained in our study, we can suggest that the flipped classroom methodology could be an appropriate tool, framed in active methodologies, where the student is at the centre of the teaching–learning process, redefining the role played by the student and relying mainly on the level of satisfaction acquired in carrying out these activities for the development of sailing sports content. Innovative educational tools must aim at the quality and enrichment of learning through curriculum design based on the characteristics of the content being taught [40]. In this process, the role of the teacher changes completely to become a facilitator, but it is also necessary for the student to acquire total commitment so that they can work in synergy and take responsibility for their part in the learning process. One of the main aims of the teacher is to provide an appropriate context for the student to take an active role and be empowered as a builder of their own learning [23]. Therefore, the application of this pedagogical perspective will allow both the teachers and the students to be competitive [41].

In our study, we can consider some limitations. Firstly, a sample of student from only one institution was used, which limits the generalizability of the results. Secondly, the size of the sample is show as a limiting factor of the article. Other limitation for this paper is that it should be noted that a longitudinal study could have provided more evidence to strengthen the results obtained. In our study, only one questionnaire was used to assess students' satisfaction with the teaching provided. In future studies, it would be necessary to include other questionnaires that allow the evaluation of other variables related to the teaching activity, thus providing a more global vision of the whole process. Likewise, the use of other indicators that reflect the learning acquired or the performance of the students could provide more information that would benefit the interpretation of the results obtained. More studies could be developed to assess the effectiveness of the flipped classroom model in the sport of sailing. A larger sample and students from different universities should be used in future studies.

The contextual characteristics of sport sailing are complex [3]. This complexity of the sport makes it even more necessary to use methodologies that can facilitate the teaching and learning process for students. To solve this problem, some researchers have chosen to use the Teaching Games for Understanding (TGfU) system, with excellent scores [42]. TGfU is a teaching and learning approach that uses games to learn sports tactics. This learning of tactics is conditioned by the development of the performance skills of the sport itself. A game framework and a modified game form are developed to deliver TGfU [2]. As players improve, the game adapts to provide a greater challenge to the participant in terms of appreciation of the game, tactical awareness, decision making, and execution of skills. Researchers such as Zainuddin believe that the implementation of the flipped classroom needs to be reimagined through gamification. This new approach would be an innovation to improve the learning skills of this century's university students [32]. We believe that the combination of this methodology with pre-course video viewing could significantly improve the teaching and learning process of sailing. Furthermore, this combination could reduce the workload that both teachers and students have to develop when implementing the flipped classroom methodology. Therefore, it would be appropriate to have a combination of both methods in future research lines.

To the best of our knowledge, the majority of studies that have used the flipped classroom have not used evaluation tools, or the tools that have been used have not been validated [43–46]. Similarly, this type of methodology has not been carried out for teaching content related to sport sailing. A review study carried out in Spain showed that studies on the flipped classroom at university level in the field of Physical Activity and Sport Sciences only accounted for 2.9% within the knowledge area of Social Sciences, and only 1.2% when they included the rest of the knowledge areas [47]. Therefore, we believe that our study

provides relevant results for this knowledge area, even more so if we take into account the novelty of the content in sport sailing.

5. Conclusions

The use of the flipped classroom pedagogical model with university students seems very appropriate to increase their satisfaction with the teaching–learning process in sailing, in addition to encouraging a high level of participation and usefulness.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data are available on reasonable request from the corresponding author.

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Conflicts of Interest: The authors declare no conflicts of interest.

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