

METEOROLOGY FOR MARITIME STUDENTS. LITERATURE SEARCH FOR RELEVANT INFORMATION ON METEOROLOGICAL SUBJECT AND PROMOTION OF TEAMWORK

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Abstract

The Teaching Innovation Project to which we refer below has been focused to pupils of the subject "Meteorology", taught in the third year of the degree in Nautical Sciences and Maritime Transport. Furthermore, the general and specific skills enhanced in the students through this project, are very useful for many other subjects on their degree.

The implementation of this project sought the achievement of several learning objectives. First, it was intended to improve the student's preparation in the subject, trying to make more attractive for pupils the usually tedious process of searching and analysis of relevant bibliographic information, not only from an academic point of view, but also from the perspective of the future sailor. Secondly but not least, it has been tried to promote studying and working habits through team activities.

Although individual work creates habits of personal reflection, since the student marks his own learning patterns, it carries the risk of leading to subjective interpretations that are little contrast; therefore, is necessary to find a way to properly combine individual and group work. To achieve the aforementioned objectives, this teaching project has enhanced the active work of the student by conducting activities of five members designing thematic posters (chosen from a list of proposed topics), which are later exposed and discussed publicly.

Through continuous interaction with fellow students in the preparation of the posters, we have sought to foster critical and self-critical capacity, as well as constructive competition. It promotes creativity and increase the investment of the student in improving their training. A poster is a type of academic communication of great educational interest since, in addition to its obvious importance in the academic field, it provides educational benefits that will be briefly explained below. By having a limited space, the student is forced to develop their ability for synthesize, through the use of graphs, tables, images, etc. This in turn requires applying their capacity for analysis, discerning essential and superfluous concepts. At last, the public exposition and discussion increases the responsibility that falls on the student facing their peers, which positively affects to the quality of the work.

This teaching project has been carried out throughout the corresponding semester. With this purpose, a certain number of hours of practical classes were assigned. This affords the student to devote more time for the accomplishment of his work, as well as it allows the teacher a punctual and immediate follow-up of its development. The chosen format (poster size) favoured the attainment of several of the didactic objectives sought, at the same time that it served as an introduction to the student in the methodologies and vehicles of knowledge broadcasting at the academic world.

Keywords: Project, innovation, improvement, skill, teacher, objective, group work, poster, bibliography.

1 INTRODUCTION

Meteorology for Maritime students, as some other engineering and technical subjects are difficult to learn and, consequently, have always been characterized by a large number of academic failures [1]. This is the reason why alternative methodologies have been used to teach similar physico-mathematical contents in different countries [2]. Some of these methodologies are noteworthy to mention: audio/visual resources as a useful tool to improve the teaching of coastal engineering [3] (which increased the number of students who pass this course [4]), use of GPS and Google Earth [5], use of "rules of thumb" [1], tutorials to promote self-directed programming learning [6], collection of practical exercises already solved [7], etc.

This teaching innovative project was planned and designed specifically to be applied in the subject "Meteorology", taught in the third academic course (sixth semester) of the Degree in Nautical and

Maritime Transport (University of Cádiz). However, the skills and abilities improved in the students, both global and specific ones, provide an obvious academic profit for many other subjects of their degree.

It is indisputable that the wisdom and skills acquired in this subject are crucial to train the future sailors. In the so-called ficha 1B for this subject (summarized information about the specific academic objectives, bibliography and topics) three teaching goals are set: First (consigned as learning result R1), must be able, at the end of the semester, to analyse methodically most meteorological phenomena as well as to reach the necessary skills to make a record of a wide set of experimental data for their study. Secondly (R2), the pupil must be capable to explain, in a comprehensible way, the phenomena and processes related to the basic aspects of Meteorology, using the appropriate magnitudes and units. Finally (R3), to acquire the ability to solve meteorological problems in order to reinforce the theoretical knowledge and serve as an introduction to later applications or to perform weather analysis and forecasting. The achievement of these objectives, such as the surveys carried out and qualifications reached with the progressing tests of the subject, has been decisively favoured by the application of the innovative and teaching improvement project introduced herein.

Obviously, in addition to learning results and the general or specific competences which are specifically set at curricula, the teacher must suggest alternative classroom activities to enhance a becoming interest in students [8,9]. This is doubtlessly the best way to guarantee the achievement of the expected teaching results, mainly if the subject demands a significant academic and professional qualification compared to other subjects previously developed in this degree.

Just like any project of similar characteristics, its ultimate goal is to improve the teaching results through the implementation of a set of educational activities to achieve it. For this purpose, the first step consists in the correct identification of the deficiencies shown by the student, before and after the teaching of the subject.

Students of Nautical Sciences demand, along their degree, an essentially practical teaching profile but, however, the contents of our subject require to achieve a consistent scientific basis for its adequate understanding. It is therefore necessary to search for ways to improve the suitable skills and abilities for a better assimilation and understanding of the physic and meteorological primary concepts. All this without diminishing its practical importance, for example in the determination of wave parameters, sea level variation, etc. [10,11]

By means of the own and other teachers' experience acquired over the years, we concluded that, after the completion of their studies and even after their training periods, most students shown a manifest deficit synthesizing scientific literature. Teaching technics based exclusively on transmitting knowledges and information through class notes (wrote up and edited by himself, or provided by the teacher) encourage this gap. In addition, a free and easy access to information offered by web pages can provide the student with immediate information but, unfortunately, it is not adequately verified in too many occasions.

On the other hand, although individual work tends to generate habits of personal reflexion, because the student marks its own learning patterns, it also involves the risk of misleading and subjective interpretations due to the lack of discussion. So, finding a way to combine team and individual work has become imperative. Asserting our words, it is a confirmed fact that most of professional chances (especially for the future Bridge Officers, the preferred professional destination for our students) will be carried out collectively, requiring continuous interaction with other co-workers. Decision-making and the consequent distribution of tasks go beyond the logical labour subordination. Therefore, it is necessary to foster the improvement of necessary skills and abilities at the academic period for their future work life.

This innovative Project try to fill out, at least partially, the shortages mentioned above. To achieve this, we proposed series of teaching activities detailed at the following sections.

2 METHODOLOGY

In order to fulfil the aforementioned objectives, our project enhanced the active work of the student at classroom by conducting group activities (five member groups) consisting in the design and development of thematic posters, chosen from a list of proposed content, to be exposed and discussed in public. To promote its broadcasting and to strengthen the confidence of the students in the value and usefulness of their work, these posters have been publicly exposed for viewing, during several months, to the whole university community (directly invited by the Nautical Sciences Management Staff).

As we previously commented, the vehicle chosen to develop our project was printed posters. This has been possible thanks to the financing granted for the execution of the project.

A poster is a well-known type of academic communication with a great educational strength. It affords to transmit contents in a clear, concise and permanent way. In addition to its obvious benefits in the field of academic research, its use provides teaching improvements that will be briefly explained below.

Resulting from a limited space to expose their topics, students are forced to enlarge their faculty for synthesizing and to merge information by means of the use of graphs, tables, images, etc. This in turn requires applying their ability to analyze data and discerning essential contributions from superfluous ones.

The managing of a poster demands a broad knowledge about the concerned matter. Due to the limited space and the constraint to resume and to select the exposed information, the know-how of the pupil about the topic must exceed clearly the information finally exposed. As posters will be published and discussed publicly, authors must be able to enrich and to supplement the information showed and, of course, dare to ask any question about it. This fact set up a growing necessity to be better qualified and, therefore, to devote additional time for studying.

Furthermore, a poster should be visually attractive and comprehensible. It supply to the student the opportunity to develop his creative facet. The fast visual comprehension supplied by a poster promotes the self-improvement in order to compete between groups. In addition to worry about documenting adequately their work, pupils try to carry out a visually striking, refined and rigorous execution.

The meteorological topic to be developed at posters must be publicly exposed and argued. This fact, in addition to reinforcing on the preparation in the subject, as was mentioned in the previous paragraph, encourage students to work improving different skills which are not usually appropriately highlighted at technical study schedules. We must emphasize at this point the significance that public discussion must entail for a university student, leading to contrast different points of view and to argue about matters and concepts whose infallibility, at different scientific and technical fields, may be overestimated.

3 RESULTS

3.1 Task Schedule

It is not difficult to understand that properly progressing in such activities requires an increased number of working hours. We believe that it would be counterproductive for students to consume a large part of their free time performing the requested work. This, on the one hand, would lead to conflict with the required dedication to another subjects and, on the other, it would make the student to lose something that we understand is essential to reach the fixed objective: to preserve the interest on the undertaken activity. Obviously the latter would be more difficult to achieve if students are overburdened with tasks, and they are not allow to work unstressed.

For all these reasons, the characteristics of this project have been carefully explained to our pupils at the beginning of the corresponding academic degree. Students are meticulously and promptly apprised, both at classroom and by means of the specific academic electronic links, about requirements of suggested task, organization of working groups, selected topics and working schedule, as well as the rate at final qualification of this subject.

Several sessions of applied courses were devoted to elaborating posters (according to the fixed timetable for this subject, we consider that two or three one-hour sessions could be enough). This hours are also used to recommend the guidelines that working groups might to follow once the programmed sessions ended, and to follow working outside the classroom (for example, in the work rooms offered by the library of the Campus or at home eventually).

In order to make easier the work for our students, and to encourage them to concentrate a large part of their time searching for information and to reinforce the personal study of chosen topic, they were adequately advised in class on the use of appropriate poster editing programs.

Along May, at previously established dates, works were exposed at class. Just at the end of each presentation, after teacher on-site corrections, their classmates had the opportunity to ask and judge the work.

Posters were printed on paper in size 80 x 60 cm and remained exposed in the aforementioned classroom for public exposure to the University Community. We must clarify at this point that, the

exhibition was attempted in the common areas of the CASEM building (Centro Andaluz Superior de Estudios Marinos), but the administration of the Campus alleged the impossibility of doing it in the foreseen dates, offering alternatively the possibility of exposing works in the habitual classroom during the required time. This is why the Management Staff of the Center was encouraged to broadcast, using TAVIRA resources (a sort of e-mail inter-University communication), the student activity that had been carried out.

3.2 Qualification

The qualification of this activity accounted 20% of global qualification for this subject. The work was evaluated in two phases, the first one correspond to the search for bibliographic information, in which each group had to draw up a list of bibliographic references rightfully contrasted. In the second one, both the managing and public defense of works were valued.

4 CONCLUSIONS

This teaching project seeks to make "subjective" conditions such as personality, severity, as well as personal slackness of the teacher, to become less relevant at final qualification. At the same time, it works to increase the interest and personal formation of students about Meteorology, regardless of the way and even the extent and depth with which it is given. However, the ability to spread passion at work is essential to motivate students and this is inherent for the teacher.

When this project was introduced at first time to students, their initial reactions were not very positive, since it implied an additional workload. However, once the groups were distributed and the topics were chosen, the response of students was completely different. They were clearly enthusiastic and interested about the activity. The idea of seeing their work publicly published was especially motivating.

The carrying out of part of the working activity at classroom allows to verify the evident interaction between members of the same work groups and also between different groups. The possibility of comparing the evolution of their work with that of another groups had a clearly positive effect, as it guided students to be better informed about selected topics as well as to improve the aesthetic appearance of posters.

Regarding the public defense, different patterns were observed. In most groups, interactive work was very clear and evident as all members had a good command about global presentation, independently of the settled section to be exposed. Their public appearances interventions were synchronized, showing how much time they have devoted to rehearsing the presentation. On the other hand, there was minor group in which the lack of dedication and coordination among its members was clearly reflected in the content of the poster and in the corresponding public presentation.

Once the whole process of evaluation for this subject was finished, students carried out a survey in which they had the opportunity to value this project. They were asked about how their performance had influenced the compression of the subject and whether they recommended its application in other subjects. Although the number of registered replies was low related to the number of students enrolled at this subject (doubtlessly due to the available dates to do it), the results obtained were generally positive. Approximately 78% of survey respondents would recommend applying this didactical experience in another subjects, and most considered that the work positively influenced the results of our subject.

One of the commitments acquired for the application of this innovative teaching project was to carry out an informative talk to the members of the Department of Applied Physics, in order to show the results of the project. Conclusions of our colleagues were clearly positive and even some of them took the idea into consideration to apply it in subjects under their own responsibility.

Positive academic results, students experience and acceptance of our colleagues, encouraged us to present this methodology.

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