

## SUSTAINABLE DEVELOPMENT PROGRAM AT THE FACULTY OF NAUTICAL STUDIES OF BARCELONA. NAUTICAL ENGINEERING EDUCATION

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Nautical engineering education institutions play an important role and are a key tool in the future sustainable maritime transport and naval world. This paper addresses the role of nautical engineering education in the learning and implementation of the competence of sustainability and social commitment (SSC) in the Nautical Faculty of Barcelona and presents results of the first year of the implementation of the environmental program STEP2015 at the Universitat Politècnica de Catalunya.

**Keywords:** Nautical, Engineering education, Sustainable development

### 1. INTRODUCTION

Higher education is essential if we want to achieve sustainable development and therefore social progress. Higher education introduces sustainability concepts in very much part of curricula in engineering education. Nowadays, many university of the European Higher Education Area are making important changes in their curricula and degree requirements [1].

The Universitat Politècnica de Catalunya (UPC) [2] is one of the most prestigious universities in Europe and has the commitment to train graduates and has made significant efforts to integrate the sustainability in their professional activity, incorporate disciplines of the social sciences and humanities, promote multidisciplinary teamwork and stimulate creativity and critical thinking.

As many other universities around the world, Universitat Politècnica de Catalunya has been proactive in the last years to convert its commitments towards sustainable development into actions [3]. It had committed itself to the Copernicus Declaration [4] and had adopted its own UPC Environmental Declaration [5].

The STEP 2015 Program [6] is one of the answers that the UPC has prepared to reach this challenge. One of the objectives of the STEP2015 program is develop the conceptual bases, identify concrete referring and to develop practical tools for the future graduates on sustainability and social commitment topics.

The Faculty of Nautical Studies of Barcelona (Faculty) [7] belongs to the Universitat Politècnica de Catalunya. The integration of the Faculty of Nautical Studies in the UPC allowed for the introduction in 1995 of the Diploma in Naval Architecture (Ship Systems and Propulsion), which is complementary to the Diplomas in Maritime Navigation and Naval Engineering, Degrees in Nautical Studies and Maritime Transport and Naval Engineering.

The Faculty has participated in the STEP2015 program and some of the activities developed and results obtained are presented in this paper.

## **2. ACTIVITIES DEVELOPED TO PROMOTE SUSTAINABILITY IN NAUTICAL ENGINEERING EDUCATION**

In the STEP2015 program developed at the Faculty of Nautical Studies of Barcelona in the year 2010, the Faculty has had an active position in regard the perspective of the introduction of the development sustainable in all curricula.

In February 2010, there was constituted a work team that took in charge the development and the implementation of activities related on the promotion of sustainability and social commitment at the Faculty. The above mentioned group was formed by four permanent members and by collaborators and volunteers, both members of the Faculty.

In order to be able to harmonize criteria inside the frame of the program STEP2015 of the Universitat Politècnica de Catalunya, the work team took part in several meetings of work together with team members of the other faculties and schools of the UPC.

Fruit of the different meetings, our Faculty discussed the strategies that adopted for accelerating the transformation of the university towards a sustainable university, which include following actions:

- Two sessions to integrate the generic competences, sustainability and social commitment in the new curricula.
- Maritime Transport and Naval Sustainable Industry workshop. The meeting room of the Faculty was full of students and all showed a special interest in each of the conferences. The result was very positive.
- To involve the maximum number of students on sustainable subjects, there was a competition to design the "sustainable Christmas card 2010".
- During the Christmas holidays, the modelship "San Carlos" (the flagship of our Faculty), which is in the hall, was illuminated by the light generated by static bicycle, prepared for the occasion by professors and students of the Faculty.
- Create a new database that contains topics related to the maritime and naval sustainable and social commitment.
- Create a prize to the best sustainable final project. Students incorporate sustainable concepts in their work and acquire a sustainable mentality.
- A special flag related on sustainability and social commitment topics was designed and nowadays is present in all official acts.

## **3. SUSTAINABLE QUESTIONNAIRES**

In order to learn further about the knowledge of our community related to the sustainability and social commitment topics, the STEP2015 work team surveyed the members of the community from students to professors.

Two different models (students and professors) of questionnaire were sent via email from October 15th to November 3<sup>rd</sup> of the year 2010 to each group of our community.

A total of 19 professors out of 60 answered back the questionnaire and just 52 out of 600 students did it.

The results of these questionnaires are going to be introduced as follow:

Previous knowledge and awareness on the sustainability topics and study materials.

A 95% of surveyed professors are aware of sustainability and 5% answer negatively, somehow a similar result appears when surveying students, a 90% are aware and a 10% are not.

The study material has a crucial importance in the learning process, when surveying professors if they include any topic related to sustainability and Social Commitment in their course material, a 67% of them answer affirmatively and the rest a 33% negatively.

Even though a 68% of students consider appropriated the inclusion of these topics in their curriculum, there are 24% who believe they are not necessary. Just the 8% doesn't answer or doesn't know. On the other hand, asking the same to the staff, a 78% answer positively and 17% negatively. The rest (5%) doesn't know/doesn't answer.

#### 1. Sustainability and social commitment diffusion

The 72% of the surveyed professors want more diffusion from Barcelona Tech's Direction, 2% don't want any diffusion and a 26% is not available. Regarding the students answer to this same question, a 74% agrees with this initiative, while a 12% does not agree and a 14% answer doesn't know/doesn't answer.

Faculty staff was also asked if they find interesting that activities related to SSC are performed at college: most of them (94%) finds it interesting, and only a 6% doesn't. Similar percentiles came from students: a 92% said "Yes", a 4% "No" and the other 4% answered doesn't know/doesn't answer.

When asked for their predisposition in order to participate in these activities, 67% respond "Yes", and 16% "No" and the rest doesn't know/doesn't answer. Once again, students answered the same way: a 72% would do it, in front of a 12% who wouldn't. Up to the 18% answered doesn't know/doesn't answer.

#### 2. Evaluation criteria for the SSC (Sustainability and Social Commitment) topics

A 31% of surveyed staff believes these two concepts should be independently evaluated. 39% refuse this idea, while the 28% doesn't know/doesn't answer.

When surveying the student population a 28% of them agree with separate evaluation of these subjects. But a 32% think the opposite, and there are a 40% of them.

The evaluation criteria is unknown by 82% of staff. Only a 12% know about it, and a 6% doesn't know/doesn't answer. Accordingly, a 90% of students ignore the evaluation criteria of SSC. A 6% knows how it works, and 4% doesn't know/doesn't answer.

#### 3. Involvement in SSC (Sustainability and Social Commitment)

A 91% of staff agrees that it is interesting to implement the SSC in current degree's curriculum. A 6% don't agree with it, and the rest doesn't know/doesn't answer. Less percentile of students agrees with the implementation (68%). A 24% admits it is not interesting and 8% N doesn't know/doesn't answer.

A 71% of staff thinks that is viable the introduction of SSC concepts into their courses materials. A 17% thinks not, and the other 12% doesn't know/doesn't answer. From the point of view of surveyed students, just a 56% of students think it is viable. Another 38% does not think so and a 6% answered doesn't know/doesn't answer.

The 58% of professors has been involved in projects related to SSC and the rest has not. According to the student survey, a 62% of them have been involved in this kind of projects. A 14% does not.

An 83% of surveyed staff would like to participate on projects related to SSC. An 11% don't and the rest doesn't know/doesn't answer. In the case of students, a 62% also would like it, a 14% would not.

Finally, the questionnaire asked to the students if they think that professors would easily accept to introduce sustainability and social commitment materials in their course. A 28% said yes, a 32% no and 40% didn't know.

#### 4. CONCLUSIONS

Universitat Politècnica de Catalunya has developed and implemented a solid methodology to carry out its environmental commitments through environmental planning since 1996.

Questionnaires can not represent the opinion of the entire community of the Faculty of Nautical Studies of Barcelona due to the fact that the global participation on the questionnaire barely surpasses a 20%. Nevertheless, it was higher participation than the expected.

The results show a background on sustainability and social commitment on both groups, students and professors. Obviously, there is a growing concern about the impact of our engineering education and activity over the environment. Moreover, both groups are interested to involve themselves into projects related on SSC. This is one of the most interesting and positive conclusions of the questionnaire.

Answers of both, professors and students, seem to agree on the importance of the teaching material and the inclusion in some SSC topics in different levels of this competence. Even though, some professors do not see a faceable viability of introducing SSC topics in their teaching material. In fact, most of students are doubtful whether professors will be eager to do so.

Furthermore, it is important to point out the fact that around 90% of the surveyed teachers don't know the evaluation criteria for SSC competences. Thus, it is necessary to increase the information in this aspect.

This questionnaire shows how important is for us spreading the sustainability and social commitment. The diffusion of any idea or topic makes it more popular and known by more population. Therefore, it is big issue in our community as well. Also, results show that the sustainability competence is poorly defined.

To sum up, this questionnaire and actions realized during 2010 tell us how our community feels about the topics treated and could be used as a guide to take further actions for the STEP program and developing the guidelines for the incorporation of sustainable development in our studies. We hope the concern about sustainability and social commitment will grow in the future thanks to this project.

In general, there still are some barriers in their reorientation of engineering education to sustainability, but there is no doubt that the inclusion of sustainability and social commitment into the teaching curricula is a key issue and it is necessary work in this item.

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