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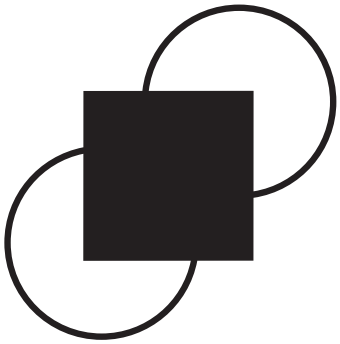

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INFLUENCE OF THE EDUCATIONAL ACTIVITIES IN THE PERCEPTION OF CREATIVITY IN ENGINEERING STUDENTS

R. Sancibrian[1], E. Gonzalez-Sarabia[1], J.M. Blanco[2], I. Lombillo[1], C. Torre-Ferrero[1]

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Abstract

For the twenty-first century, creativity and innovation are leading topics in many scenarios (i.e. social, business, technological, etc.). For this reason, many courses in engineering degrees have developed their syllabus considering creativity and innovation in their educational activities. However, creativity is a highly ambiguous concept and tends to have different meanings depending on the field to which it is applied. Furthermore, in engineering education an additional problem is found, which is how students understand the term creativity in their professional activities. Usually, they are confused about this topic and misunderstand concepts such as creativity and innovation. In this work, an empirical survey is presented to determine the perception of the students on creativity and how they use these skills in their work. The research work explores different topics that are necessary to be considered when creativity is developed in the classroom.

This work points out that the way in which the instructors organize the lessons has an important influence on students learning. It is an instructor's task to design an effective activity and encourage students to think creatively. To this end, specific activities are scheduled and included in the class. When this task is carried out properly, the students can develop creative designs with confidence. However, it is not easy to design effective lessons and activities. In the methodology proposed the students work in groups using Project Based Learning (PBL) methodology. Questionnaires are designed by the instructors to find out how the students understand creativity in design. In these questionnaires, the opinion of the student is reflected at different stages, i.e. before, during and after the work is concluded. In this way, the answers provide the changes in the perception of the students about creativity and these modifications are highlighted in the conclusions.

Keywords: Creativity, Innovation, Industrial engineering, Design.

1 INTRODUCTION

Nowadays, the challenges that the education has to confront with (e.g. cultural, economic, and environmental) have made to change the role of our Universities, because they are an essential part of the society and should be involved in these changes. Universities have been paying attention to the creativity as an important tool to address these changes [1]–[3]. Thus, it should be an aim for every lecturer in engineering courses to foster creativity in students while they develop their skills. Creativity is a fundamental aspect that should be included in the engineering curricula in our Universities. No doubt, incorporating creativity and innovation into the courses as general skills in students is essential to confront with the modern world, because students can create original designs, products and systems [4]. Nevertheless, design subjects that should address both creativity and innovation usually forget this point. Furthermore, perception of creativity in engineering among students and lecturers are often subjective. In [5] the study of the perception of creativity in engineering degrees was studied. In this study, participants revealed difficulties to define how they include creativity and innovation in the problems that students encountered in class regarding creative experiences. This work concludes that the lack of confidence was the most important factor influencing the difficulties to achieve creative ideas, and therefore, the students feel themselves vulnerable when they are unprepared in this field.

A lack of engineering skills to design and a lack of modelling also contribute to the difficulty of having creative ideas. In [6] it is recognized that instructors are often unclear as how creativity are defined in engineering. Thus, instructor training is an essential factor to foster creativity in students. It is necessary to identify various kinds of creative knowledge that can be covered in classroom helping instructors to teach creatively their subjects, and therefore to teach creativity. In summary, creativity should be taught creatively, as this makes students more open to the perception of this concept. How the instructors organize and present their lessons has a huge effect on students learning. It must be

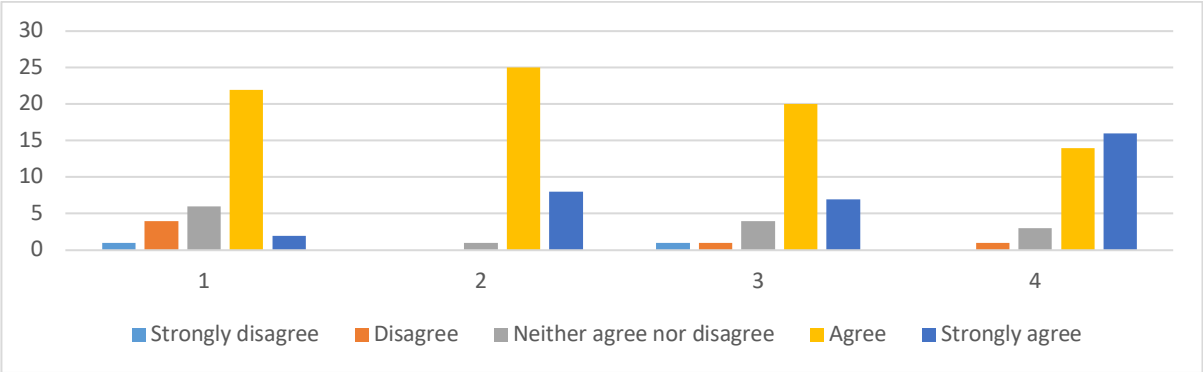

Figure 4. Results obtained from Questionnaire III.

After the educational activity has finished the students filled out the third questionnaire. The results are shown in Figure 4. The education activity in creativity has changed their perception of creativity (question 1), and they have understood the importance of creativity in engineering (question 2). They recognize the utility of the educational activity in creativity (question 3) and its importance. They think that it should have more presence in the engineering degrees (question 9).

In the next paragraphs, some of the students' comments are presented:

- "I think the work we've done is very useful to realize that we can be creative and work to bring ideas to reality. It's been entertaining and I find it, honestly, a great idea to have done this activity".
- "I found the activity interesting. I liked the goal of boosting the creativity of the students, something that until now we have not worked. On the other hand, it teaches you how to work in a group and to value the contributions of your partners. As drawbacks, perhaps the lack of time to elaborate a design finished perfectly and fully functional. As improvements the change of part of the practical classes by hours dedicated to developing a prototype of the proposed idea".
- "It is an activity that I have really liked to do, it seems to me that perhaps the groups should be a little smaller, because being so many it is more difficult to express your opinion. The only drawback I have found is that it has been done at the end of the semester and after Christmas we are always more busy (getting ready for exams) and we spend less time in these activities, if it were done before, at the beginning of the semester, it would be better".

4 CONCLUSIONS

The present study confirms that, in general, the engineering students do not understand the concept and the importance of creativity. Thus, the first step should be to introduce this concept and to explain the importance that this topic has in engineering. After that, the instructors should introduce examples in class using PBL in order to teach how to think creatively. Therefore, it is clear from the results that more effort to introduce creative activities in class is necessary. In the educational activity presented in this work, we are successful in changing the perception of the students about creativity. Students indicated that the creative perspective is beneficial for them and it would be helpful to incorporate more examples throughout the year in different subjects. By encouraging students to generate creative ideas, instructors promote critical thinking and it helps students to understand concepts that would be more difficult to learn using traditional methodologies. On the other hand, by understanding the perception of the creativity by the students, instructors can schedule more easily this kind of activities.

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