STRATEGIES TO ESTABLISH THE STRUCTURE AND THE EVALUATION SYSTEM OF THE STUDENT PROJECTS IN THE BACHELOR ENGINEERING IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT AT UNIVERSITAT POLITÈCNICA DE VALÈNCIA – CAMPUS OF ALCOI

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Abstract

The Bachelor Engineering in Industrial Design and Product Development is a multidisciplinary degree, in which a wide range of disciplines have a key role in the final projects developed by the students of fourth grade.

At Universitat Politècnica de València – Campus d'Alcoi, a number of lecturers are involved in an Education Project in order to change and adapt the evaluation system of the student projects. The current model is based on developing the work with the help of a supervisor and the evaluation carried out by other three teachers, who form the panel.

In the frame of the Education Project, some teachers are trying to apply new strategies to improve both the supervising process and the evaluation system of the projects.

First of all, an index is provided to the students to adapt the structure of their work. Then, it is intended that a number of teachers, each one from a different specialization, supervise the progress of the students weekly. Finally, the same teachers will take part in the evaluation as examiners. All this work must be integrated in the 120 attendance hours established to develop the project, which correspond to the 12 credits ECTS.

In the frame of the new teaching-learning methodologies, the aim of this Education Project is to provide a system to develop and evaluate the student final projects, taking into account the role of students, supervisors and examiners in every stage of the work.

Keywords: evaluation, student projects, industrial design.

1 INTRODUCTION

The new education system adopted because of the Bologna plan, supposes a change in the assessment of students final projects, including the evaluation of abilities and competences [1-3]. In front of this new challenge, this work is conducted in the frame of an education project, which has the goal of establishing the structure, advising process and assessment.

Figure 1 shows the studies map at Campus d'Alcoi – Universitat Politècnica de València: eight Engineering Bachelors, four Engineering Masters and one Doctoral Programme. In all the Engineering Bachelors and Masters, the system for the student projects is the same, but this work is for the Bachelor Engineering in Industrial Design and Product Development
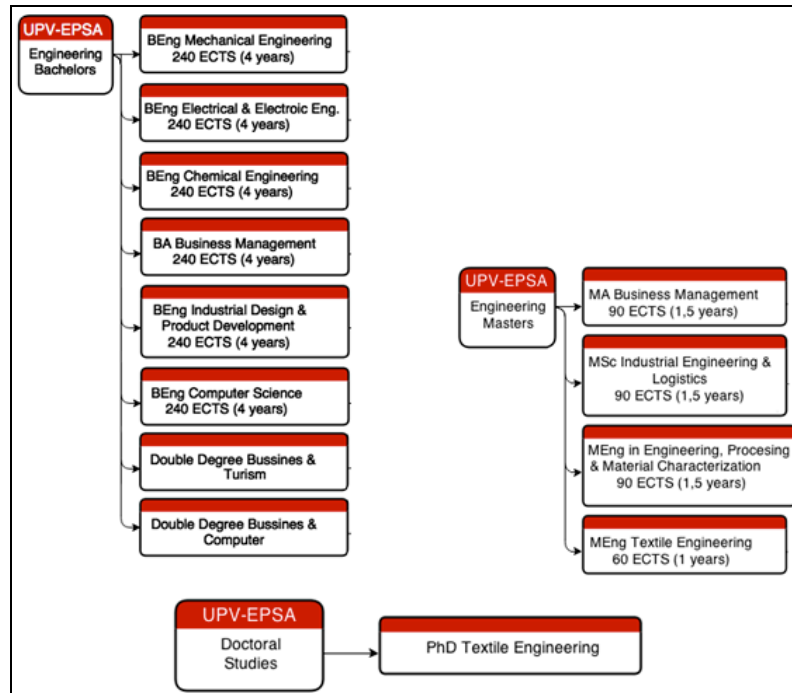
Figure 1. Studies map at Campus d'Alcoi – Universitat Politècnica de València.

1.1 Current system

In the Bachelor Engineering in Industrial Design and Product Development, there is no established system to advise and structure the projects. The current system for the student projects consists of developing the work under the supervision of one advisor. All the work must be done by the students, and the advisor guides them through the whole process.

The work is developed in the frame of the 12 credits ECTS, and it is mainly done in the fourth year, second semester.

The assessment is based on a panel of teachers who evaluate the project in the presentation. The panel of teachers can reach an agreement for the final mark or apply a rubric in which a number of items is evaluated. Table 1 shows the stages for the assessment system.

Table 1. Assessment System.

	STAGE 1	STAGE 2	STAGE 3
EXAMINER	Advisor.	Panel	Panel of teachers.
WHAT?	Development, abilities and documents.	Documents	Presentation.
WHEN?		Before the presentation.	After the presentation.
HOW?	Before the presentation.	Rubric.	Rubric.
EVALUATION	Rubric.	Average mark of each member of the panel of teachers.	Average mark of the members of the panel.
PERCENTAGE		70%	30%

The evaluation, by means of three rubrics, consists of three different parts:

a) **Development**: the advisor reports the work conducted by the student during the whole process. This report is not part of the mark, but is considered by the panel of teachers.

b) **Documents and report:** the panel of teachers evaluate the documents that the student has developed and have access to these documents before the presentation. It counts for 70% of the final grade.

c) **Presentation:** this is the last stage and this part is evaluated by the panel of teachers at the moment of presentation. It counts for 30% of the final grade.

1.2 Detected Problems

One of the problems of the current system derives from the fact that only one advisor guides the student through the whole process. The result is that the work is good in the specialisation of that particular teacher, but the project lacks quality in other fields related to the studies.

Sometimes, this problem is solved in an isolated way, with other teachers being asked for help in their field of knowledge. The point is that only the advisor has the recognition established by the institution.

On the other hand, the same topic is perceived from different points of view depending on the field of knowledge of those teachers. During the process this is a problem, but when the panel of teachers evaluating the projects is formed by members with different approaches to the topic, this fact results in some conflicts when deciding the final mark.

1.3 Suggested Improvements

1.3.1 Types and structure of the projects

Due to the detected problems in the current system, some suggestions are made in the frame of the education project. To start with, there can be two different ways of developing the project:

a) **Projects advised by one teacher**; that is the traditional way.

b) **Projects coordinated and supervised by a team of teachers**. In this new system, the office hours will be scheduled and the participant teachers will be helping students to deal with their projects; each teacher is in charge of a specific part of the project depending on his or her specialization. These office hours will take place in a workshop.

Another suggested improvement is to clearly define the structure of the four different types of projects, depending on the specialisation:

a) *Product Design.*

b) *Manufacturing and Innovation Design.*

c) *Textile and Fashion Design.*

d) *Communication topics.*

These four types of projects are related to the specialisations that the students can choose in the fourth grade. Those specializations are connected to the labor market in the region.

With the aim to define the structure of the main document that students must write, the suggestion is to follow the recommendations of the Standard UNE 157001:2014: General criteria for the drawing-up of the documents which make up a technical project [4].

1.3.2 Assessment

The suggested assessment has the same structure as in the current system, including some changes in the process. There will be a weekly report with comments about the progress of the work made by the advisors. Table 2 reports this progress.

Table 2. *Chart to register the weekly progress of the student.*

ANNEX 1. ACTIVITY OF ADVISING THE PROJECT		
TITLE:		
STUDENT:		
ADVISOR:		
DATE	**TEACHER**	**COMMENTS**

1.3.3 Rubric

As for the evaluation, one of the objectives is the definition of a rubric [5, 6]. There are three different rubrics to evaluate:

a) *Competences.*

b) *Documents.*

c) *Presentation.*

As for the thirteen transversal competences, table 3 shows the rubric to evaluate them:

Table 3. *Transversal Competences.*

TRANSVERSAL COMPETENCES	D (Not achieved)	C (Developing)	B (Achieved)	A (Excellent)
CT-01: Comprehension and Integration.				
CT-02 – Application and Critical Thinking.				
CT-03 – Analysis and Problem Solving.				
CT-04 – Innovation, Creativity and Entrepreneurship.				
CT-05 – Design and Project.				
CT-06 – Team work and Leadership.				
CT-07 – Ethical, environmental and professional responsibility.				
CT-08 – Writing Communication.				
CT-09 – Critical Thinking.				
CT-10 – Knowledge of Contemporary Problems.				
CT-11 – Continuous Learning.				
CT-12 – Planning and time management.				
CT-13 – Specific instruments.				

2 PREVIOUS EXPERIENCES RELATED TO THE EDUCATION PROJECT

In the Engineering Bachelor of Industrial Design and Product Development, there is an extra-curricular project named *MILANO WORKSHOP* for the students to present their ideas and products in an international exhibition.

The project consists of a workshop to design objects oriented to work in a studio environment. The aim of this activity is that students learn by developing projects from the concept stage to the manufacturing and promotion of the products.

Teachers from different fields participate in guiding the students to fulfill their projects that will be presented in an international exhibition. Figure 2 shows a picture of the workshop with teachers and students.

Figure 2. Workshop with teachers and students.

In the frame of this workshop, the teaching-learning process is related to the industrial activities by means of agreements with some companies, which cooperate with the university.

The challenge for the students is to work in multidisciplinary teams. Students from different fields of knowledge, such as robotics and mechanics, chemical studies, textile studies, design studies and computer science are working together in the same project applied to Product Design.

Figure 3 shows the images of some of the developed projects.
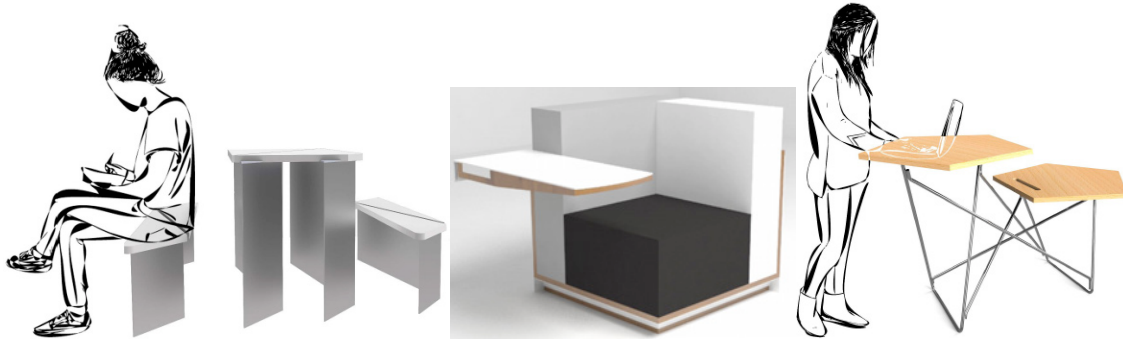

Figure 3. Renders of some projects presented in an international exhibition.

This extra-curricular activity is related to the application of a project-based learning methodology in the Degree of Industrial and Product Development [7-9].

3 EDUCATION PROJECT

With all that background, a group of lecturers teaching in the Bachelor Engineering in Industrial Design and Product Development, decided to start an education project to improve the current system for developing and evaluating the student projects.

The participant teachers are from different fields of knowledge, such as Applied Mathematics, Graphics Engineering, Electronic Engineering, Textile and Paper Engineering, Architectural Composition, Mechanical and Materials Engineering, Continuous Medium Mechanics and Theory of Structures. Figure 4 shows the different fields of knowledge involved in the Education Project.
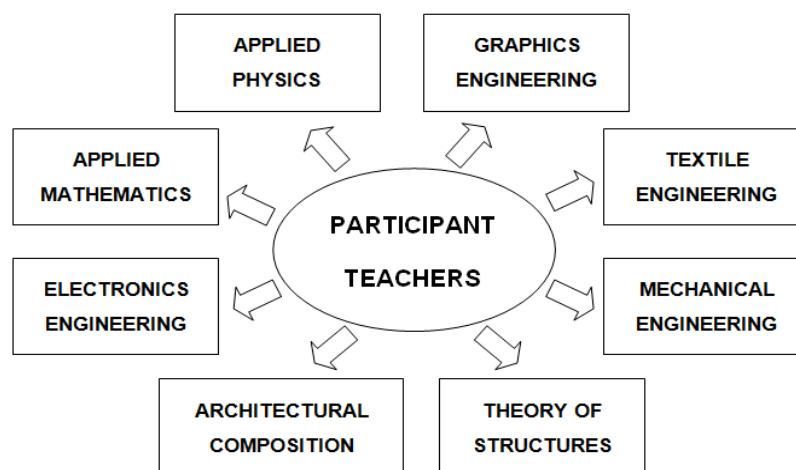

Figure 4. Fields of knowledge involved in the Education Project.

3.1 Aims of the Education Project

This Education Project has these main goals:

1 To define the participants and their implication in developing the Final Projects.

2 To establish the different stages which allow the project guiding in a suitable way, by indicating the timing of every part.

3   To determine the different types of projects in the Bachelor Engineering in Industrial Design and Product Development.

4   To determine the structure for each type of project, related to the previous objective, and the assessment criteria.

3.2   Tasks of the Project

The Education Project is divided into three main tasks:

a)   *Task A:* definition of all the participants and stages for a suitable project process, defining the timing in advance. This task will be registered by means of a document that indicates the procedure to develop and present the work, for every participant.

b)   *Task B:* determination of the different types of Final Projects in this particular Bachelor, depending on the three specializations, and of their structure. This task will be registered by means of a document that indicates the structure for each type of project.

c)   *Task C:* definition of the assessment criteria. This task will be registered by means of a document that indicates the items to be evaluated.

4   RESULTS AND CONCLUSIONS

The tasks of the Education Project have been developed in one year time. Since the proposals will be carried out after the acceptance by the management team, some of the outcomes need some time to be analysed.

The objectives of the education project will be evaluated in terms of the quality of the student works. Table 4 shows the expected results.

Table 4. The outcomes after the application of the project.

PARTICIPANTS	STUDENT	ADVISORS	EXAMINERS
OUTCOMES	QUALITY OF THE PROJECTS	A SCHEDULE TO GUIDE AND SUPERVISE THE PROGRESS	SAME CRITERIA TO EVALUATE THE PROJECTS
HOW	MAIN DOCUMENT	STRUCTURED INDEX	RUBRIC

Figure 5 shows a diagram representing the system with the participants and the activities, and how they are related among them.
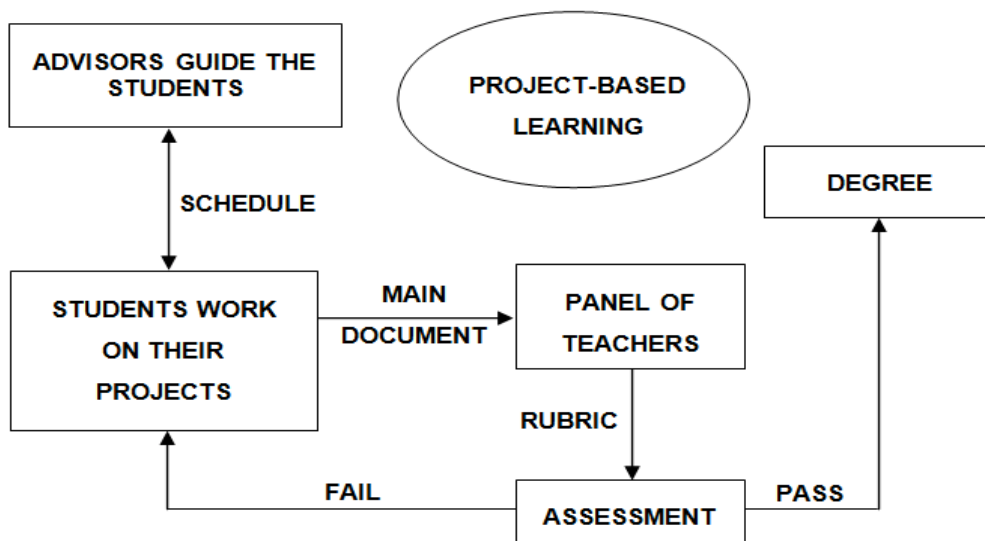
Figure 5. Participants, activities and their relations.

Finally, one of the conclusions is to apply the suggested system to the other Engineering Degrees at Campus d'Alcoi – Universitat Politècnica de València.

ACKNOWLEDGEMENTS

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