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Integral Framework to Drive Engineering Education beyond Technical Skills*

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This paper presents the steps followed at the Escuela Técnica Superior de Ingenieros Industriales (ETSII) at the Universidad Politécnica de Madrid (UPM) to progressively implement an outcomes assessment framework. This assessment is understood as the integral process to guide and guarantee that graduates, when they finish their studies, have acquired the knowledge, abilities and skills established in the program (i.e. outcomes). This is a process linked to the entire program (and not to a single course or activity) and to the cohort of students (and not to the evaluation of each student individually).

At the ETSII, the outcomes assessment process has been designed in accordance with the Accreditation Board for Engineering and Technology (ABET) criteria which establishes 11 outcomes that must be fulfilled by the students as a necessary step in the accreditation process and as a preparation to attain the educational program objectives. The implementation of these 11 outcomes is intentionally unspecified by ABET to encourage each engineering program's faculty to achieve its own specificity considering its idiosyncrasy. This paper describes the approach followed in the ETSII to develop an integral strategy for the institution and to progressively evolve to an outcomes assessment culture. From this experience, some quite generalizable learned lessons are extracted that can be useful for other faculties involved in similar processes.

Keywords: outcomes; competencies; ABET; framework; skills

1. Introduction

ABET, Inc., formerly the Accreditation Board for Engineering and Technology, is a non-profit organization that accredits postsecondary year programs in applied science, computing, engineering, and technology. Accreditation is intended to certify the quality of these programs. ABET was founded in 1932 as the Engineers' Council for Professional Development (ECPD), an engineering professional body dedicated to the education, accreditation, regulation, and professional development of the engineering professionals and students in the United States.

ABET provides specialized, programmatic accreditation that evaluates an individual program of study, rather than evaluating an institution as a whole. The institution must design a strategy to ensure and enhance skill acquisition processes.

ETSII-UPM was accredited in 2010 by ABET. During the process stages, the university's board of directors realized the importance of strengthening students' outcomes and the need to evaluate them.

ABET specifies the minimum curricula for various engineering programs. For instance, ABET requires that all engineering graduates in a baccalaureate program receive at least one year of study in the natural or physical sciences and mathematics, and some more general education [1]. ABET also requires that each student completes a capstone project or design class during his or her education. Because of ABET's involvement, engineering curricula are somewhat standardized at the bachelor's level, thus ensuring that graduates of any ABET-accredited program have some minimal skill set for entry to the labour market or for future education.

Engineering faculties tend to emphasize narrow technical outcome at the expense of a more general preparation for thoughtful professional practice [2, 3]. To change the approach and to begin to work with competences, instead of just with subjects, strategy in the University must be changed. It must be considered *ex ante*, when study plans are being designed. The Bologna process has been a challenge regarding this matter for Spanish Universities and ETSII UPM decided to initiate this challenging process.

It has been already proved by several authors at different universities that this model improves the engineering environment [4, 5]. McGourty et al. [5] focus on different assessment approaches considering twelve different methods and their application to engineering education. J. M. Williams [6] described the use of engineering portfolios as an assessment

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vehicle. Nault and Hoey [7] argue how important it is to establish a culture of trust in an organization as a first step towards creating a sustainable assessment system.

Also, empirical methods can be used to develop a model of the engineering education process, Besterfiel-Sacre et al [4], Kaw et al. [8], Steward et al. [9] and Mitchell et al. [10] presented innovative course-level assessment techniques. Finally, Howell et al. [11] suggested a program assessment process that links program objectives to course objectives and educational activities. L. A. Shay et al. [12] focus on the important issue of improving the efficiency of the outcome assessment process (reducing the burden on already busy faculties) without sacrificing the quality of results.

The difficulties to teach some of the outcomes of the ABET model have also been proved (e.g. ''an understanding of professional and ethical responsibilities'' or ''the broad education in order to understand the impact of engineering solutions in a global, economic, environmental and societal context'') [13, 14]. The importance of teaching management ethics has been emphasized [15, 16].

Other authors have also determined which of the outcomes presented in the ABET model students and instructors consider to be most reinforced when carrying out their Final Year Project tasks [17].

The problem of assessing the level of competence that engineering students acquire during their course of studies is challenging. In this sense, this paper presents the strategy of ETSII UPM to measure and strengthen the outcomes of students. The difficulties presented in the process have been analysed and the steps followed to introduce competences assessment in the institution are shared. The process was aligned with the vision and educational objectives of the institution and the need to be implemented was detected working with external stakeholders.

2. Outcomes set out in the industrial engineering program at the ETSII UPM

Listed below are the ABET[1] outcomes developed in this framework, which are designated with the letters *a* to *k*. Apart from these outcomes the Universidad Politécnica de Madrid has considered it to be of interest to include three other outcomes for students' degree courses (designated with the letters *l, m* and *n*). The ETSII has incorporated these outcomes into the assessment and promotion system presented in this paper.

Designing a Development Framework for these outcomes requires commitment not only on the part of the Institution, in our case the ETSII, but also from faculty, the students and the administration and service staff.

ABET outcomes:

a) An ability to apply a knowledge of mathematics, science, and engineering
b) An ability to design and conduct experiments, as well as to analyze and interpret data
c) An ability to design a system, component, or process to meet desired needs within realistic constraints such as the economic, environmental, social, political, ethical, health and safety context and manufacturability, and sustainability
d) An ability to function in multidisciplinary teams
e) An ability to identify, formulate, and solve engineering problems
f) An understanding of professional and ethical responsibility
g) An ability to communicate effectively
h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i) A recognition of the need for, and an ability to engage in life-long learning
j) A knowledge of contemporary issues
k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. And the outcomes that the UPM wishes to be included in all its degrees but which are not clearly stated by ABET are:
l) The ability to work in a bilingual context (English-Spanish)
m) Organization and planning in a company context and in the context of other institutions, project organisations and human resources
n) Creativity

3. Educational objectives as the driving force for defining outcomes

Any educational project must have a clear idea of the institution's identity, which should be stated in an explicit and unambiguous description of the mission undertaken, of the desired vision and of the values that will guide all the action during the process.

In order to be able to measure the level of compliance with the mission, the strategic objectives are set that will enable the mission to be fulfilled.

In the case of the ETSII, the mission and the objectives have been set by means of a reflective process together with the different constituencies identified by the organization. Therefore, in 2010 the mission of the ETSII Industriales was approved

[1] http://www.abet.org/accreditation-criteria-policies-documents/

Table 1. Educational Objectives of the DITE

	Industrial Technology Engineering Degree Objectives	ABET/UPM Outcomes
OE1	They will be effective in professional practice for formulating and solving engineering problems and they will be qualified to successfully continue their education in postgraduate studies, thanks to their broad and solid scientific and technical background.	a) b) c) e) k) i)
OE2	They will implement solutions to engineering problems, including innovative approaches, evaluating their economic consequences, considering their global impact on society and the environment and taking as guiding principles for action an ethical and socially responsible conduct.	n) e) f) h) j)
OE3	They will be efficient in oral and written communication.	g)
OE4	They will efficiently implement the activities to be performed in their professional field considering those deadlines and resources established to achieve the proposed results.	m)
OE5	They will effectively manage, participate and work in multidisciplinary teams and in multilingual and multicultural environments.	d) m) l)

as "to prepare high level professionals with wide-ranging skills who can apply their scientific, technical and business knowledge to the context of industry, thereby contributing to the economic and environmental development of society".

So that they can contribute to the ETSII's mission, a few years after obtaining their degree, students must have attained certain educational objectives in accordance with their knowledge and the skills acquired during their training and the experience accumulated in their work experience.

Table 1 shows these objectives for the Degree in Industrial Technology Engineering (DITE) and also indicates the relevant ABET and UPM outcomes.

In the case of the Master's in Industrial Engineering (MIE), the educational objectives are the same as for the Degree, but include aspects mainly related to innovation, development, management, entrepreneurship and leadership.

Once the educational objectives have been defined and the outcomes the students must acquire during their training have been set, the following sections show how these competences are defined, implemented and measured.

4. Methodology

Having defined the generic competences for the qualification a Competence Development Framework must then be set that will guide and guarantee the acquisition process by the students on completion of their studies. This process, which is a requirement for international accreditations, is also key to improving students' training, and therefore their employability and their future job performance.

In order to get that the objective of improving training will be consolidated over time and lead to a culture of quality throughout the process, as shown in Fig. 1, a cyclical procedure has been designed that will let the data be compiled and analyzed during all the training stages and that any possible defects or gaps can be detected and actions for improvement be introduced. These actions would be reflected in the updates to the teaching methodology and its assessment.

4.1 History and milestones

Listed below are the actions carried out by the institution that are key to the competence model implementation process:

1. January 2009: the ETSII submitted a request for assessment in order to obtain the ABET accreditation for the Industrial Engineering program.
2. August 2010: the ABET accreditation was obtained.
3. 2015–2016 academic year: During this year the next accreditation audit will be carried out and

Fig. 1. Continuous Improvement Process.

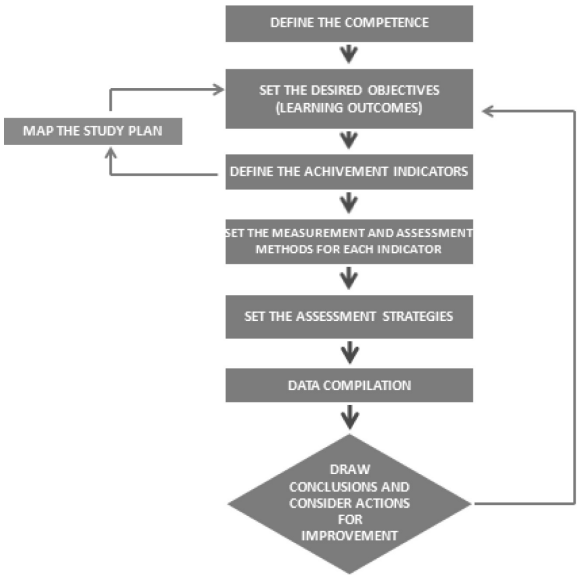

Fig. 2. Process followed.

will cover the industrial engineering program comprising the degree in industrial technology engineering (DITE) and the master's in industrial engineering (MIE).

4.2 Procedure undertaken

Although there are different methodologies and approaches to implementing learning-by-competences models in an institution, there are a series of steps, which if carried out in sequence and systematically will help achieve the set objectives [18]. Fig. 2 illustrates the framework of the complete process designed to be applied in the ETSII. As can be seen, it is a dynamic process with feedback for improvement.

4.3 Defining the outcomes in the study plan

One of the first steps taken was to prepare an initial map of outcomes (Table 2) that have been or hope to be strengthened as each of the study plan subjects unfolds. It is thus possible to see how the outcomes are spread out throughout the training program. It can also be seen which outcomes will be most strengthened when the student completes their studies and which emerge as the weakest.

With the purpose of leading the process, a Competence Assessment work group was set up. Seeing the repercussions and importance of the results of this work, the institution decided to transform the work group into a Competence Assessment Subcommittee, an officially recognized body. The Subcommittee is made up of teachers in the School interested in the matter, and their main mission is to develop and initiate the Competence Development Framework. Moreover, in the initial stages the Committee had the help of external experts.

In a competence-based learning system, not only is it important to analyze and characterize the competences required to develop a career, but they must also be defined in an unambiguous way, grading their levels of achievement and characterizing them in an objective and measurable manner.

From the very beginning, the need to define the meaning of each of the ABET outcomes precisely and clearly within the framework of the qualification, was taken into account, and then how they could be broken down into the different objectives that would state how the outcome was to be attained (i.e. the expected learning outcomes or what we want the students to be capable of doing on completion of their studies at the University). Thus, the objective will always depend on the outcome. The objectives have been graded according to their levels of complexity associated with the different educational stages (degree and master's). Some achievement indicators have been set for each objective, which, as a whole, will show whether or not the objective has been reached. In addition, for each indicator, it has been described which of all the many variations of activity that can be developed throughout a course of study, can be measured, suggesting a measurement methodology. In this way, one or more achievement indicators of a specific outcome can be measured in the same subject.

A considerable effort has gone into defining the objectives for each outcome so that there will be no redundancies when measuring similar objectives in two separate processes.

With this methodology, the objectives to which each subject contributes have been identified together with which achievement indicators must be measured from all the activities being undertaken that will reveal if the learning outcomes set for the outcome have been attained.

Table 2. Map of outcomes by subject

	ABET+UPM													
	a	b	c	d	e	f	g	h	i	j	k	l	m	n
Subject1	X	X					X					X		
Subject2	X				X			X			X			
Subject3	X		X				X					X		
Subject4	X			X									X	
Subject5	X					X			X			X		

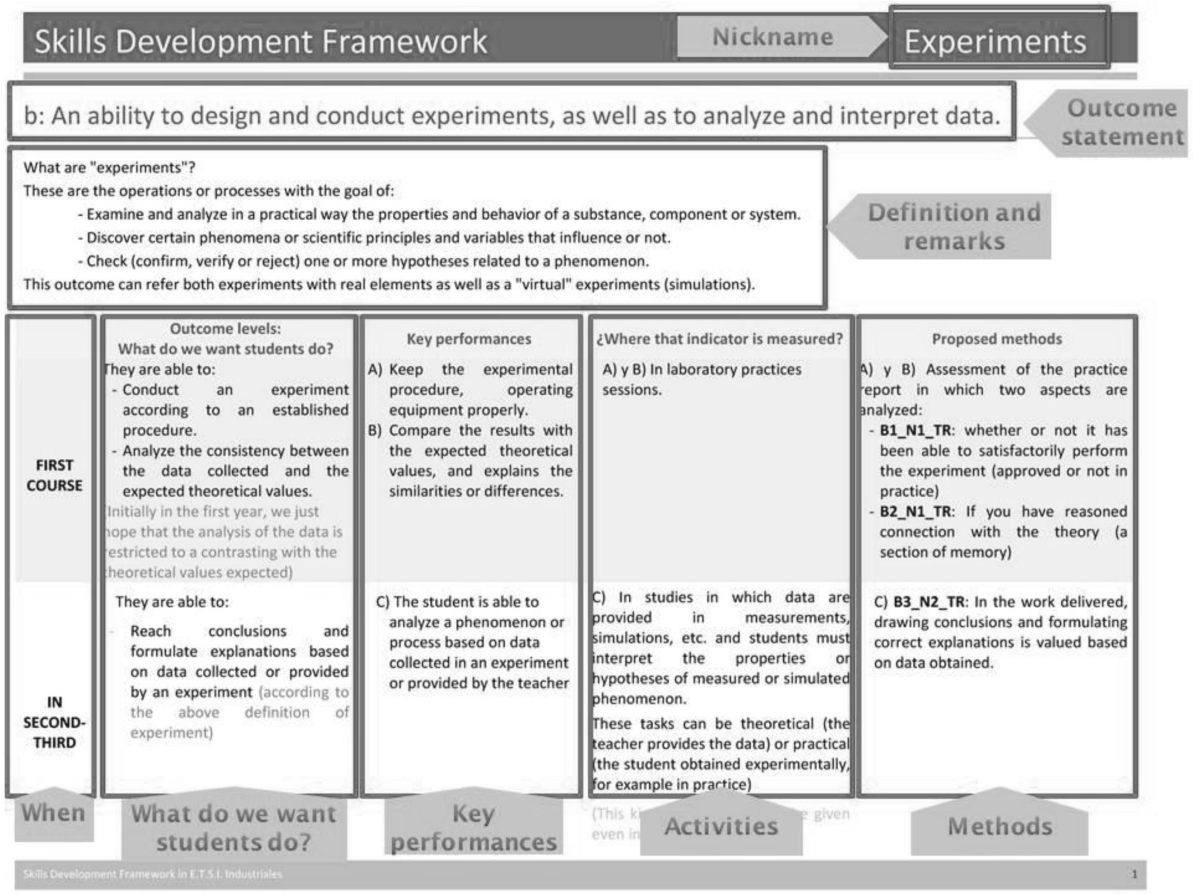

Fig. 3. Definition of objectives, indicators and assessment methods. Application to ABET outcomes.

As a result, a standard layout has been designed to define each outcome, following a data grid structure. It also contains the learning outcomes and the achievement indicators, with a definition of the measurement and assessment methods for each indicator. Figure 3 shows the layout for ABET outcome b.

An assessment layout was then designed for the cases where the rubric is set as a measurement method.

4.4 Activity planning

The process of defining, developing and implementing this design methodology was approached with a time horizon of 4 years, spanning the 2010/2011 and 2013/2014 academic years.

Table 3 illustrates a summary of the main activities undertaken in the last three academic years and those planned for the next year.

5. Application through pilot project and specific actions

After defining an outcome, that is to say, after identifying its achievement indicators and setting the measurement strategies (where, how, who, etc.), as shown in Fig. 3, the following step in the cycle to be implemented is "the assessment". This consists in designing the processes that identify, retrieve and process the data for the next step: the evaluation.

Table 3. Activities undertaken in recent academic years and those planned for the next year.

			TASKS PERFORMED			
		OUTCOME	**10/11**	**11/12**	**12/13**	**13/14**
ABET	**a**	Applies				D / P
	b	Experiments		D		P
	c	Designs				D / P
	d	Team		D		P
	e	Solves				D / P
	f	Responsible				D
	g	Communicates	D	P		
	h	Complete				D
	i	Learning		D	P	
	j	Contemporary	D		P	
	k	Tools				D / P
UPM	**l**	English				
	m	Leadership				
	n	Creativity	D	P	P	
LEGEND						
D	Outcome definition					
P	Outcome assessment pilot project					

To implement the program it was decided to apply the PDCA (Plan-Do-Check-Act) methodology. This is a well-known, proven methodology in the context of continuous quality improvement. It is also known as the Deming Circle. At the ETSII, we decided on the strategy of initially implementing the assessment cycle as a Pilot Project or a trail to be applied with the collaboration of a small group of teachers who were highly motivated by the importance and need to strengthen our students' competences.

The pilot project would let a preliminary assessment of the impact of the process to be made to ensure that the procedures to be adopted would be appropriate and able to ensure the effectiveness of the project as a whole before involving all the university community. The objective of the assessment was to measure, but in a Pilot Project the validation of the developed method should also be considered before being implemented. The following aspects need to be studied:

- Applying the method is feasible and efficient. Error detection in the application of the measurement strategies.
- The information and worksheets are clear and easy to understand. Elimination of any ambiguities when writing the sheets.
- Validity of the measurement method used (rubrics, questionnaire design, etc.).
- Detecting gaps.
- Compiling ideas regarding possible improvements and adjustments.
- Setting the target value for successful assessment. These highly important values are set and reviewed throughout the process cycles, but the situation at the outset needs to be known through the Pilot Projects so that the values can be set the first time.
- Learning for other outcomes.

The Pilot Projects were designed with a common structure for all outcomes:

1. Selection:
   (a) The subjects were chosen that would be measured for outcomes. For example, for outcomes b) Designing experiments, d) Teamwork or g) Communication, subjects were chosen for which: teachers had previously stated that these outcomes would be worked on as they developed and would be taught by teachers motivated by the success of the process.
   (b) If the outcome was to be measured through surveys, for example, outcomes i) Lifelong- learning, j) Contemporary issues or Creativity, the course to be measured was chosen, together with the students (the qualification they were taking) and the part of the course where it was wished to carry out the survey.
2. Communicating information about the outcome to faculty: definition, indicators, measurement methods, etc. Explaining the relevant aspects in detail, such as the rubrics or surveys. This section is fundamental because something that is not understood cannot be applied. Moreover, it is very important that teachers assimilate the common definition of each outcome and are aware that they have to be measured with common tools (for each outcome) so that the results can then be compared (valid and reliable). This information was given through meetings with the teachers involved to ensure they understood the process.
3. Measurement. Teachers used the surveys that were designed and the rubrics defined to measure the outcomes in their subjects. Their comments on the process and measurement method were also collected.
4. Compilation of data using a specially designed and standardized data collection sheet. A computer tool is currently being developed so that data can be collected via the staff intranet.
5. Data analysis: Taking the information collected as the different subjects developed, an analysis was performed to check whether the indicators and the measurement system were appropriate. An analysis was made to check whether the indicators had achieved their established values. This analysis is of help when making decisions regarding new actions to improve the process.
6. Follow-up. Follow-up meetings with faculty, since apart from the data, feedback is also important. In order to encourage dialogue among teachers, get to know the difficulties, find new approaches and be able to prepare plans for improvement to consolidate and set the assessment methodology for each outcome in all the Pilot Projects, the following three sections were included: a) If possible, what would you like to change regarding the assessment methodology used? b) What would you like to keep regarding the assessment methodology used? c) Other comments or opinions you consider relevant.
7. Disseminating the results. The work done by the teachers and the conclusions reached must be made visible. (Climate to culture)

Table 4 shows the pilot projects carried out and the future actions considered by all the ABET outcomes.

Table 4. Pilot projects carried out and future actions for all the ABET outcomes

Pilot	Academic Year	Outcomes	Situation
First	2011–2012	a) g) j) creativity	Designed/Applied/Analyzed/Improvement
Second	2012–2013	b) d) i)	Designed/Applied / Under analysis
Third	2013–2014	a) e) k) c)	Designed: technical outcomes
Fourth	2013–2014	f) h) c) restrictions	Designed: social outcomes

6. Results

This section sets out the main results obtained in the outcome assessment processes performed to date at the ETSII. For reasons of space it is not possible to provide detailed results for every outcome, but by way of example, the results of two of them that were assessed using different techniques are shown:

- Outcome j (knowledge of contemporary issues) assessed through a specifically designed questionnaire.
- Outcome g (oral and written communication), assessed through the use of a rubric.

6.1 Outcome j: knowledge of contemporary issues

Outcome j was assessed using a methodology that consisted in comparing the outcomes of a so-called "Study Group", made up of students that were to be assessed for the outcome (34 students in the final year of their qualification), and a "Control Group" (122 First Year students that had just enrolled in the School).

Before performing these assessment processes, a pilot test was carried out with a group of 49 students to check the validity of the questionnaire used and debug some of the questions set.

Table 5 compares the average score obtained by the first year and fifth year students for the three levels of difficulty into which the questions were classified. The levels set were defined as follows:

- General Level: The level that any person with a university background should have. The result of the interest shown in the subject and its occasional follow-up in the social media.
- Professional Level: The level an industrial engineer should have due to the importance the subject may have in their future professional development or for the future professional openings that may arise.
- Specialist Level: The level required by an industrial engineer who in the future will apply their skills to a field directly connected with the subject. This level of knowledge is what could be acquired in other subjects by choosing a specific subject from those included in the Study Plan for the qualification.

In the first stage of the assessment process, the outcome is assessed by quantifying the differences between the results obtained by one or other group and an analysis of the significance of the statistical difference. Therefore, it can be seen that the average score obtained by the fifth year students is always higher than that of the first year students, although the variation is greater in the professional or specialist questions than in the general ones.

Table 6 shows the average scores obtained by the first year students according to class group (they belong to 6 different class groups) and for the two years that measurements were taken. It can be seen that the results are very similar among class groups and for the two years that measurements were taken. This proves the consistency of the method because since students from the Control Group were assessed in two different years the results were very similar and the differences between one year and another practically non-existent.

The above results were subjected to a highly rigorous statistical analysis from which the results shown in Fig. 4 were obtained, which demonstrates that:

- There are no statistically significant differences between the different class groups of the first year students
- There are definitely statistically significant differences between first year and final year students.

In addition, the results can be used to set objective values for the outcome acquisition indicators so that medium and long term improvement strategies can be set. These improvement strategies will be taken

Table 5. Average scores obtained in the ABET outcome j questionnaire

Levels	First Year students (2011)	Fifth Year students	Variation
Level G	7.55	8.53	1.13
Level P	4.71	6.48	1.38
Level E	2.37	3.74	1.58

Table 6. Average scores for the different groups of first year students. ABET Outcome j

Class group	Level	2011 average	2012 average	Class group	Level	2011 average	2012 average
1	G	7.58	7.85	4	G	7.38	7.60
	P	4.88	4.92		P	4.72	4.59
	E	2.42	2.42		E	2.60	2.46
2	G	7.64	7.61	5	G	7.26	7.30
	P	4.78	4.37		P	4.17	4.50
	E	2.88	2.36		E	1.85	2.33
3	G	7.76	7.70	6	G	7.69	7.48
	P	4.89	4.77		P	4.84	4.54
	E	2.04	2.56		E	2.41	2.23

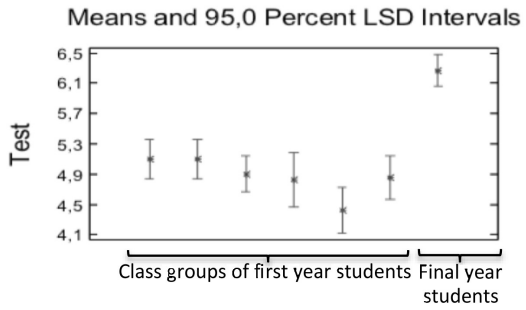

Fig. 4. Statistical comparison of the results of ABET outcome j.

into account when redesigning the course content and teaching methodology.

In the future, assessment will be performed by comparing the results obtained by successive Study Groups in different years.

6.2 Outcome g: oral and written communication

Outcome g was assessed using a rubric (included in the Appendix) which, in the case of oral communication, considered the following indicators:

- gA: Organization of information and a style appropriate for the audience.
- gB: Appropriate use of graphic resources.
- gC: Use of oral communication techniques (tone, volume, gestures, etc.).
- gD: A clear reply to questions asked by the audience.

This rubric was used to assess the students' oral communication skills when defending their Final Project. The measurements were taken during the presentations of 24 students (8 from the Industrial Organization speciality, 7 from Energy Technology and 9 from Mechanical engineering). The assessment was performed by the teaching members of the assessment committee (three ETSII teachers) and by another two non-teaching staff who were experts in communication.

Figure 5 contains the graphs showing the average marks obtained by students in the three different specialities (Industrial Organization, on the left and Mechanical Engineering on the right) according to the assessment by the teachers and experts.

In general, it can be seen that the results are similar for the three groups of students. The lowest score is for indicators B and C (use of graphic resources and oral communication techniques). It can also be seen that indicator C is assessed systematically in all the groups, with a certain discrepancy between the assessments of the teachers and the experts in communication. The experts in commu-

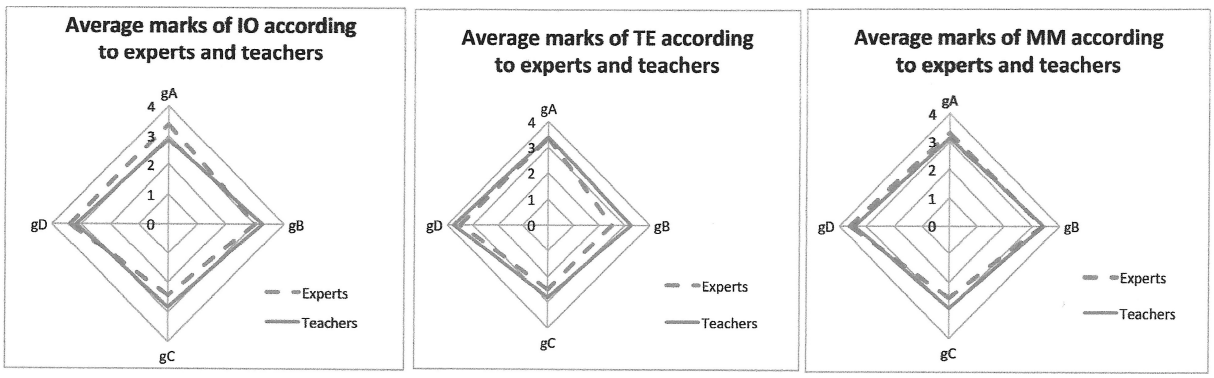

Fig. 5. Average marks obtained in ABET outcome g.

nication give indicator C a lower score than the teachers. The indicator is related to whether the student uses the right tone and volume, reinforces the message with gestures, looks at the audience, whether or not they use repetition, etc. This result seems logical bearing in mind that the experts in communication, since they are experts, are more sensitive than the teachers to the improvable aspects of the students' presentations.

However, it can be seen that the teachers give lower marks than the experts in communication to aspects related to content, which is proof that they are demanding in this respect.

This pilot project for outcome g has enabled the measurement process to be validated and updated, leading to improvement actions being set, as Table 4 shows. The rubric has been slightly modified in line with teachers' comments and the accumulated experience. The success rates have been set according to levels. Finally, specific communication workshops are being set up for Final Project students.

7. Conclusions

This paper describes the process followed to set up a Generic Competence Framework at the ETSII UPM.

The work presented reflects the large amount of work that is being put into designing the study plans to adapt all the material to the new philosophy and base the subjects not only on specific technical outcomes, but also, in a large percentage, on generic outcomes. This is requiring the whole of the university staff to work as a team to reach a shared objective, which is to move forward from ''my subject'' to ''our outcomes''.

This work contains a considerable amount of educational innovation and teaching improvement, but in addition, the authors are convinced that this model will be highly beneficial for the School. Not only because of the important accreditations such as the ABET, or because the Institution's external image will be enhanced, but because those who will most benefit are the students.

This work has enabled us to move forward in implementing the model and in learning to measure the outcomes. However, a lot of work still remains to be done since the final objective of the overall strategy of the ETSII UPM is to move on from climate to assessment culture.

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Appendix

The rubric applied for outcome g (An ability to communicate effectively) is shown in the following table:

Communication Competence Factors	Achievement Levels			
	Unsatisfactory	Needs Improvement	Satisfactory	Excellent
The student organizes the content of the presentation and uses an adequate style to facilitate the instructors' understanding.	The presentation is disorganized and lacks a logical structure.	The presentation is structured in a confusing way. The organization by sections, titles, points, etc. is not clear.	The presentation is generally clear, although some points are not well structured.	The structure of the presentation is clear, coherent and logical.
	The vocabulary used and overall level of the communication is not suitable for the audience.	In many aspects, the presentation is neither well structured, nor oriented to the audience	The style is adequate for the audience, although some ideas are expressed in a simple or complicated manner.	The presentation was done perfectly according to the audience, including the style and vocabulary used.
The student uses graphics and other resources to effectively communicate the information.	Neither graphics, nor additional resources are used.	Graphics and/or other resources are poorly used or inadequately applied.	Graphic and/or other resources are commonly used, not always suitable for the content of the presentation.	Graphic and/or other resources are perfectly used, in a professional manner.
The student uses oral communication techniques appropriately.	The presentation was done in a hesitant fashion or nervous state or supported by notes. Oral techniques were not used.	The presentation is not well supported by communication techniques.	Communication techniques are generally well used, although sometimes the volume and the oral expression are not correct.	Message is reinforced, getting the audience attention and using adequately the communication techniques.
The student listens actively to the instructor, and answers questions and comments clearly and precisely.	Interruptions, little effort to understand the questions and responses that answered different questions than those that were asked.	Insufficient attention given to the conversations, unable to answer some questions.	Actively listens to formulated questions, although sometimes seems not to understand.	Shows interest by the comments appeared. Clearly answers to proposed questions.

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