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Alternative Assessment in Engineering Language Education: The Case of the Technical University of Madrid*

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Engineering institutions across Europe are currently involved in a major process of reform and restructuring as a part of the Bologna Process, which stresses the role of competencies and outcomes in curriculum design. In the field of languages, the Council of Europe has developed the CEFR (Common European Framework of References) for languages, which aims to provide a reference framework for describing different qualifications, identifying different language learning objectives and setting out the basis of different achievement standards. Using this framework of language competence levels, our research group, over a three-year period, has developed and piloted the ACPEL (Academic and Professional English Language Portfolio) especially designed for engineering students and professionals. This portfolio was accredited by language division of the Council of Europe in 2008. This paper will report on an ongoing project dealing with self- and peer- assessment based on the ACPEL portfolio. The project's aim is threefold: firstly, to train university language professionals in the use of self- and peer- assessment through the implementation of the ACPEL portfolio; secondly, to gradually introduce these assessment processes into the engineering language curriculum; and finally, to monitor and evaluate these two processes at the seven engineering schools.

Keywords: assessment, higher education, second language, self-assessment

Introduction

Actively involving students in their own learning and focusing on how to teach students to become more independent learners is a major educational goal in most European countries. The preamble of the declaration of Barcelona on sustainability on engineering education (Engineering Education in Sustainable Development, 2004) asks us as engineering educators to address the whole educational process in a more holistic way implementing an integrated approach to teaching knowledge, attitudes, skills and values which incorporate disciplines of the social sciences and humanities. It also emphasises the need to promote multidisciplinary teamwork, creativity and critical thinking as well as to promote reflection and self-learning. Rompelman (2000) argued that as engineering curricula were shifting from traditional teacher-oriented, individual programs toward learning-oriented programs aimed at cooperation among students, not only are the role of the student changing

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but also the role of the professor. Referring to this "academic culture" of teaching, especially in tertiary education, Rogers (1983) commented the following:

> When we put together in one scheme such elements as prescribed curriculum, similar assignments for all students, lecturing as almost the only mode of instruction, standard tests by which all students are externally evaluated and instructor chosen grades as the measure of learning, then we can almost guarantee that meaningful learning will be at an absolute minimum. (p. 21)

Since meaningful learning is a goal, emphasis should be on a student-centred approach where learning is viewed both as a product and a process. The acquisition of knowledge is then under the students' control. It implies that students should be actively involved in the planning and management of their own learning and take more responsibilities for it as they progressively develop as independent learners. Teaching, learning and assessment practices are considered inseparable, and students should be active participants in the development of assessment procedures. Both the process and product of assessment tasks should be evaluated. Consequently, the assessment results should be reported as a qualitative profile rather than a single score (Birenbaum, 1996). Hence, the actual situation at our university with an intensive exam period and an overload of exams do not stimulate involvement in classroom sessions nor retention of course materials (Hattum-Janssen & Lourenco, 2008).

Self-assessment: What It Is and Why Use It

In general, assessment is regarded as a process of collecting, synthesizing and interpreting information in order to make decisions on student performances. Assessment can be conducted to diagnose student problems to judge their academic performances, provide feedback to students and plan future learning. Self-assessment in the educational context involves the learners in a process of evaluation and monitoring their own levels of knowledge, performance and understanding. Enabling students to self-monitor their learning helps the students to develop knowledge through conscious control over that knowledge or develop metacognitive awareness of knowledge and thought (Vygotsky, 1962). In a student-centered learning environment, this kind of assessment aims at preparing students to be autonomous, critical and responsible graduates and lifelong learners as promoted in the Bologna declaration.

Traditional assessment practices according to Boud and Falchikov (2006) can undermine students' capacities to judge their own work. Students have to learn not to over rely on the opinion of others since in a working situation, these future engineers must be able to judge or evaluate the adequacy, completeness or appropriateness of their own outcomes. Hence, allowing self-assessment opportunities that provide the learner with increasing responsibility helps them to be prepared for lifelong learning and assessment of this learning. Self-assessment plays an important role in helping the student extract meaning from the new experience and reach at an optimal level of performance. Practice in self-assessment helps students reflect on their own performances using relevant criteria and analyze strengths and weaknesses, becoming more critical toward their own roles in outcomes.

Factors Affecting Self-assessment

Much of the literature on student self-assessment has over emphasized the agreement of self-awarded ratings and ratings awarded by the professor overlooking the value of self-assessment as a learning tool. Orsmond, Merry, and Reiling (2000) stressed the importance of student development during all stages of the

assessment process, and TAN (2008) argued that in classroom practice, professor-student mark agreement should be de-emphasized, and research should concentrate on the process and its outcomes that are experienced by the academics and their students.

In an extensive survey of research studies (Deakin et al., 2008) on the impact of self- and peer- assessment in secondary schools, the following factors were found to have impacts:

(1) Teachers' attitude;

(2) Weaning away from dependence on others' opinions, included teachers;

(3) Students' involvement in criteria setting.

The professor, in this new paradigm, needed to be committed to learners having control over the process, and be able to discuss learning and develop effective feedback. Also, it was found that types of this alternative assessment have a larger impact on students' outcomes when there was a move from a dependent towards an interdependent relationship between teacher and students. Finally, in situations where the students become "co-designers" of the criteria for evaluation, it seems to help them develop a better understanding of their own strengths and weaknesses. Oscarson (1989) mentioned six advantages of using self-assessment:

(1) Promotion of learning;

(2) Raised level of awareness;

(3) Improved goal orientation;

(4) Expansion of range of assessment;

(5) Shared assessment burden;

(6) Beneficial post-course effects.

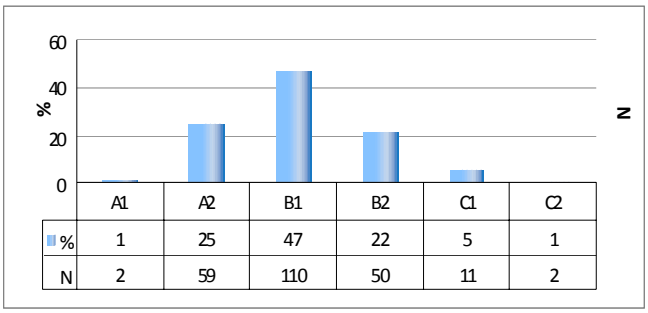
Blue (1994) identified benefits, such as encouraging greater effort, boosting self-confidence and facilitating awareness of distinctions between competence and performance as well as self-awareness of learning strengths and weaknesses. Being motivated by the advantages of implementing self-assessment, our research group has set up an ongoing project which intends to implement this assessment process.

The Context

With an expected increase in workforce mobility, the need for engineers and architects to acquire communicative language skills is paramount (Pierce & Durán, 2008). These skills include not only formal linguistic goals, such as improved pronunciation, better command of vocabulary, etc., but also social and cultural language skills, as well as the ability to use different compensatory communicative strategies (like paraphrasing) when linguistic means are inadequate. Students are arriving at the university with varied levels of English language achievement. The European language reference framework (CEFR (Common European Framework of References)) (Council of Europe, 2001) divided language achievement into six levels: A1 level is the most basic level and C2 is the most advanced being equivalent to a bilingual capacity. A total of 232 from the schools of architecture, technical architecture, technical aeronautical engineering, agricultural engineering, civil engineering, technical mining engineering and mining took the placement exam. Figure 1 shows total distribution for level according to the CEFR.

If we assume that the total levels are representative of the student body, nearly 77% of them are below the B2 level. The chancellor of the university and his team have decided that all engineering and architecture graduates of the Technical University of Madrid must have at least a B2 level upon leaving the university. This requirement has been put into place in view of the European Space of Higher Education for student mobility

and future job requirements. Hence, it is paramount that the teaching staff and the students make an effort to improve their communication skills in English. Much work needs to be done with 73% of the student body falling below the B2 level.



	A1	A2	B1	B2	C1	C2
%	1	25	47	22	5	1
N	2	59	110	50	11	2

Figure 1. Percentage results of Oxford placement test.

The research group consisting of technical English teaching staff and researchers from the above mentioned schools are making an attempt to move towards this goal. The wide range of teaching content areas included in the research group motivates us to develop a language portfolio which includes competence descriptors, i.e., learning outcomes covering all skills, which serve as criteria for the different genres taught. These learning outcomes will be used in curriculum design and for defining specific course objectives. The ACPEL (Academic and Professional English Language Portfolio) portfolio serves two major assessment purposes. The detailed list of language competencies can be used for students' self-assessment, to guide them through their learning process, identify and set goals and assess their learning progressively, inside and outside the educational framework, thus, promoting self-directed learning.

A second rationale for developing the portfolio was to provide an interface among language learning, teaching and assessment. Learning outcomes can be a pedagogical resource for professors to determine the key purposes of the course and a practical tool for students to take control of their learning processes under the professor's guidance. Students do not become self-directed learners instantaneously; rather they need opportunities as well as clear directions and careful planning in many instances. The development process underwent several stages. Existing curricular programmes throughout the different schools of engineering and architecture were analyzed to determine the genres (both academic and professional) and criteria were set up for skill areas as well as genres. Five sets of 50 to 85 specific learning outcomes were developed and researched with the students for clarity and calibration, corresponding to the five categories: spoken production and interaction, written production and interaction, reception-spoken, reception-written, and working with oral and written texts (Durán & Pierce, 2007; Pierce & Robisco, n. d.; Roldan & Ubeda, 2007). After three years of development, piloting and testing, writing and rewriting, the ACPEL (Durán et al., & Santiago, 2009) was validated by the Council of Europe. The goal of this current study is to train students as well as academics in the area of alternative assessment procedures especially self-assessment using the criteria set out in the portfolio.

The Project

The overall question to be addressed is "How does the implementation of peer and self-assessment impact on students and academics in engineering education at the Technical University of Madrid?". In order to compare the impact of the implementation of self- and peer- assessment, the current assessment and evaluation

procedures needed to be analyzed. To acquire this information, two procedures were carried out.

First, at the end of academic year of 2008-2009, students were asked to fill out a questionnaire on their impressions of the different aspects of the course and professors wrote a report on methodology and evaluation procedures used up to this point. Table 2 shows types of evaluation used in different schools. There seems to be a strong correlation between the number of students in the course and the number of different types of evaluation procedures. Small classes need fewer evaluation procedures, though more holistic (e.g., an oral presentation), while larger classes depend on more types of evaluation (shorter and more frequent).

Table 1

Target Communicative Skills

Skill	B1* level of reference	B2* level of reference	C1* level of reference
Spoken production and interaction	I can connect phrases in a simple way in order to describe experiences and events. I can orally summarize a short experiment or a simple article in my field.	I can present clear, detailed descriptions on a wide range of subjects related to my field of interest. I can explain a viewpoint on a topical issue giving the advantages and disadvantages of various options.	I can present clear, detailed descriptions of complex subjects integrating sub-themes, developing particular points and rounding off with an appropriate conclusion.
Written production and interaction	I can write simple connected text on topics which are familiar or of personal interest. I can write personal letters describing experiences and impressions. I can write brief reports of experiments and summarize articles.	I can write clear, detailed text on a wide range of subjects related to my interests. I can write an essay or report, in support of or against a particular point of view, and write letters highlighting the personal significance of events and experiences.	I can write clear, well structured text, expressing points of view at some length. I can write about complex subjects in a letter, an essay or a report. I can select style appropriate to the reader in mind.
Reception/ spoken	I can understand the main points of clear standard speech on familiar matters regularly encountered in work, school, leisure, etc. I can understand the main point of lectures or current affairs when the delivery is relatively slow and clear.	I can understand extended speech and lectures and follow even complex lines of argument provided the topic is reasonably familiar. I can understand most TV news and current affairs programmes, the majority of films in standard dialect.	I can understand extended speech even when it is not clearly structured and when relationships are only implied and not signalled explicitly. I can understand TV programmes and films without too much effort.
Reception/ written	I can understand texts that consist mainly of high frequency everyday or job-related language. I can understand articles in my field.	I can read articles and reports concerned with contemporary problems in which the writers adopt particular attitudes or viewpoints. I can understand contemporary prose.	I can understand long and complex factual texts, appreciating distinctions of style. I can understand specialised articles and longer technical instructions, even when they do not relate to my field.

Note. * Adapted from CEFRL (2001).

Table 2

Most Valued Genres for Each Course

Genres and competences	Tech. mining	Tech. Aeron	Tech. agric	Mining	Agriculture	Civil	Architect
Oral presentations	3	3					
Reading skills	2	2	1	2		1	
Summary writing			2	1		2	3
Report writing	1		3	3	2		
Curriculum vitae					3		1
Letter writing					1		2
E-mail composition		1				3	

As to the students' reactions to the course and the evaluation procedures, the results were important so as

to get a profile of the students and the course contents in the different schools. Various blocks of evaluations were included in the questionnaire: genres taught in the course (eight types), learning activities, assessment method, hours dedicated to the course, satisfaction and global learning competences.

We shall concentrate here on the students' evaluations of the genres, global learning and satisfaction. The eight genres included in the questionnaire were the following: oral presentations, research skills in internet, reading skills, summary writing, report writing, curriculum vitae, letter writing and e-mail composition.

Table 3 demonstrates the results of the students' evaluations for the genres and competences included in the questionnaire. The students were asked to evaluate their learning in following genres and competences on a five-level Likert scale from "Very low" to "Very high". The three most valued for each course/school are included with 1 depicting the most valued. These results have set the basis for the course assignments that are being included in the self- and peer- assessment.

Table 3

Assessment and Evaluation Procedures

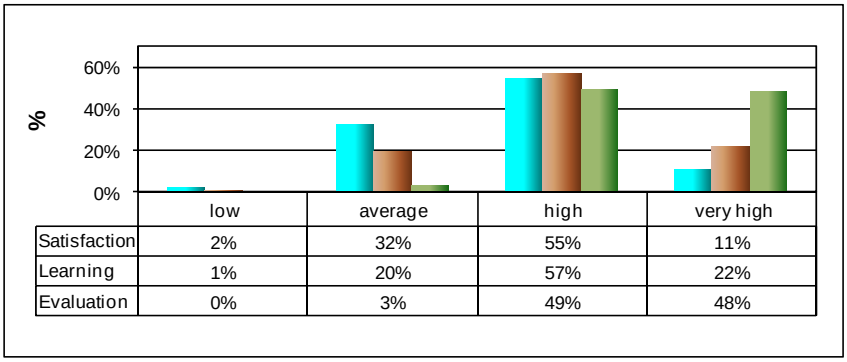
	Tech. mining	Tech. Aeron	Tech. agric	Mining	Agriculture	Civil	Architect
Oral presentations	x	x					
Attendance and participation	x	x	x	x	x		
Project work		x	x		x	x	x
Exercises							x
Final exam	x		x	x			x
Continuous evaluation	x		x	x		x	
Periodic quizzes	x			x		x	

Other important information to the study was also gathered in the questionnaire. The students were asked to evaluate how satisfied they were about their language learning from "Very low" to "Very high". Another question posed to the students was "How do you evaluate the amount of learning in the course?". Finally, we asked students to appraise the amount of information supplied to them about the grading and evaluation system utilized by the professor in the course. None of the students choose "Very low" on any of questions, hence, this alternative has been removed from the graph for more clarity. Figure 2 shows that the level of satisfaction of the students learning to be quite high with nearly 80% marking "High" or "Very high". We can see that their opinions of the amount of learning are high, but substantially, less than satisfaction about their language learning. Surprising 97% of the students considered the amount of information on the methods of evaluation "High" or "Very high".

The Ongoing Project

Well designed self-assessment procedures that present students with explicit criteria, provide for student involvement in assessment decision-making, elicit student opinions about their performance, and base student goal setting on achievable targets, are the keys for enhancing students' learning. Figure 3 highlights the processes involved in self- and peer- assessment and how it affects students' performances. One can see that the learner is at the centre of the assessment and the learning process is affected by many factors. Goals, effort, performance, self-judgment and self-reaction all can be combined to impact self-confidence in a positive way. However, a negative cycle can develop if there are significant gaps between the different factors and learners tending to perceive themselves as unsuccessful performers. Professors must be involved in the process of

training students to assess effectively. The goals of our ongoing research and the practical model and ideas following are aiming at assisting professors with this important work.



	low	average	high	very high
Satisfaction	2%	32%	55%	11%
Learning	1%	20%	57%	22%
Evaluation	0%	3%	49%	48%

Figure 2. Results of students' questionnaire.

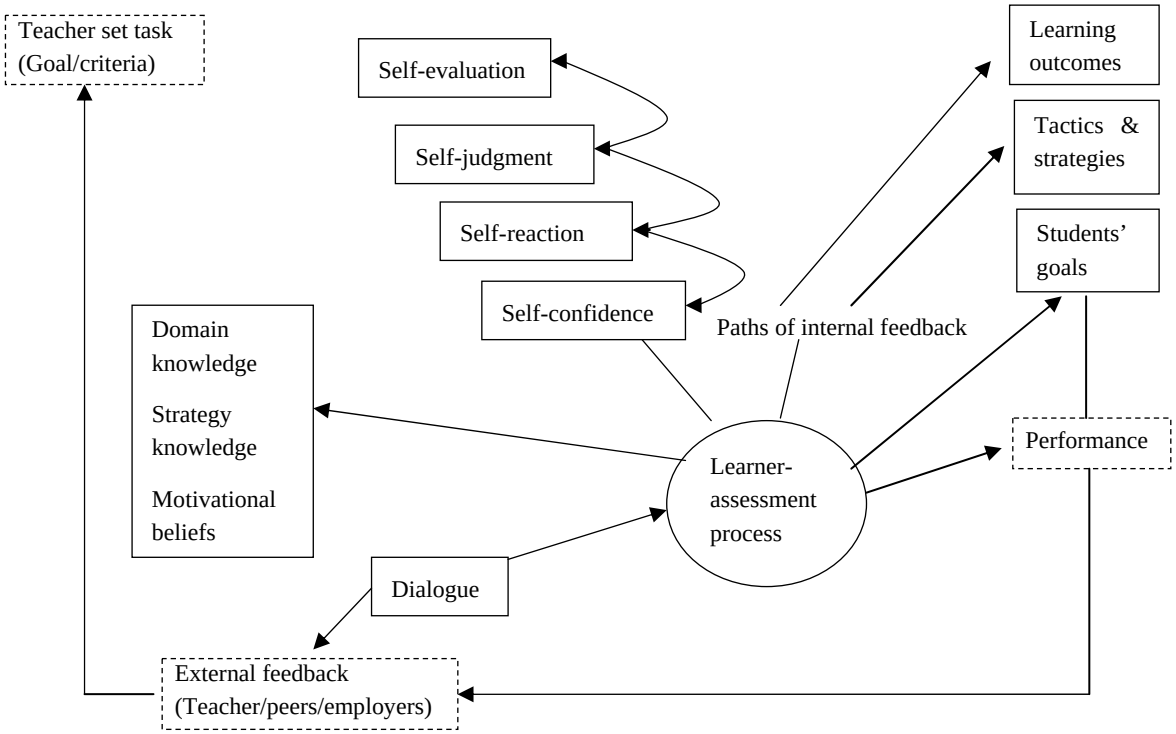


Figure 3. Process of learning through assessment.

The procedures being followed by the members of the project are numerous. Once the professors were informed and trained in a four-hour workshop, each professor has involved their students in defining the criteria that will be used to assess their work with the help of the learning outcomes descriptors from the portfolio. Table 4 is a small selection of can do language descriptors currently being used for self- and peer- assessment in the technical school of aeronautical engineering. In addition to increasing students' commitment to instructional goals, negotiating criteria and learning outcomes enable professors to help students set goals that are specific, immediate and moderately difficult, characteristics that contribute to greater learning.

Once the criteria have been established, students can then apply the criteria to the examples of the genres dealt with in the course. These models or examples help students understand specifically what the criteria mean.

Templates can also be used to provide students of lower level with guidelines for improving their learning cycles. Once the criteria are clear, the students will develop an assignment and apply the criteria to their own work. The next step in the process is to apply the criteria to peer work. It can be done in a cooperative learning environment, such as group work. At this point, the professors will provide feedbacks on the self- and peer-evaluations. Discussion regarding differences can follow and perhaps adjustments are needed. An important part of the process can be the support provided to the students in setting up their goals and developing strategies to achieve them.

Table 4

Selection of Can-Do Statements

A2	Can give a short, rehearsed presentation on a familiar academic or professional topic, being aware of the use of body language to transmit information.
B1	Can structure a simple talk in a comprehensible way, indicating the beginning and end of each section, using cohesive devices and presenting it clearly, speaking from notes or visual aids (e.g., outlines, diagrams, charts, etc.).
B2	Can give a clear, prepared presentation, discussing the advantages and disadvantages of various options or solutions to a problem, using cautious language and modality.
C1	Can attract the attention of the audience using appropriate presentation strategies (e.g., international clues, voice volume, etc.).

Conclusions

Self-assessment is a process where students are involved in and are responsible for assessing their own piece of work. It encourages students to become independent learners and can increase their motivations. Peer-assessment is where students are involved in the assessment of the work of other students. Research evidence, outside of the field of language learning, reported that students' experience increased self-esteem, engagement with learning, especially goal setting, clarifying objectives, taking responsibility for learning, and/or confidence. Assessment is acknowledged as a major influence on students' learning. Thus, all assessment activities need to be examined from the point of the view of what they contribute to prompting students' learning which should be the intended outcome from the course. Self-assessment needs to be demystified to allow students to become confident enough to use it as well as make connections between assessment activities and learning. Since students will inevitably have to make their own assessments in the real world, ample opportunities should be offered to practice this skill.

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