INTEGRATED APPROACH TO FOREIGN LANGUAGE IN THE BUILDING ENGINEERING DEGREE AT THE UNIVERSIDAD POLITECNICA MADRID

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Abstract

The European Union has been promoting linguistic diversity for many years as one of its main educational goals. This is an element that facilitates student mobility and student exchanges between different universities and countries and enriches the education of young undergraduates. In particular, a higher degree of competence in the English language is becoming essential for engineers, architects and researchers in general, as English has become the *lingua franca* that opens up horizons to internationalisation and the transfer of knowledge in today's world.

Many experts point to the Integrated Approach to Contents and Foreign Languages System as being an option that has certain benefits over the traditional method of teaching a second language that is exclusively based on specific subjects. This system advocates teaching the different subjects in the syllabus in a language other than one's mother tongue, without prioritising knowledge of the language over the subject.

This was the idea that in the 2009/10 academic year gave rise to the Second Language Integration Programme (SLI Programme) at the Escuela Arquitectura Tecnica in the Universidad Politecnica Madrid (EUATM-UPM), just at the beginning of the tuition of the new Building Engineering Degree, which had been adapted to the European Higher Education Area (EHEA) model. This programme is an interdisciplinary initiative for the set of subjects taught during the semester and is coordinated through the Assistant Director Office for Educational Innovation.

The SLI Programme has a dual goal; to familiarise students with the specific English terminology of the subject being taught, and at the same time improve their communication skills in English. A total of thirty lecturers are taking part in the teaching of eleven first year subjects and twelve in the second year, with around 120 students who have voluntarily enrolled in a special group in each semester.

During the 2010/2011 academic year the degree of acceptance and the results of the SLI Programme are being monitored. Tools have been designed to aid interdisciplinary coordination and to analyse satisfaction, such as coordination records and surveys. The results currently available refer to the first semester of the year and are divided into specific aspects of the different subjects involved and into general aspects of the ongoing experience.

Keywords: Foreign Language, Educational Innovation, Second Language Integration Programme.

1 INTRODUCTION

Present-day society requires university graduates to attain a certain level in foreign languages. This is not only for everyday use in life but they also need to master the technical terminology of their specialisation so they can transfer knowledge on a global level among researchers, teachers and professionals.

For many years now, the European Union has been fostering linguistic diversity as one of its main educational goals. One of the most representative statements calls for European Union citizens to become competent in two languages apart from their mother tongue – that is, Europeans should not only be bilingual but multilingual [1]. If this is to be turned into reality consideration will have to be given to reorganising European education systems in the sphere of language learning.

Many experts point out that the Content and Language Integrated Learning (CLIL) system is an option that has some advantages over the method used at present [2]. This system has the backing of

European Union directives and is based on teaching any subject, with the exception of the language itself, by using the foreign language as a common tongue [3, 4].

Nowadays, foreign languages are taught in most universities as a subject that is not linked to the other subjects in the pupil's curriculum. The CLIL system suggests a different focus. It advocates teaching different subjects (mathematics, science…) in a language other than the mother tongue.

Universidad Politecnica Madrid (UPM) is committed to ensuring its graduates reach a satisfactory level of English as this is an essential requirement for scientists and researchers now that English has become the indisputable lingua franca that is the vehicle for internationalisation and knowledge transfer [5].

In order to make it easier to meet these requirements, the Building Engineering School of Madrid, a part of the UPM, is organising the gradual introduction of English for teaching the first years of the Building Engineering Degree.

2   A HISTORICAL LOOK AT THE SPANISH UNIVERSITY

The gradual harmonisation of university systems required by the construction of the European Higher Education Area (EHEA) begun in 1999 with the Bologna Declaration has endowed the process of change undertaken by European universities with an unprecedented scale and momentum. Within this context in Spain, Royal Decree 1393/2007, of 29 October [6], sets out the legislation for state university education.

This royal decree adopts a set of measures that are not only compatible with the EHEA, but also makes university education more flexible by encouraging a widening of the syllabus and lets universities make the most of their capacity for innovation, their strengths and opportunities so they can address the demands of society in an open context that is constantly changing.

Of all these measures, one of the most important is the need to foster a change in teaching methodology by adopting a student-learning centred approach in a context that will be lifelong.

If this is to be achieved, skills acquisition by students must be at the core of the objectives when designing a degree syllabus. Without excluding the traditional content and class contact time-based approach, the description of the teaching methods for these skills is widened as are the procedures for assessing the acquisition of such skills.

Before the new Degrees were designed, both ordinary and postgraduate Degrees, in parallel with its "Educational Model" the UPM regulated the skills that were to be included in the syllabus and made compulsory as part of the core subjects for these Degrees. One of the major skills is the "Use of English" [7].

To prove this skill has been acquired the student must accredit a B2 level of knowledge in the language [8] and take a subject called English for Professional and Academic Communication.

However, it is not only the UPM that has understood the importance of language use as a basic part of its students' education but also other universities which have adopted this same point of view.

Listed below are some of these universities and specifically the Schools that teach the Building Engineering Degree. The level of achievement required is specified as well as the compulsory and supportive measures that have been introduced for students to acquire these skills.

University	School	Achievement level	Compulsory subject in English	Supplementary measures
Univ. Politécnica de Madrid	University School of Architectural Technique	B2	Yes [1]	English group. Optional courses
Univ. Pontificia de Salamanca (Madrid)	Higher School of Engineering and Architecture	No	No	Optional courses [2]
Univ. Camilo José Cela (Madrid)	Higher School of Architecture and Technology	No	No	On-line English courses
Univ. del País Vasco	Donostia - San Sebastian Polytechnic	No [3]	No	Optional subject (Technical English)
Univ. de Alicante	Higher Polytechnic School	B1	No	Optional subjects [4]
Univ. de Sevilla	Higher Technical School of Construction Engineering	B1	No	University Language Institute. Pilot group with classes in English
Univ. Ramón Llull (Barcelona)	La Salle Higher Technical School of Architecture	No	Yes [5]	Subject in English
Univ. de Extremadura (Cáceres)	Polytechnic School	No [6]	No	University Language Institute. Optional courses
Univ. de Castilla - La Mancha (Cuenca)	University Polytechnic School	B1	No	No
Univ. de Burgos	Higher Polytechnic School	No [7]	No	No
Univ. Católica San Antonio (Murcia)	University School of Architectural Technique	No	Yes [8]	No
Univ. Alfonso X El Sabio (Madrid)	Higher Polytechnic School	No	Yes	Research project
Univ. Politécnica de Valencia	Higher Technical School of Building Management.	B2 [9]	No	Optional subjects [10]
Univ. Europea de Madrid	Higher School of Art and Architecture	B2	Yes	English laboratory. Activities in English
Univ. de La Coruña	University School of Architectural Technique	No	No	University Language Centre.
Univ. Politécnica de Cartagena	School of Architecture and Building Engineering	No	No	Doctoral courses

(1) Subject worth 6 credits.
(2) Courses outside compulsory lectures.
(3) Except for students going on an Erasmus placement. In this case B2 is not required.
(4) Two subjects in the fourth year worth 6 credits. In addition, preparatory courses for students who receive a European mobility grant.
(5) Subjects in the third and fourth year worth 6 credits.
(6) When defending their Final Project students must demonstrate their knowledge of English.
(7) Except for students going on an Erasmus placement. In this case B1 is required.
(8) In the second year.
(9) May replace the Defence of the Final Project at ordinary degree level in English or Erasmus placement.
(10) In the third year (English or French), levels B1 and B2.

Only in one third of the universities analysed is English currently a compulsory subject although most offer supportive measures so that students can acquire skills in the "Use of English".

3 EXPERIMENTAL DEVELOPMENT OF THE PROJECT

When the new studies were added to the new EHEA framework, the Second Language Integration Programme (SLI) appeared on the 2009-2010 year and was put into practice on the 2010-11 year. This programme is the object of an Educational Innovation project at the UPM.

3.1 Aims

The SLI programme appeared with a dual goal: to familiarise students with the scientific and technical English terminology in the subjects taught that will be necessary for an ever more internationalised working life, while at the same time improving their communication skills in English, the demand for which is currently on the increase in the European knowledge context [9].

3.2 Procedure

The SLI programme is advertised among new students on the Building Engineering Degree before they formally register and if they wish they can join the group. In the following semesters the students can either carry on as they are or change group.

The experience is developed with a group from each semester of the first and second courses and is completely voluntary. In this group all the subjects are partially taught in English. Each faculty member adapts their material to its being partially taught in English according to their knowledge of English as well as the nature of the subject.

3.3 Participants

Listed below are the data concerning those taking part in the project, broken down into two groups of students and teaching staff.

This project was organised around one group of sixty-five new students who joined voluntarily. It was intended for students with a low or average to low level in the language, as the top priority, as stated previously, was not to reach a high level of English but for students to become familiar with English terminology in the different science/technology subjects.

The teaching staff taking part in the SLI programme during the 2010-11 course taught the following subjects: Mathematics I; Architectural Drawing I; Descriptive Geometry I; Principles of Construction Materials, Chemistry and Geology; Physic (in the first semester) and Statistics; Building Control Legislation; Construction Materials II; Masonry and Concrete Structure Construction; Timber and Concrete Structure Construction; and Architectural Detail Drawing I (in the third semester). In all, 16 lecturers from all the departments belonging to the School of Building Engineering.

3.4 Methodology

In order to monitor and assess the SLI programme a set of templates and documents were generated as illustrated below.

3.4.1 Coordination Files

The coordination files were intended to reflect as much information as possible regarding the actions that would be carried out by faculty members in their SLI experience in their subjects. Fig. 1 shows the coordination file model.

PROGRAMA ISI

ACTIVIDADES EN INGLÉS

PROFESOR

Recursos	Explicación Oral	Material Didáctico						Bibliografía Recomendada			Glosarios	Otros
		Guía	Apuntes	Transparencias	Presentac.	Texto	Otros	Web	Libros/Revistas	Otros		
Valoración Cualitativa — Nada												
Valoración Cualitativa — Poco												
Valoración Cualitativa — Bastante												
Valoración Cualitativa — Todo												

ALUMNO

Recursos	Conversación	Prácticas		Trabajos Individuales		Trabajos en Equipo	
		Ejercicios	Laboratorios	Presentación Oral	Escrito	Presentación Oral	Escrito
Valoración Cualitativa — Nada							
Valoración Cualitativa — Poco							
Valoración Cualitativa — Bastante							
Valoración Cualitativa — Todo							

EVALUACIÓN

Criterios de evaluación	Valoración	
	SÍ	NO
¿Se tiene en cuenta el uso del segundo idioma?		
En caso afirmativo:	Puntuación máxima (sobre 10)*	
Presentaciones orales (individuales/grupales)		
Trabajos escritos (individuales/grupales)		
Participación en clase (oral, foros…)		
Otros		

SEGUIMIENTO

Opciones de seguimiento	Valoración	
	SÍ	NO
¿Se conoce el nivel de inglés de los alumnos al inicio del curso?		
¿Se tiene en cuenta el nivel de inglés para la distribución en equipos de trabajo?		
¿Se pasa encuesta de satisfacción sobre la experiencia?		
En caso afirmativo, ¿cuándo?		
¿Sólo al finalizar el curso?		
¿Al comienzo del curso (EXPECTATIVAS) y al final (RESULTADOS)?		
¿Al comienzo del curso, intermedio y al final?		

* En caso de valorar positivamente el trabajo del alumno en inglés, puede indicar la puntuación máxima que puede alcanzarse en las actividades siguientes

Programa ISI (Integración Segundo Idioma)   Proyecto de Innovación Educativa

Figure 1. Coordination file model

The coordination file has fields covering:

- **Activities in English**: This indicates the expected grade for the use of English in oral presentations, teaching materials, bibliographies, practice, tasks…
- **Assessment**: This indicates the weighting of the English activity in the student's final mark.
- **Follow-up**: A series of questions are answered on how the experience developed.

3.4.2 Assessment: Student satisfaction surveys

In order to know students' opinion on the teaching received, a survey was designed that is handed out to students during the last weeks of the semester where they are asked questions about the teaching received on the SLI programme. It is only focused on English: That is, the aim of the survey is not to assess either the subject or the teacher but to assess the experience of partially teaching the subject in English.

Fig. 2 shows the survey designed for the subjects.

STUDENT SATISFACTION SURVEY - SLI PROGRAMME
1. I have studied with documentation in English
2. The material used was adequate for teaching in English (transparencies, notes, …)
3. The methodology used has made it easier to follow the teaching in English
4. The right level of English was used in the subject
5. English was a problem for understanding the subject
6. I would have learnt more if the subject had been taught only in Spanish
7. The subject assessment has taken account of the linguistic effort
8. I improved my English as the subject progressed
9. This experience will be positive for my academic/professional future
10. Overall, the experience has been positive and I intend to repeat it on future courses

Figure 2. Student survey model

From the survey it can be seen that three different groups of clearly differentiated questions can be extracted:

- **Positive questions**: These are questions where a high score is positive. This corresponds to questions 1, 2, 3, 4, 7 and 8.

- **Negative questions**: Contrary to the above group, in these questions a high score has negative connotations. These questions are numbers 5 and 6.

- **Global questions**: These correspond to questions 9 and 10 and refer to the experience of the programme as a whole rather than the individual point of view on each subject.

3.5 Results

When the students have submitted the surveys an analysis is made and conclusions are drawn, as detailed below.

3.5.1 Survey evaluation

In order to evaluate the surveys numerically, each response is assigned a score so that according to the responses each subject will have an associated score.

The following score scale has been designed (Table 1) according to students' responses.

RESPONSE	SCORE	
	Positive Question	Negative Question
I totally agree	5	0
I quite agree	4	1
I agree to an extent	3	2
I disagree	2	3
I disagree quite a lot	1	4
I do not agree at all	0	5

Table 1. Score card

In accordance with this scale, the subject score will be given by the following expression:

$$\text{Subject score} =$$

$$\sum_{\substack{\text{Positive} \\ \text{Questions}}} 5 \cdot \text{Number of "I totally agree"} + 4 \cdot \text{Number of "I quite agree"} + \ldots + 0 \cdot \text{Number of "I do not agree at all"}$$

$$+$$

$$\sum_{\substack{\text{Negative} \\ \text{Questions}}} 0 \cdot \text{Number of "I totally agree"} + 1 \cdot \text{Number of "I quite agree"} + \ldots + 5 \cdot \text{Number of "I do not agree at all"}$$

Due to each survey having a different number of students, the scores need to be weighted. To do this, the maximum possible score is calculated as follows:

$$\text{Maximun possible score} = \sum_{\text{Questions}} 5 \cdot (\text{Total surveys - Doesn't know/Didn't answer})$$

Therefore, the score (as a %) of each subject will be the result of:

$$\text{Score}(\%) = \frac{\text{Subject score}}{\text{Maximun possible score}} \cdot 100$$

Having obtained the score, all that remains to be done is to associate it with the qualitative score, for which the following scale is used (Table 2):

Score (%)	"Stars"
0-10	★★★★★
10-30	⭐★★★★
30-50	⭐⭐★★★
50-70	⭐⭐⭐★★
70-90	⭐⭐⭐⭐★
90-100	⭐⭐⭐⭐⭐

Table 2. Link between quantitative score (%) and qualitative score (stars)

3.5.2 Detailed results

The results obtained for the first and third semester of the Degree are shown below, in Tables 3 and 4.

FIRST YEAR				
First Semester				
Name	E.I. Project	Coordination File Model	Bilingual Learning Plan	Student Survey
Subject 1	Yes	Yes	Yes	⭐⭐⭐⭐★
Subject 2	Yes	Yes	Yes	⭐⭐★★★
Subject 3		Yes	Yes	⭐⭐⭐★★
Subject 4	Yes		Yes	⭐⭐★★★
Subject 5		Yes	Yes	⭐⭐★★★

Qualitative Mean for the First Semester: ⭐⭐⭐★★

Table 3 Detailed results report for the First Semester

SECOND YEAR				
Third Semester				
Name	E.I. Project	Coordination File Model	Bilingual Learning Plan	Student Survey
Subject 6	Yes	Yes		⭐⭐★★★
Subject 7				⭐★★★★
Subject 8	Yes	Yes		⭐⭐★★★
Subject 9		Yes		⭐⭐★★★
Subject 10	Yes	Yes		⭐⭐⭐★★
Subject 11				⭐★★★★

Qualitative Mean for the Third Semester: ⭐⭐★★★

Table 4. Detailed results for the Third Semester

3.5.3 Overall results

For the global questions, the results obtained in the first and second semester are shown in Tables 5 and 6 respectively.

	Total Surveys	I do not agree at all (0)	I disagree quite lot (1)	I disagree (2)	I agree to an extent (3)	I quite agree (4)	I totally agree (5)	Doesn't know / Didn't answer
1. This experience will be positive for my academic / professional future	35	2	1	4	9	10	8	1
2. Overall, the experience has been positive and I intend to repeat it on future courses	35	6	0	3	8	7	11	0

Table 5. Detailed results for global questions in the First Semester

	Total Surveys	I do not agree at all (0)	I disagree quite lot (1)	I disagree (2)	I agree to an extent (3)	I quite agree (4)	I totally agree (5)	Doesn't know / Didn't answer
1. This experience will be positive for my academic / professional future	39	1	3	2	11	8	12	2
2. Overall, the experience has been positive and I intend to repeat it on future courses	39	1	4	3	10	7	12	2

Table 6. Detailed results for global questions in the Third Semester

By associating these numerical values with colours, we obtain Fig. 3 and 4 for the first and third semester respectively.
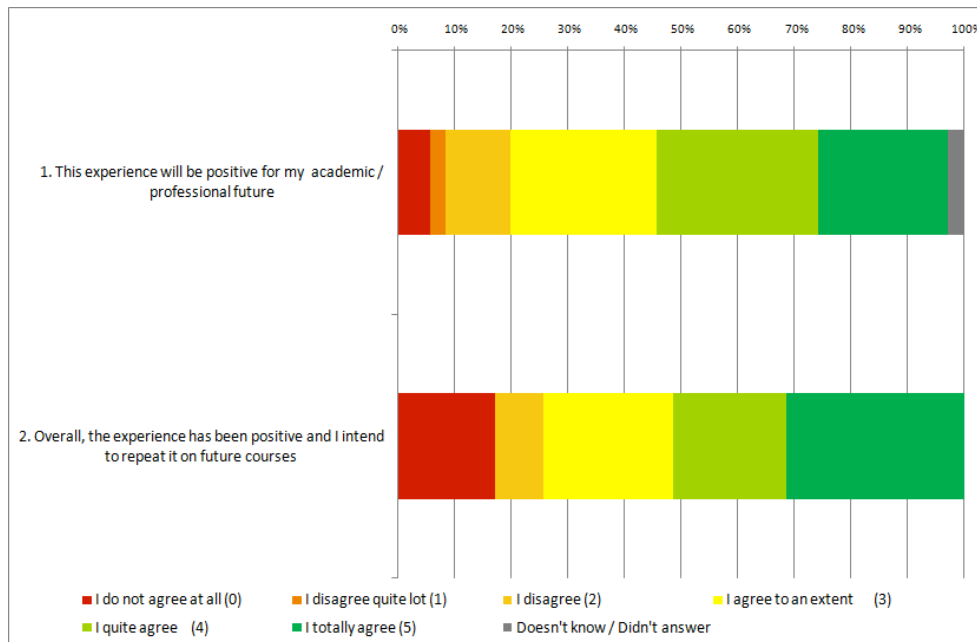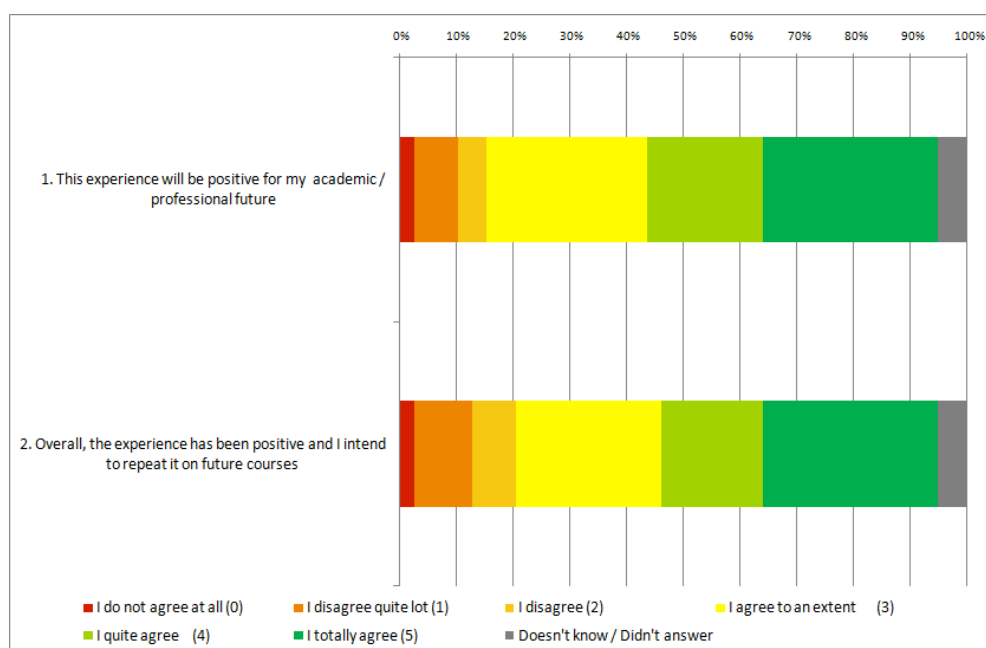

Figure 3. Global questions (First Semester)

Figure 4. Global questions (Third Semester)

4 CONCLUSIONS

The results from the implementation of the Second Language Integration Programme, undertaken at the UPM School of Building Engineering, during the academic years 2009-10 and 2010-11, are encouraging.

On the whole, students are of the opinion that their knowledge of English is reinforced without any excessive added difficulties in learning the specific course material. The global questions in the surveys responded to in the first and third semesters (available at this time) indicate that 78.38% consider the experience for their academic and professional future as positive or very positive while 74.32% would like to repeat the experience in successive years. Another finding of this survey is that the level of satisfaction is highest among first semester students compared to the third semester. The main reason may be that the staff who teach the first year subjects are more experienced since they are teaching it for the second time.

Teaching staff response to the programme is highly satisfactory. All faculty members taking part in the 2010-11 experience, together with some others, have signed up for the second year in order to extend this experience to the third and fourth semesters. And this is in spite of the fact that teaching in a foreign language requires an extra effort for the teacher, who, quite often, is not an expert and has to devote extra time to class preparation. As is usually the case in the teaching profession, satisfaction for the results achieved outweighs the extra effort and time put in.

As a result, we believe it is very important to continue with the Second Language Integration Programme so that the improvements deemed necessary can be implemented. In addition, the teaching staff on the programme will be able to complete their teaching materials in each edition and so adapt them to student needs according to the experience acquired over each academic year.

Progress needs to be made in achieving a consensus regarding how to assess second language activities as well as better interdisciplinary organisation to harmonise criteria so that the students taking part have an overall experience and not one that is confined to individual subjects.

One of the measures to be taken if better results are to be had in any future SLI programme is to make a better choice of students by taking account of their level of English and their degree of motivation for the experience. Regulations and the student registration system are a real restriction in this respect, but they unfortunately cannot be changed to adapt to our aims.

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