



Implementation of a bilingual curriculum Engineering degree in the Spanish Air Forces

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Institución u Organismo al que pertenecen: 1-Centro Universitario de la Defensa, San Javier; 2- Academia General del Aire, San Javier; 3-Allied Air Command HQ Ramstein, Republica Federal de Alemania 4- Universidad Politécnica de Cartagena

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Resumen.

El Ministerio de Defensa y el Ejército del Aire establecen como requisito que los Tenientes graduados como ingenieros en organización industrial utilicen Inglés como lengua vehicular en su ambiente de trabajo. Esto incluye mando, trabajo en operaciones internacionales y tareas dependientes de las misiones asignadas. Hemos abordado este reto en el curso de 6 créditos ECTS de tercer año Tecnologías de Seguridad y Defensa. El curso contiene conocimientos básicos de defensa contra armas no convencionales (Nuclear, Biológica, Química y Radiológica), guerra electrónica y contramedidas electrónicas en sistemas aéreos y aeronaves de combate. Las clases se imparten Castellano e Inglés excepto la terminología NATO. El material de aprendizaje se encuentra aproximadamente un 60% en Castellano y un 40% en Inglés. Los estudiantes presentan un seminario corto en Inglés en un tema elegido por ellos, que supone el 20% de la calificación final. A pesar de las dudas y reticencias, las presentaciones son excelente y muestran unas notas significativamente superiores que el examen escrito

desarrollado en Castellano. En la presente ponencia discutimos nuestros resultados y la táctica docente desarrollada.

Palabras Claves: presentación oral, Inglés, exámenes tipo test

Abstract.

As a requirement of the Spanish Ministry of Defence and Spanish Air Forces, Lieutenants graduating as Engineers in Industrial Organization and finishing the military training should be able to use English in all situations of their working environment. These include commanding, working in international operations and implementing new tasks according to different job assignments. We have tackled the challenge in third year in the 6 ECTS course Security and Defence Technologies. It comprises basic training in defence against non-conventional weapons (Nuclear, Biological, Chemical and Radiological), electronic warfare and counterelectronic warfare in combat aircrafts. Lectures are delivered mainly in English, while presentations are written in Spanish and English except for terminology that is NATO. Learning material is roughly 60% Spanish 40% English. Students present a short seminar in English on a chosen subject, comprising 20% of the final grading. In spite of the initial reluctance the oral presentations are excellent and show significantly higher grading than the multiple choice theory test performed in Spanish. We discuss our findings and the general overview of our teaching strategy.

Keywords: oral presentation, multiple choice test, English

Texto.

Número de páginas máximo: 10.

Mixed studies in military careers in Spain.

The Spanish Ministry of Defence established in the law of Military Career 39/2007 the development of military training that will include a university degree taught by the so-called Defence University Centres (DUC). The university curriculum is based on the Bologna model. As such the DUC are under the laws and regulations of the Spanish Organic Law of Universities, known as LOU. However the special requirements of the military career have to be taken into account. The civilian degree defined by the Ministry of Defence was Industrial Engineer with specialty on Management for the Air Forces and Land Forces and in mechanical engineering for the Navy. The Spanish Ministry of Defence requires English as a vehicular language for all officers finishing their studies as it is a highly technological working environment and international missions are the rule rather than the exception.

Peculiarities of the military and civilian mixed curriculum

In contrast to regular civilian studies, a military career comprises a number of fields that is large enough to require a total of 70 credits per year for a total of five years. The complete career comprises 350 ECTS credits out of which 240 correspond to the civilian degree. Amongst the military requirements the students receive ample training in military subjects (Table 1). As a result of the high physical demand of the training on the students, the spreading of the ECTS is not linear and is coordinated with the main and most difficult task the flying training (Table 2).

Table 1 General overview of the military curriculum at the Academia General del Aire.

Military training	Civil training
Law and social aspects	Law and social aspects
Applied physics and mathematics	Basic sciences and informatics. Physics, chemistry, mathematics and informatics
Foreign languages (English)	Foreign languages (English)
Logistic economy and administration	Engineering and applied technology
Flying training and aircraft navigation	
Tactics and weapons	
Instruction and training	

Table 2 Structure of the curriculum according to years and coordination with military training

Year	Civilian credits	Military tasks
1	60	Basic training
2	60	Basic training
3	45	Flying and navigation
4	33	Reactor flying and navigation
5	42	Practical training in the Spanish Air Forces

Students of CUD

The students of CUD have two different origins, depending on the Spanish Air force requirements; the number of newly recruited students in first year will vary between 50-75% of a total of 78 positions. This makes it highly competitive with an average entry degree of over 12/14 every year. The rest of the positions are the so-called internal promotion. But these also require exams to switch from a sub-officer to an officer career. The difference in age and experience can be considerable, but altogether the students are highly qualified. Some of the students coming from internal promotion have ample experience in international operations and have been deployed in real combat situations in Afghanistan.

Security and Defence Technologies

The course Security and Defence Technologies comprises three parts. The first part of the course defines the major threads in non-conventional weapons, and the reasons for their destructive power. The so-called NBQR part comprises 2 ECTS credits. All lectures are delivered in English while the lecture material, power point presentations and part of the material from the Spanish Ministry of Defence is in Spanish (Defensa, 2009, 2010, 2011).

The second part of the course teaches the basics of electronic warfare. Lectures are delivered in Spanish while the learning material is 60% in Spanish and 40% in English.

Finally the third part comprises the basic principles of electronic attack and counter electronic defence technologies. It is delivered in Spanish while the material is in English. Teaching and learning material is unclassified and accessible to civilians.

Overview of the English oral presentation and written exam requirements

The written exam is designed to test the general knowledge acquired by the students. It is a standard multiple-choice test comprising 60 questions, twenty per

part. The oral presentation is organized by groups of three to four students that request either a subject given by the lecturers or identify some personal interests within the conceptual framework of the subject. Presentations are given for four minutes per student, thus each group has an allocated time slot of 12-16 minutes. Questions asked by lecturers are in most cases done and answered in Spanish but in some cases they are done in English.

The criteria for judging the oral presentations is shown on table 3

Table 3 Overview of judging criteria for oral presentations

Criteria	Elements judged
Quality of presentation	The formal part, includes using visible combinations of letter and background colors, overuse of mobile elements is penalized. A right balance between text and figures.
Technical content	The degree of technical content and the adjustment for the audience, layman, decision making and experts
Oral presentation skills	The proper expression of ideas and proper use of voice and body language. Leadership skills.
Fluidity and structure	Development of a proper index, structure of the presentation
Adjustment to time	Time framework adjustment
Questions answered	Proper focused answer to questions

Comparison of gradings obtained in oral presentations and written exams

We analysed the data of the gradings obtained in the oral presentations versus the written exam. The inspection of the data (n=78 for both populations) clearly shows a marked difference in terms of distribution. The average grading in the oral presentation was 8.09 whereas the average in the written exam was 6.36 (Figure 1).

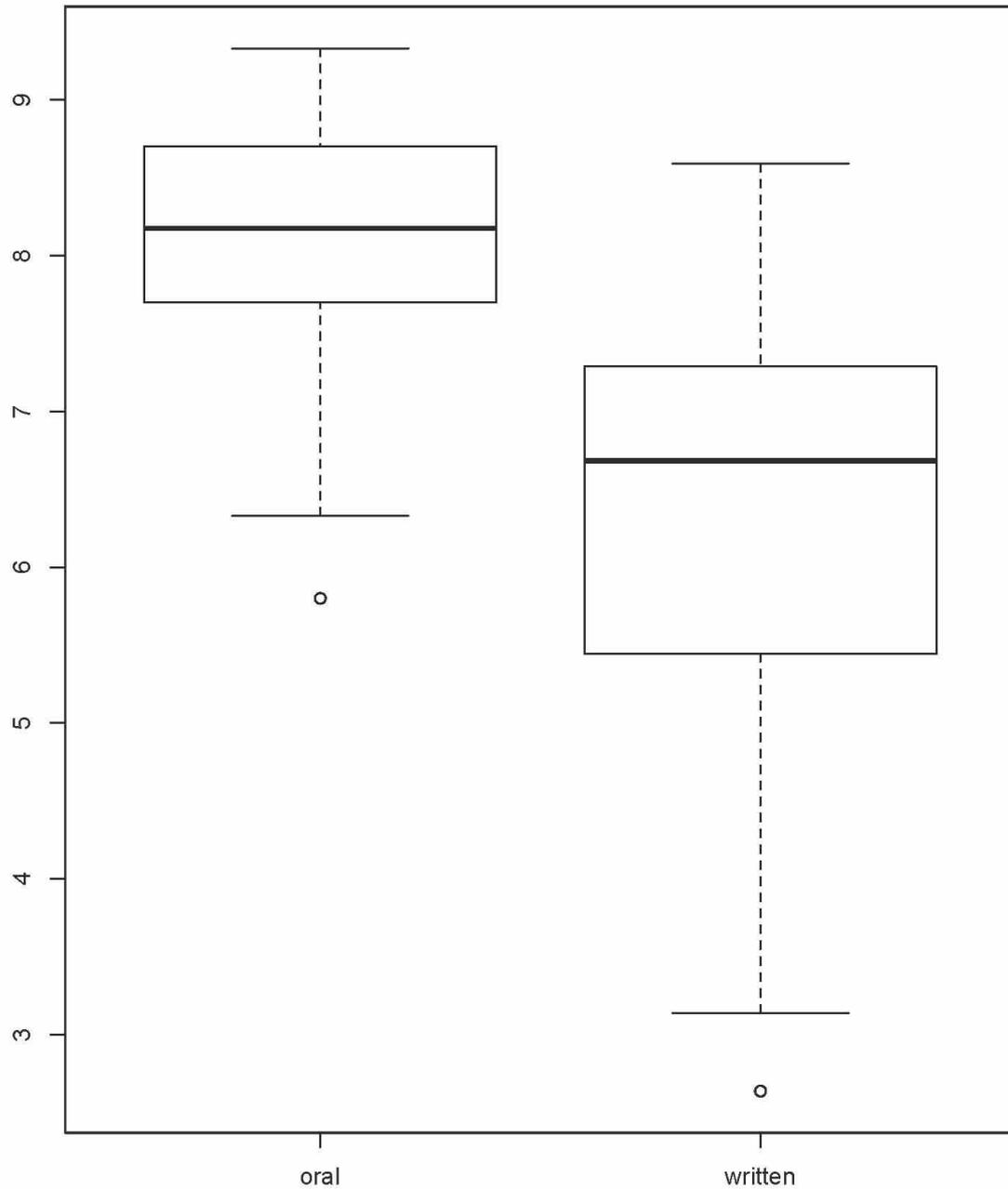


Figure 1. Boxplot of the data corresponding to the grading's of oral and written presentation of the course Security and Defence Technologies

We performed a statistical analysis using open software (R program www.r-project.org). We found that there is a highly significant difference between the oral and written presentation (Table 4)

Table 4 Statistical Results of comparing oral and written presentations with the Welch Two Sample t-test.

Statistics
t = 10.7906
Degrees of freedom 129.903
p-value < 2.2e-16
95 percent confidence interval: 1.41-2.04

The military students have a total of 16.5 credits of English with most of the load in the first and the second year (12 credits) before they start the course of Security and Defence Technology. Nevertheless, they rated better in the oral presentation than in the written exam. There are several reasons that could explain the significant difference. First the subject of the presentation was chosen by the students, allowing a gentle introduction into a professional oral presentation in a foreign language. Second the task given was short and concise, allowing the concentration of their efforts on a challenging, yet achievable task. These types of tasks are typical of the military training, are not a new feature for them and improve the motivation of the students.

Another aspect that might account for their improved performance is the possibility of orienting their presentation towards a comfort zone concerning terminology. However the learning of international and conventional military terminology is in fact an asset and property of the oral presentations.

In this respect the oral presentations is an important tool for teaching in foreign languages in spite of the reluctance of any student, including the highly disciplined military students.

In contrast to other subjects, it is not questioned as a simple formative step but rather a true mixture of engineering and military formation. This questioning by students has been described before (Weiss & Egea Cortines, 2008), and we believe that avoiding it, by focusing the subject into a true formative asset is part of the success of the approach.

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