

Article

Agricultural Engineering Students' Segmentation in Relation to Their Attitudes towards English-Medium Instruction

Ana Isabel Carrapiso *, Elena González , María Jesús Petróñ , Francisco Pérez-Nevaldo  and Paula Gaspar *

School of Agricultural Engineering, Universidad de Extremadura, 06007 Badajoz, Spain

* Correspondence: acarrapi@unex.es (A.I.C.); pgaspar@unex.es (P.G.)

Abstract: The School of Agricultural Engineering has been involved in English-medium instruction (EMI) within the framework of the internationalization strategy of the University of Extremadura (Spain). Several years after these actions were initiated, it has become necessary to analyze them, with the main objective of researching the attitude of the students towards it, keeping the focus on finding common trends. With this aim, a segmentation of the students was carried out based on a questionnaire that included aspects related to their attitudes towards English-medium instruction, their socio-demographic characteristics and the program they were enrolled in. A total of 251 students were surveyed, and the data were analyzed by performing a multiple correspondence analysis and a cluster analysis. They revealed three typologies of students with clearly different underlying features, especially related to the program and year in which they were enrolled, their age and English level, and their perceived skills. The main conclusion is that the multivariate techniques applied are useful tools to identify groups of students with different features in the EMI frame, which may facilitate the launch of specific actions focused on the needs and expectations of each group to ensure that EMI programs and students achieve their goals.

Keywords: English; EMI; attitudes; higher education students; technical studies; engineering school; multiple correspondence; segmentation



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1. Introduction

Globalization and the need for English language skills in the labor force, as well as the internationalization of universities from non-English speaking countries, have led to the worldwide introduction of English as a medium of instruction (EMI) [1,2]. Despite the large number of studies devoted to this topic [2–6], there is still not enough evidence to conclude if EMI benefits language acquisition and/or has a clear negative impact on content learning [2].

Whether or not the internationalization policies of universities are justified, there is still a need to improve the existing EMI programs [2] and the English communication skills of the students within their discipline [7], including the acquisition of technical vocabulary needed for mobility programs in higher education (such as Erasmus) and career prospects. In this regard, it has been proposed that training in communication skills should be implemented in the academic and technical context throughout the engineering studies [8], with a shift in the conventional focus to meet the new requirements for global skills [9].

In this context, the University of Extremadura (UEx) has promoted some actions to stimulate EMI teaching, some of them performed at the School of Agricultural Engineering (EIA) [10–12], which initially did not have a marked international projection, nor did most of the related local industry. As a result of the UEx policy, EMI was implemented in some courses for years, either totally (at least one course per year and program was offered as a voluntary option in all the undergraduate programs) or partially. However, this EMI implementation has had a limited success among students [13] and lecturers, and recent changes in the university policies for the 2022–2023 academic year led to a limited EMI

program with no courses offered entirely in English, although 12 courses are still delivering some EMI teaching within an institutional frame.

As for the response of the students towards the EMI teaching, some information is needed to implement programs that meet their expectations. In this respect, several studies have researched the attitudes of higher education students towards EMI programs [5,14,15], revealing that most students expected a positive impact on their careers [6,14,15]. However, this open attitude towards English is often paired with the expectation of a detrimental effect on knowledge acquisition and grades [6,15]. Even so, some students without the language requirement are willing to enroll in EMI courses, disregarding the negative consequences after weighing up the benefits for future career opportunities [15]. This suggests that students with considerable differences in their language competences and expectations might be enrolled in EMI courses, causing disruptions and poor EMI implementation, and reveals the importance of investigating common trends in the students to adjust the actions and offers according to those trends. In this respect, few studies have been performed to explore the variables that influence students' beliefs in the EMI context, with most of them being focused on gender, academic discipline, program level and international variations [2].

In this study, a methodological process was designed based on a survey carried out by telematic means in the classroom to identify the main attitudes of EIA students towards teaching in English after several years of applying various internationalization strategies and the underlying trends. The hypothesis to test was that segmentation among the students might be affecting the EMI program and other English-mediated activities. The main objective was to analyze the development of these strategies, to know the attitude of the students towards the English language, and to identify common trends. To this end, a survey was conducted to later segment the students according to their responses using multivariate statistical techniques, which revealed marked segmentation among the students.

2. Materials and Methods

2.1. Area of Study and Questionnaire Design

The target of this study was the students of the Agricultural Engineering School in Badajoz (Extremadura, Spain). The school had 500 students enrolled in four 4-year undergraduate degrees (some courses entirely in English had been offered as a voluntary option since the 2017–2018 academic year to 2020–2021 and, therefore, the 2nd, 3rd and 4th year students had had the opportunity to enroll in them), a 1-year and a 2-year postgraduate degrees (no courses entirely in English had been offered to them) when the survey was undertaken. All the undergraduate and postgraduate degrees had included elective and mandatory courses partially taught in English and/or with activities in English since at least 2017 up to the moment when the students were surveyed.

A questionnaire in Spanish based on the ones previously reported [16,17] was used to collect information on the attitudes towards the English language. The questionnaire was made up of four sections (English level and perceived skills, past response to the offer of courses taught entirely in English and opinion on future options to implement EMI in the classroom, reasons to implement EMI in the higher education setting, and the enrolment details and social–demographic characteristics of the students), with a total of 24 questions. While 20 of them were based on single select multiple-choice questions with one possible answer (Sections 1, 2 and 4), 4 of them were Likert-scale questions with a scale ranging from 1 to 5 to choose depending on the extent to which the students agreed or disagreed with the aspects proposed (with 1 being fully disagree and 5 fully agree) (Section 3).

2.2. Surveying Procedure

The survey was conducted in February 2021 in the classrooms of the Agricultural Engineering School in Badajoz using Google Forms. A lecturer informed the participants in each classroom that participation was voluntary, the questionnaire was intended for gathering information on the attitudes towards the use of English in the classroom as part

of a research project and that the answers would be anonymous, and provided the students with an explanation about the questionnaire. A QR code was then displayed for the students to access the questionnaire with their mobile phones. To increase the response rate, the students were asked to send the link to the questionnaire to other students belonging to the same course who were not in the classroom at that moment. All the participants provided their informed consent for inclusion in the study when they filled the questionnaire. A total of 251 valid questionnaires were received, which is roughly half the total number of students enrolled in the undergraduate and postgraduate programs.

2.3. Data Analysis

The data from the 20 qualitative variables based on single-selection multiple-choice questions were analyzed using multivariate statistical techniques to study the relationships among the variables (by performing a multiple correspondence analysis) and to characterize the students by splitting them into three groups with common underlying features (by performing a cluster analysis on the variables generated from the former analysis), which were checked for differences by performing a chi-square test.

First, a multiple correspondence analysis was performed to reduce the qualitative variables and summarize their information in two newly formed variables. This facilitates the understanding of the relationships among the variables and the association between the categories in those variables [18]. The multiple correspondence analysis is an interdependence multivariate technique for qualitative variables similar to the principal components analysis for quantitative variables, and generates perceptual maps [19]. A k-means cluster analysis was then performed on the two variables generated to classify the survey respondents into three groups of students with answers sharing common features, separated from the students whose answers were different. Finally, the Pearson chi-square test was applied to each of the 20 original qualitative variables to check for differences between the three newly generated groups, in order to characterize each group. The standardized residuals were calculated to identify differences between observed and expected counts (should the value be outside ± 1.96 , then there would be significant differences at $p < 0.05$ level; outside ± 2.58 , significant at $p < 0.01$ level, and outside ± 3.29 , significant at $p < 0.001$ level) [20].

With respect to the four quantitative variables, measured using a Likert scale (related to the reasons to implement the English language in the higher education setting), they were not included in the multivariate analyses. The differences in them among the groups previously generated in the multivariate analyses were analyzed to characterize those groups by performing an ANOVA, followed by the post-hoc Tukey test when significant differences appeared.

All the statistical analyses were performed using the SPSS Statistics v.27 software (SPSS, Chicago, IL, USA).

3. Results and Discussion

The overall results from the 251 valid questionnaires received (the 50.2% of all the students enrolled when the survey was conducted) revealed a lack of homogeneity between the students, which is shown and discussed first. A multiple correspondence analysis was then performed on the qualitative variables to summarize the information into two new variables, revealing the association between some of the original qualitative variables. A cluster analysis performed on the new variables was used to segment the students into three groups with common features. The results from a chi-square test and an ANOVA (performed on each of the 20 qualitative and the four quantitative variables, respectively) carried out to characterize the groups according to the differences among them are finally shown and discussed.

3.1. Global Results from the Survey

The enrolment details and social–demographic features of the 251 students surveyed are detailed in Table 1. Most respondents were enrolled in an undergraduate degree program (212 out of 251, 84.5%), mostly in the first year (27.1%) or fourth year (25.1%), and there was a roughly similar percentage of males (53.0%) and females (47.0%). Most respondents declared a medium family income (57.0%) and a rural (small towns and villages) family address (62.8%). With respect to the age, most students declared to be 22 or 23 years old (28.9%), followed by 20 or 21 (27.6%) and 18 or 19 (24.4%).

Table 1. Total results for the enrolment details and social–demographic questions and results detailed per group after performing the multiple correspondence and cluster analyses *.

		Total (n: 251)	Group 1 (n: 87)		Group 2 (n: 64)		Group 3 (n: 100)		χ^2 , <i>p</i>
			N°	Residuals	N°	Residuals	N°	Residuals	
Program	Food Science and Technology (U.D.)	84	34	0.9	31	2.1	19	−2.5	95.230, <i>p</i> < 0.001
	Farming and Livestock Engineering (U.D.)	80	13	−2.8	7	−3.0	60	5.0	
	Agricultural and Food Industry Engineering (U.D.)	25	4	−1.6	10	1.4	11	0.3	
	Horticultural and Gardening Engineering (U.D.)	23	6	−0.7	7	0.5	10	0.3	
	Quality and Traceability Management of Vegetal Food (P.D.)	16	11	2.3	5	0.5	0	−2.5	
	Agricultural Engineering (P.D.)	23	19	3.9	4	−0.8	0	−3.0	
Year	1st year of U.D.	68	12	−2.4	16	−0.3	40	2.5	91.333, <i>p</i> < 0.001
	2nd year of U.D.	47	3	−3.3	6	−1.7	38	4.5	
	3rd year of U.D.	42	17	0.6	13	0.7	12	−1.2	
	4th year of U.D.	63	32	2.2	21	1.2	10	−3.0	
	1st year of P.D.	27	21	3.8	6	−0.3	0	−3.3	
	2nd year of P.D.	4	2	0.5	2	1.0	0	−1.3	
Gender	Not answered	4	0	−1.2	0	−1.0	4	1.9	14.643, <i>p</i> = 0.006
	Female	116	46	0.9	36	1.2	34	−1.8	
	Male	131	41	−0.7	28	−0.9	62	1.4	
Income	Not answered	9	1	−1.2	4	1.1	4	0.2	18.315, <i>p</i> = 0.050
	High	4	0	−1.2	3	2.0	1	−0.5	
	Medium–High	63	21	−0.2	17	0.2	25	−0.0	
	Medium	138	52	0.6	36	0.1	50	−0.7	
	Medium–low	33	13	0.5	4	−1.5	16	0.8	
	Low	4	0	−1.2	0	−1.0	4	1.9	
Type of family address	Not answered	4	1	−0.3	2	1.0	1	−0.5	12.224, <i>p</i> = 0.016
	Rural	155	60	0.9	28	−1.8	67	0.7	
	Urban	92	26	−1.0	34	2.2	32	−0.8	
Age (years)	Not answered	5	0	−1.3	1	−0.2	4	1.4	108.915, <i>p</i> < 0.001
	18–19	60	0	−4.6	12	−0.8	48	4.9	
	20–21	68	15	−1.8	18	0.2	35	1.5	
	22–23	71	41	3.3	18	−0.0	12	−3.1	
	24–25	29	21	3.5	7	−0.1	1	−3.1	
	Over 25	18	10	1.5	8	1.6	0	−2.7	

* U.D.: undergraduate degree; P.D.: postgraduate degree; χ^2 : Pearson’s chi-square; *p*: significance level.

With respect to the English level and perceived skills, roughly half the students (47.8%) declared to have had an outstanding (B) or excellent (A) averaged grade in high school (Table 2). Half the students (128 out of 251, 51.0%) did not have an English certificate, 37.8% had at least a B1, and only 9.6% had at least a B2 certificate (Table 2). These percentages indicate that, despite the high school grades reported, a considerable percentage of students either did not feel adequately prepared for taking a B1 English exam or did not feel the need to do it despite the University of Extremadura requirement for it (it could be replaced with an internal course granting the students had the B1 competencies or passing three courses entirely taught in English). These data compare unfavorably with another study also in a Spanish engineering school, where 48% of the students declared to have at least a

self-assessed B2 level and 86% at least a B1 (although it was concluded that the declared level was rather optimistic since half of them thought they did not meet the English level required for EMI courses and only 39% thought they had the competences required to understand a lesson in English) [15]. The general low English level might be explained by the basic requirement for English communication skills from the local industry, mainly composed of small companies with little orientation towards exports.

Table 2. Total results for the questions on the English level and perceived skills, and results detailed per group after performing the multiple correspondence and cluster analyses *.

		Total (n: 251)	Group 1 (n: 87)		Group 2 (n: 64)		Group 3 (n: 100)		χ^2 , <i>p</i>
			N°	Residuals	N°	Residuals	N°	Residuals	
My averaged grade in the English course in high school was:	Just pass (C-)	61	27	1.3	2	-3.4	32	1.6	65.372, <i>p</i> < 0.001
	Acceptable (C+)	70	32	1.6	8	-2.3	30	0.4	
	Outstanding (B)	88	26	-0.8	31	1.8	31	-0.7	
	Excellent (A)	32	2	-2.7	23	5.2	7	-1.6	
My highest English level certificate is:	None (I have just passed the required course)	128	61	2.5	13	-3.45	54	0.4	71.816, <i>p</i> < 0.001
	A2	28	8	-0.5	4	-1.2	16	1.5	
	B1	71	16	-1.7	27	2.1	28	-0.1	
	B2	23	2	-2.1	19	5.4	2	-2.4	
	C1	1	0	-0.6	1	1.5	0	-0.6	
When somebody talks to me in English, I:	I try to tell them that I cannot speak English	31	18	2.2	0	-2.8	13	0.2	127.032 <i>p</i> < 0.001
	I try to communicate, but with difficulty	157	64	1.3	16	-3.8	77	1.8	
	I try to communicate and hold the conversation as long as possible to gain fluency	38	4	-2.5	24	4.6	10	-1.3	
	I can communicate fluently	25	1	-2.6	24	7.0	0	-3.2	
My current English skills would allow me to cope in the academic setting:	It would not be possible regardless of the effort	28	21	3.6	0	-2.7	7	-1.2	106.156 <i>p</i> < 0.001
	With excessive effort, but I could cope	110	45	1.1	7	-4.0	58	2.1	
	With great effort, but effectively	85	21	-1.6	33	2.4	31	-0.5	
	Fluently, except for some academic or technical terms	28	0	-3.1	24	6.3	4	-2.1	
Frequency of reading documents or books in English	I am not used to reading text in English or Spanish	59	15	-1.2	5	-2.6	39	3.2	109.216 <i>p</i> < 0.001
	I try not to read in English as far as I can (e.g., I use a text translator)	105	56	3.2	5	-4.2	44	0.3	
	Sometimes	82	16	-2.3	50	6.4	16	-2.9	
	When I read, I always try to do it in English	5	0	-1.3	4	2.4	1	-0.7	
I am used to watching movies and series in English	I do not watch any in English or Spanish	14	8	1.4	3	-0.3	3	-1.1	73.133 <i>p</i> < 0.001
	Never	137	57	1.4	10	-4.2	70	2.1	
	Sometimes	81	18	-1.9	36	3.4	27	-0.9	
	As often as I can	19	4	-1.0	15	4.6	0	-2.8	
The time I have spent in English-speaking countries has been:	None	130	44	-0.2	24	-1.6	62	1.4	32.460 <i>p</i> < 0.001
	Only some days, on holiday	99	40	1.0	24	-0.2	35	-0.7	
	Some months during the summer	17	2	-1.6	13	4.2	2	-1.8	
	Long periods	5	1	-0.6	3	1.5	1	-0.7	

* χ^2 : Pearson's chi-square; *p*: significance level.

The low percentage of students with at least a B2 certificate (Table 2) suggests that ineffective communication and other linguistic difficulties, as well as a lack of confidence when deciding for or against the enrolment, might have seriously hindered the EMI program. In this regard, most students declared a lack of confidence in their oral communication abilities (74.9% declared either difficulties or inability). However, most of them thought they could cope in the academic setting (88.8%). Unexpected as it might seem, it should be noted that if a minimum linguistic competence has been achieved, linguistic errors and inaccuracy in EMI programs do not generally have a remarkable impact since the English language itself is generally not considered when grading the students [21–24]. In this

respect, a focus on grammar assessment might be not advisable because it can restrict and discourage students' willingness to speak and communicate [25].

The apparent low English level of the respondents matches a weak contact with the English language in their daily life, with 41.8% trying not to read in English and 54.6% never watching movies in English. These habits of a considerable percentage of respondents suggest an apparent lack of interest in striving to improve their English level in the foreseeable future. It is also noteworthy that 51.8% had never been to an English-speaking country (Table 2).

Regarding the past response to the offer of courses entirely taught in English, almost half the students (46.2%) said they were unaware of these (Table 3). That percentage almost matches the percentage of students who had not been offered those EMI courses (postgraduate and first-year undergraduate students, who total 39.4%). Therefore, it could be inferred that when the courses taught entirely in English were offered, almost all the students were then aware, and that the low enrollment was not the result of a lack of information but a conscious decision that might have been made on the basis of a lack of confidence in the English communication skills. In this respect, a lower willingness to enroll when the self-assessed English level is low has already been reported [15]. In fact, among the respondents who were aware of the past offer of courses taught entirely in English, those not interested in them (37%) were double the number of the interested students (17%). This indicates that these EMI courses were not sufficiently attractive to them, which could be explained in terms of the generally low English level and an imbalance in the reward and expected effort.

Table 3. Total results for the questions on the past response to the offer of courses entirely in English, and results detailed per group after performing the multiple correspondence and cluster analyses *.

		Total (n: 251)	Group 1 (n: 87)		Group 2 (n: 64)		Group 3 (n: 100)		χ^2 , <i>p</i>
			N°	Residuals	N°	Residuals	N°	Residuals	
Some courses were offered entirely in English for some years. Were you ever interested in taking them?	I was not aware	116	17	−3.7	30	0.1	69	3.4	72.290, <i>p</i> < 0.001
	I knew of them, but these did not interest me	93	53	3.7	15	−1.7	25	−2.0	
	I took the courses when I could just for the B1 certificate exception	17	11	2.1	3	−0.6	3	−1.4	
	I took the courses when I could because I found them interesting	25	6	−0.9	16	3.8	3	−2.2	

* χ^2 : Pearson's chi-square; *p*: significance level.

On the one hand, the low enrolment and interest in the courses entirely in English might be related to the low English level of a high percentage of students, which might have thought that passing those EMI courses successfully was not feasible for them. In this respect, a previous study in a Spanish engineering school with students with a considerable higher English level (48% respondents with a self-evaluated B2 level vs. only 9.6% with at least a B2 certificate in our study) reported a stronger interest in similar EMI programs (76%) [15], nearly doubling ours.

On the other hand, the enrolment might have been hindered by the perception of an imbalance in the reward and the expected effort (probably estimated as considerable due to the lack of English proficiency), with the expected outcome of some technical vocabulary acquisition in English and some advantages (such as priority in the Erasmus program and the exemption of the B1 certificate or course after passing three courses taught entirely in English) at the expense of a negative impact in their grades and content knowledge acquisition. These potential fears have been proven real: previous research has shown that EMI in scientific disciplines might have a seriously negative impact on most students [26]. However, a lack of negative impact on the grades has also been reported provided that a minimum linguistic competence has been achieved [21–24], as mentioned above. In fact,

English proficiency itself does not necessarily ensure a sufficient background to meet the academic communication requirements [27]. To overcome language potential issues, it has been recommended that instructors should focus on facilitating learning rather than on the lecture content [28,29].

Among the students enrolled in the courses entirely in English, most (25 out of 42, 59.5%) declared to have done it just because it was interesting, whereas the rest (40.5%) declared that they did it just to have the B1 certificate (or equivalent course) requirement waived (Table 3). It could be inferred that 59.5% of the enrolled students have at least a B1 certificate, which is clearly higher than the 37.8% of the total students claiming not to have it (Table 2). This reveals that the students with a higher English level were more enthusiastic about the courses taught entirely in English. For those students, who were more proficient in English, the perception of a potential negative effect might have been outweighed by the positive expectations about career prospects and Erasmus mobility. The greater interest in those EMI courses of respondents with the higher English level agrees with a previous study, also from an engineering school [15].

Regarding the students who had been enrolled in courses taught entirely in English and who declared that the B1 exemption was the main motivation to enroll (40.5%), it can be inferred that they had neither a B1 certificate nor any intention of passing a B1 certificate test. For them, the reward seems to have been sufficient to risk failure and add special effort to pass the courses. In addition, the high percentage of students with an apparent low English level suggests that the academic outcome and knowledge acquisition may have been hindered, and this might have dissuaded some well-prepared students from enrolling in the courses taught entirely in English. The enrolment of such a high percentage of students without the B1 level may seem surprising, since it is generally assumed that at least a B1 or B2 level is necessary to thrive in the higher education setting. In fact, the University of Extremadura recommends having at least a B2 level, in accordance with other universities' requirements, to prevent dropouts and/or an excessive negative impact. A previous study also reported that some students with a low English level may be interested in EMI programs because of the expected positive effect on their future careers, highlighting the convenience of reinforcing their language competences before entering them [15]. Similarly, reinforcing the language skills under verifiable standards has been recommended [30] to ensure the future success of EMI programs. It should be noted that in the technical studies, regardless of the English level of the students, it is advisable to integrate the acquisition of academic communication skills within each course [8]. In fact, this has also been recommended even in traditional English-speaking nations to ensure a sufficient development of language proficiency within the higher education courses [31,32].

With respect to the opinion on future options to implement the English use in the classroom, the enrolment in courses taught entirely in English was the least chosen option (only 50 out of 251, 19.9%) (Table 4). This percentage is roughly similar to that of students who declared having been enrolled in those EMI courses (16.7%) (Table 4), which suggests that a similar percentage would enroll if they were offered. In fact, even a lower enrolment could be expected considering that the B1 certificate exception is no longer granted. As mentioned for the past EMI courses enrolment, the weak response to a future offer might be due to the general low English level and the expectation of a negative impact. In fact, previous research has shown that EMI in scientific disciplines might have a negative impact on content comprehension and grades, as well as cause anxiety and frustration [26]. A previous study reported a comparable percentage of students (19%) preferring courses entirely taught and assessed in English to other EMI options [15]. The low enrolment and willingness to enroll is a critical issue to maintaining the courses taught entirely in English and hinders an effective offer to internationalize the programs. In addition, it puts the need for additional English language programs under the spotlight when the students' English level is low.

Table 4. Total results for the questions on the opinion on future options to implement the English language in the classroom, and results detailed per group after performing the multiple correspondence and cluster analyses *.

		Total (n: 251)	Group 1 (n: 87)		Group 2 (n: 64)		Group 3 (n: 100)		χ^2 , <i>p</i>
			N°	Residuals	N°	Residuals	N°	Residuals	
How should English learning be implemented in the school? I would like . . . more courses entirely in English	Not answered	201	69	−0.1	35	−2.3	97	1.9	43.847, <i>p</i> < 0.001
	Yes	50	18	0.2	29	4.6	3	−3.8	
How should English learning be implemented in the school? I would like . . . some of the lessons in English	Not answered	133	55	1.3	36	0.4	42	−1.5	8.775, <i>p</i> = 0.012
	Yes	118	32	−1.4	28	−0.4	58	1.6	
How should English learning be implemented in the school? I would like . . . videos in English in more courses	Not answered	189	69	0.4	50	0.3	70	−0.6	2.537, <i>p</i> = 0.281
	Yes	62	18	−0.8	14	−0.5	30	1.1	
How should English learning be implemented in the school? I would like . . . more academic texts in English	Not answered	178	54	−1.0	42	−0.5	82	1.3	10.127, <i>p</i> = 0.006
	Yes	73	33	1.5	22	0.8	18	−2.1	
Do you think that the English level displayed during the English activities should be assessed separately?	No	106	44	1.2	10	−3.3	52	1.5	24.964, <i>p</i> < 0.001
	Yes	145	43	−1.0	54	2.8	48	−1.3	
Do you think that the obligatory English activities should be listed in your academic record? * Non-mandatory question	Not answered	57	29	2.1	6	−2.2	22	−0.1	31.229, <i>p</i> < 0.001
	No	36	12	−0.1	1	−2.7	23	2.3	
	Yes	158	46	−1.2	57	2.6	55	−1.0	

* χ^2 : Pearson's chi-square; *p*: significance level.

Conversely, the option of some lessons in English was the most interesting to the survey respondents, with a 47.0% of positive responses (Table 4). The clear preference for courses taught in English partially rather than entirely was previously reported in an engineering school (82% vs. 6%) [15]. It could be surprising that this option reached a higher percentage of positive responses than other less demanding options, such as video- (24.7%) and text-based (29.1%) activities. These choices suggest that a high percentage of respondents might want to participate in activities to acquire or improve their oral production and comprehension skills with other students and the lecturer, and that they might want to do it to a greater extent than just focusing on the comprehension of recorded videos or written texts. This indicates that the respondents consider the lessons taught in English useful to improving their oral skills (often considered a weak area for Spanish students, but at the same time a key point for better career prospects) without the risk of failure or the extra effort expected to pass courses entirely in English.

Regarding the activities in English performed in some courses not entirely taught in English, most respondents answered that they should be assessed separately (145 out of 251, 57.8%) and that a mention about those activities should be included in their academic record (62.9%) (Table 4). This suggests that most students might think that those activities are valuable for their résumé. It should be noted that a high percentage was against the English assessment (42.2%), although only 14.3% were against the mention in the academic record, probably because of an expected negative impact of the former on their grades and a positive impact of the later on their career prospects.

In relation to the perceived usefulness of acquiring or improving the communicative skills in English (including technical vocabulary) in the classroom, there were not dramatic differences between the proposed options, with the averaged values being in the 3.1–3.9 range (Table 5). All the scores were over 3 (scale: 1 = fully disagree; 5 = fully agree), which indicates that none of the options were in disagreement with the general expectations. However, none of them were above 4, which indicates that the proposed options did not fully meet their expectations or objectives and were not completely satisfactory to all of them.

Table 5. Total results (mean \pm standard deviation) for the questions on the reasons to implement the English language in the higher education setting, and results detailed per each group obtained after performing the multiple correspondence and cluster analyses. The responses were measured using Likert scales from 1 to 5 (1: fully disagree; 5: fully agree) *.

	Total (n: 251)	Group 1 (n: 87)	Group 2 (n: 64)	Group 3 (n: 100)	<i>p</i>
To improve my overall level	3.5 \pm 1.3	3.5 \pm 1.3 ^b	4.1 \pm 1.1 ^a	3.2 \pm 1.2 ^b	<0.001
To improve my technical vocabulary	3.7 \pm 1.2	3.6 \pm 1.3 ^b	4.3 \pm 0.9 ^a	3.4 \pm 1.2 ^b	<0.001
To improve to work abroad	3.5 \pm 1.3	3.4 \pm 1.4 ^b	4.1 \pm 1.2 ^a	3.3 \pm 1.4 ^b	0.001
To meet foreign students	3.3 \pm 1.3	3.1 \pm 1.3 ^b	3.7 \pm 1.2 ^a	3.2 \pm 1.4 ^b	0.012
To prepare for mobility programs (e.g., Erasmus)	3.1 \pm 1.4	2.9 \pm 1.4 ^b	3.4 \pm 1.4 ^a	3.1 \pm 1.4 ^a	0.035
To find a better job	3.9 \pm 1.2	4.0 \pm 1.2 ^a	4.4 \pm 0.9 ^a	3.6 \pm 1.3 ^b	<0.001

* *p*: statistical significance from an ANOVA. Different superscript letters within the same row indicate significant differences at the $p < 0.05$ level in the Tukey test.

The lowest score was found for the option “to prepare for mobility programs”, which was also the one with the highest coefficient of variation (45.2%). The highest score was found for “to find a better job”, which was also the option with the lowest variability (30.8%) and, therefore, with the broadest agreement among the students. The expected impact in their career matches, although to a lesser extent, previous results reporting that 98% of the students expected that effect [15]. These expectations are in line with the increasingly demanding requirements of global communication skills for the labor force, which keeps the focus on a necessary shift in the educational focus in higher education [9]. In this regard, EMI-based learning is expected to increase employability, as well as to improve cross-cultural understanding and global awareness [33,34].

The high standard deviation in the responses (Table 5) indicates marked differences in the opinions among the students, which were reflected in high coefficients of variation, ranging from 30.8% (“to find a better job”) to 45.2% (“to prepare for mobility programs”). This variability might indicate that a number of students did not consider the English communication skills that could be acquired in the classroom critical for their objectives and future careers. That number may include a high proportion of respondents with a low English level. Therefore, to understand the needs and expectations of the students, it might be necessary to analyze the results taking into account their features in terms of common trends and segmentation.

3.2. Interrelationships among the Variables

The multiple correspondence analysis applied to the 20 qualitative variables based on single-selection multiple-choice questions generated two dimensions explaining 35.5% of the total variance (21.8% and 13.7% for dimensions 1 and 2, respectively), with an averaged Cronbach’s alpha of 0.756 (0.811 for dimension 1 and 0.669 for dimension 2). Dimension 1 was mainly described by the questions related to the English level and the perceived skills (listed in Table 2), most of them with discrimination measures over 0.4 (Figure 1). Dimension 2 was mainly explained by the program, year and age, all of them with discrimination measures over 0.490 (Figure 1). The relationships between some of those variables have already been reported [2], the attitudes depending on the discipline and the type of degree, as well as the type of EMI activity [35].

There were not any variables with a remarkable contribution to the two dimensions. Differences in the contribution to the model are related to the variation in the variables found among the students in terms of their relationship with the English language. Some variables had small discrimination measures in both dimensions (Figure 1). Among those variables were all the options to implement the English language in the classroom (Table 4), some social–demographic questions (gender, income and type of family address) and the time spent in English-speaking countries, the small discrimination measures indicating that their variability did not follow a trend consistent with other variables.

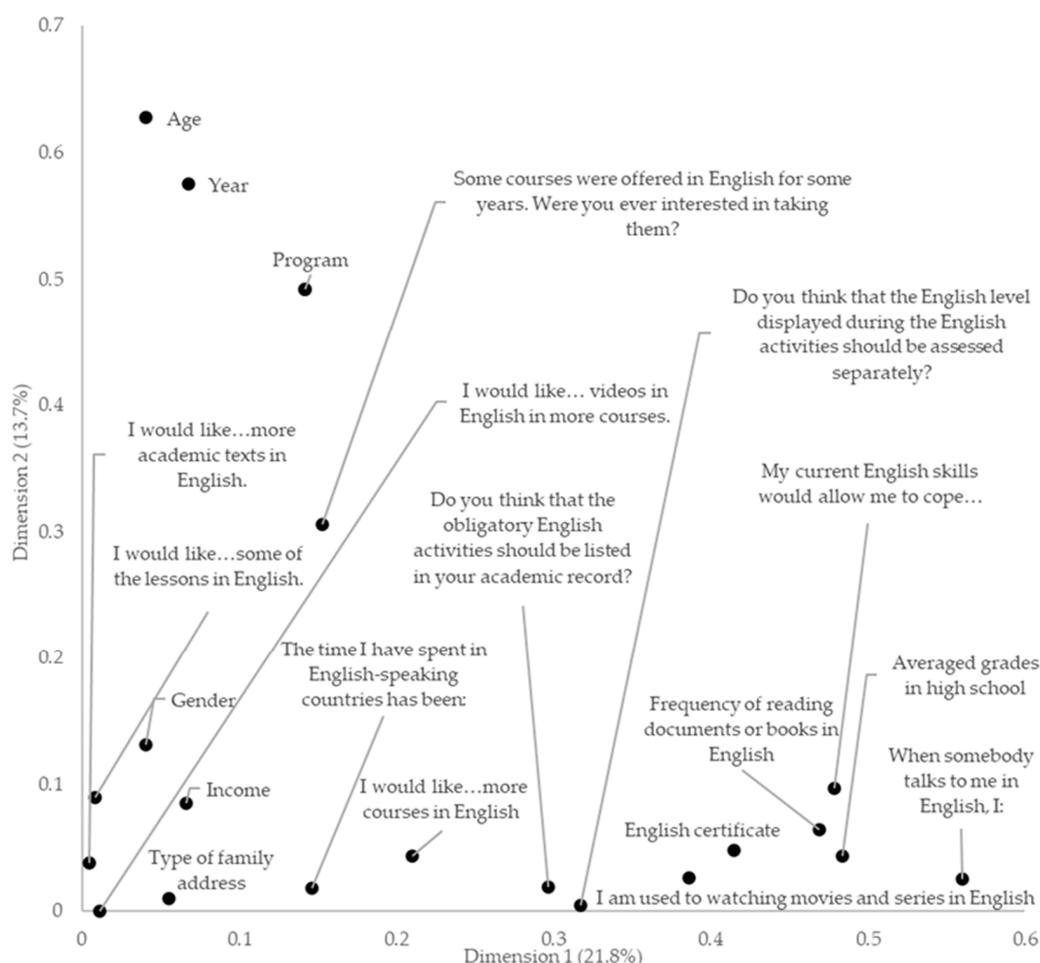


Figure 1. Representation of the variables into the space defined by the discrimination measures obtained in the multiple correspondence analysis.

With respect to the questions in Table 4, their small discrimination measures suggest that respondents with similar opinions to other questions might not have had a similar opinion on the usefulness of the proposed options. It also indicates that the options offered might not have been in line with the thoughts of the students. Regarding the social-demographic questions and the time spent in English-speaking countries, the small discrimination measures indicate that those traits related to the background did not have a marked impact on the responses to other questions. In this respect, previous research showed a lack of consistency on the effect of gender on students' beliefs on EMI teaching and motivation, with both no effect [36] and an effect on some answers but not in others [37]. That relatively slight effect is in line with our results showing no marked interrelationships of gender with the other variables. With respect to the income, the small discrimination measures match previous studies reporting a poor relationship between income and EMI academic achievement [38].

Figure S1 shows the perceptual map obtained from the multiple correspondence analysis based on the category quantifications (coordinates) of the variables included in the analysis. It reveals the extent of the relationships between the categories of each variable. Figure S1 shows that the categories related to a higher English level and perceived skills appeared close to the categories related to the option "I took the courses when I could because I found them interesting", in the positive semiaxis of dimension 1. Conversely, the categories related to a lower confidence and level appeared in the negative semiaxis of dimension 1. These relationships confirm the students' willingness to enroll in courses taught entirely in English when their communication skills are sufficient, in line with previ-

ous results, also from an engineering school [15]. With respect to dimension 2, older ages and postgraduate programs had the largest values in the positive semiaxis, whereas low income, younger ages and undergraduate programs had the lowest values in the negative semiaxis, together with not answered questions (about gender, age and type of family address) (Figure S1). This dimension reveals, as it was expected, that the postgraduate students tended to be older and to have higher income than the undergraduate students.

3.3. Classification of the Students according to Their Responses and Group Characterization

A k-means cluster analysis was performed on the two dimensions resulting from the multiple correspondence analysis to classify the students in three groups, which are displayed in Figure 2. This map shows the homogeneity level within and among groups. Figure 2 shows that the three groups were roughly similar in size, with group 2 and 3 having slightly more dispersion and, therefore, more variability among their students.

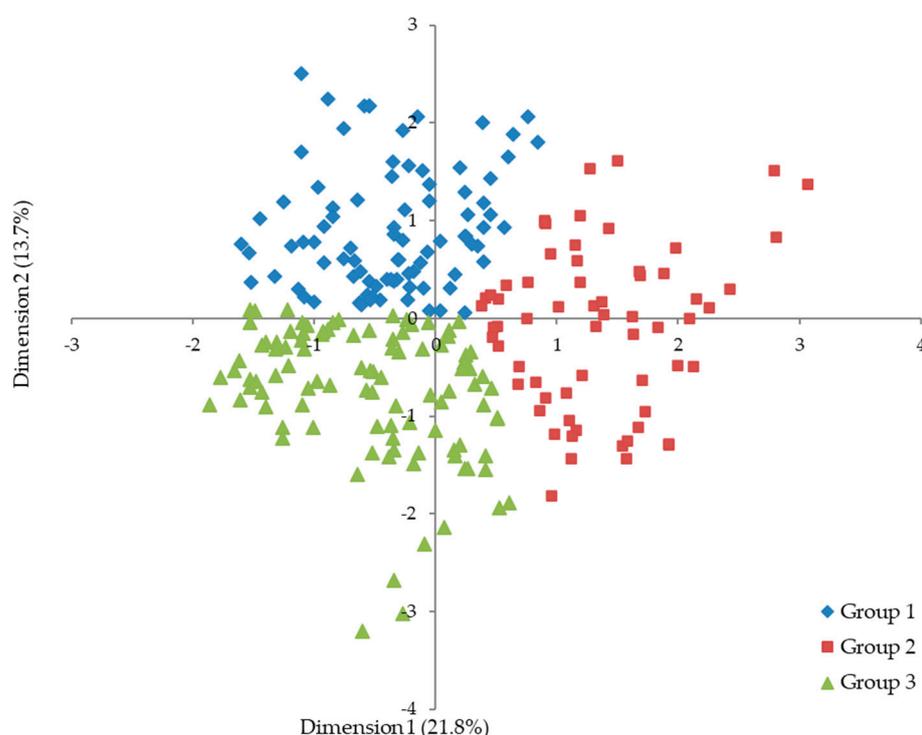


Figure 2. Positioning of the students from the three groups obtained in the cluster analysis in the space defined by dimensions 1 and 2 from the multiple correspondence analysis.

The groups were then characterized according to the original responses of its students for the 24 questions by performing a chi-square test (for the qualitative variables and an ANOVA (for the quantitative variables). Significant differences appeared between the observed and expected frequencies for most of the qualitative variables (all of them in Tables 1–3, and all except one in Table 4) and among the three groups for all the quantitative variables (Table 5).

Group 1: “Postgraduate students and students enrolled in the Food Science and Technology undergraduate degree, 22–23 years old and older” (Table 1). This group included 87 respondents (34.7% of the sample). Table 2 shows that most of the students in the group had had relatively low grades in the English course in high school (67.8%) and had not passed a certificate test (70.1%). They declared difficulties in communicating (94.3%) and coping in the academic setting (75.9%, with as much as 24.1% being unable to cope in English), as well as trying not to read in English (64.4%) and never watching movies and series in English (65.5%). In addition, most students declared that they had not been interested in taking any courses entirely in English (60.9%) (Table 3). The percentage

of students unaware of those EMI courses (19.5%) was clearly smaller than that of students who had not been offered the courses (40.2%), which were the postgraduate and the first year undergraduate students. These results suggest that some of the postgraduate students in this group might have been previously enrolled in an undergraduate degree in the same engineering school. Table 4 shows that among the options proposed to implement the English learning, most students did not choose them, with the proposed actions being chosen by only 20.7–37.9% of them (Table 4). Although they did not clearly agree with a separate assessment of the English language (50.6% in favor vs. 49.4% against it), they thought that the English activities should be listed in their academic records (52.9% in favor vs. 13.8% against it) (Table 4). They were interested in the use of the English language in the university classroom (Table 5), with most options being scored over 3 out of 5, and the main reason to have the English language in the classroom was “to find a better job” (4 out of 5), whereas the mobility programs and meeting foreign students were the least valued options (2.9 and 3.1 out of 5, respectively). It is worth noting that this group, with a general low English level, poor self-assessed English communication skills and little interest in courses entirely in English, had a considerable percentage of postgraduate students (34.5%, 30 out of 87), which were 76.9% of the total postgraduate students. Previous research had shown that the postgraduate students were more enthusiastic about EMI (including taking courses entirely in English) than the undergraduate students [35]. The lack of agreement with our results might be explained in terms of the differences in the English communication skills, English usage in the program and other students’ features. The abovementioned study reported a much higher proportion of EMI implementation in the postgraduate than in the undergraduate degrees due to the institutional policy and the higher intake of international students. However, the programs included in our study had not been under a similar policy, with no English-speaking international students and no emphasis on implementing EMI in the postgraduate courses. Our results show that it is the English level and skills that influence the attitudes towards EMI and particularly towards the willingness to enroll in courses entirely taught in English rather than the type of degree (undergraduate vs. postgraduate) itself.

Group 2: “Students mostly enrolled in the Food Science and Technology undergraduate degree or the Agricultural and Food Industry Engineering undergraduate degree, 20–23 years old” (Table 1). This group included 64 respondents (25.5% of the sample). Table 2 shows that most of the students in the group had had high grades in the English course in high school (84.4%) and had passed at least a B1 certificate test (73.4%). They mostly declared either fluency or willingness to communicate in English (75%), being able to cope effectively or fluently in English in the academic setting (92.2%), as well as reading in English (84.4%) and watching movies and series in English (sometimes or as often as possible) (79.7%). In addition, some of them (25.0%) had spent months in an English-speaking country, and most of them had spent some time in an English-speaking country (62.5%). Nearly half the students declared that they were not aware of the past offer of courses entirely in English (46.9%). Although this percentage is similar to the overall percentage (46.2%), it should be noted that, in fact, 62.5% of the group 2 respondents (which were the year 2 to 4 students) had been offered the courses (Table 1). This disagreement reveals a failure at making some students aware of the past offer, and highlights the convenience of publicizing the information effectively to reach potential target students (those with a B1-B2 certificate or sufficient self-assessed communicative skills) during the enrolment period. With respect to the students aware, most declared having taken them (29.7 vs. 23.4%) (Table 3). Table 4 shows that among the options proposed to implement the English learning, most students did not choose them, all the proposed actions being chosen by 21.9–45.3% of them, which roughly doubled the liking of group 1. They clearly agreed with a separate assessment of the English language (84.4%), and they thought that the English activities should be listed in their academic records (89.1%) (Table 4). Students in group 2 were really interested in the use of the English language in the university classroom, most options being scored over 4 out of 5. In fact, this group scored the highest values in all the

items (Table 5). It should be noted that the option “to find a better job” was again the best scored item, very close to the maximum (4.4 out of 5). Again, the least valued options were the mobility programs and meeting foreign students were the least valued options (3.4 and 3.7 out of 5, respectively).

Group 3: “Students mostly enrolled in the Farming and Livestock Engineering undergraduate degree, in the two first undergraduate years, were mainly male, rural, and under 22 years old” (Table 1). This group included 100 respondents (39.8% of the sample). Table 2 shows that most of the students in the group had had medium and low grades in the English course in high school (93.0%) and had not passed a B1 certificate test (98.0%). Most of them declared serious difficulties in communicating (90.0%) and coping in the academic setting in English (65.0%, but only 7.0% being unable to cope), as well as not reading or trying not to read in English (83%) and never watching movies and series in English (70.0%). In addition, most of them (62.0%) had never spent time in an English-speaking country. Most students in group 3 declared that they were not aware of the courses in English (69.0%) (Table 3), although in fact only 40.0% of them had not been offered the EMI courses (those in the first year). Since the EMI courses were publicized equally among all the undergraduate degrees, this large 29.0% gap suggests that group 3 students might have been less receptive to the publicity campaign, likely due to their low self-perceived English communicative skills. Table 4 shows that among the options proposed to implement the English learning in the classroom, three of them were chosen only by 3–30% of the students, with them mostly liking the option of including some lessons in English (58%). That option was especially successful in this group, in a clear contrast with the option of courses entirely in English (3%), with those options reaching the highest and lowest percentages, respectively, when comparing with the other groups. They did not clearly agree with a separate assessment vs. of the English language (48.0% in favor vs. 52% against it), nor did they with listing the English activities in their academic records (only 55.0% in favor vs. 23% against it). The students in group 3 were slightly interested in the use of the English language in the classroom, with all the scores in the 3.1–3.6 range and none over 4 out of 5 (Table 5). Again, the option “to find a better job” was the best scored item, and the mobility programs the worst.

The marked differences in the features among the students’ groups suggest that the offer of EMI activities and/or entire courses in English should be adjusted to fit the features of each group of students. For example, for programs and/or courses whose students belong mostly to groups 1 and 3, the EMI actions should be adapted to cope with potential communication difficulties and could be reinforced with supporting English lessons, whereas those mostly with students belonging to group 2 could offer more challenging options requiring more English proficiency, such as courses entirely taught in English and activities specifically related with technical vocabulary and professional settings.

4. Conclusions

The results from the survey and the statistical analyses reflect the disparity in the response to the courses entirely taught in English and the general English usage. The main reason for the difference in the attitudes, and specially for the lack of enthusiasm of a considerable percentage of students for those courses, might be their low English level (only 9.6% of them had the minimum B2 level recommended to enroll in those courses) and poor perceived English communication skills. Even so, the positive general response to some actions to implement the use English in the classroom (such as some content lessons in English) suggests that most of the students consider them beneficial and worth the effort.

The interrelationships found among some variables in the multiple correspondence analysis, especially those related to the program and year in which they were enrolled, their age and English level and their perceived skills, revealed common underlying features. The cluster analysis and subsequent chi-square test and ANOVA confirmed that the groups of students shared features with significant differences from other groups. This segmentation suggests that the implementation of courses entirely taught in English and

other internationalization actions should be supported by specific measures focused on each group of students, considering their common features so that their expectations and needs are met. This may include the offer of supporting English language lessons and the implementation of EMI actions requiring less demanding communication skills in the programs and/or courses in which most students share common features related to poor English communication skills or low motivation for improving them, and more challenging and fulfilling activities related to specific vocabulary and professional contexts for the students' groups with sufficient English communication proficiency.

Supplementary Materials: The following supporting information can be downloaded at: <https://www.mdpi.com/article/10.3390/educsci13020121/s1>, Figure S1: Joint category plot of the centroid coordinates of each variable included in the multiple correspondence analysis showing category quantifications and contributions.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

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