

COMPARATIVE ACADEMIC PERFORMANCE ANALYSIS OF BUSINESS ADMINISTRATION FRESHMEN USING ENGLISH VS. SPANISH AS MEDIUM OF INSTRUCTION

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Abstract

This research explores the impact of language on academic performance and determine whether there are significative differences in the grades obtained by the students using English as a Medium of Instruction (EMI) and those that use Spanish (non-EMI), their mother tongue, in all the ten (core) courses of their freshman year. The courses syllabus for both types of programmes is the same and there is a strong coordination among the teaching staff ensuring that courses plans and learning achievements are similar despite the language of instruction.

The initial data set consisted of the cohorts of students who first enrolled in the Bachelor Degree in Business Administration at the Complutense University of Madrid (UCM) in years 2009/10, 2010/11 and 2011/12. Therefore the students that did all their freshman year courses in English were paired, and their results compared with those obtained by their partners on the non-EMI group using multivariate techniques.

The authors hypothesize that there are no differences in the students' performance between the EMI and non-EMI group, so that the academic output for students from one group and the other should be statistically similar. However, the obtained results show that those differences exist.

Keywords: Higher Education Internationalisation, English as a Medium of Instruction, Business Administration Degree, Academic Performance.

1 INTRODUCTION

Over the past few decades, the world has become increasingly globalized so the status of English as lingua franca has led to a fast-moving worldwide shift towards using English as a Medium of Instruction (EMI) for academic subjects such as science, mathematics, geography or medicine. EMI, where contents and English language are integrated in the learning process, is increasingly being used in universities, secondary schools and even primary schools. Therefore many governments have long realized the importance of the English language as a major core subject in schools, and it has been a compulsory subject at varying levels.

One of the main institutional arguments for adopting EMI refers to higher job opportunities for graduates. But there is the belief, sometimes voiced, that students in EMI, assessed in a language which is not their own, will be disadvantaged, although there are some studies that suggest those effects tend to be reduced with time as the EMI students become more proficient in English. On the other hand, when comparisons are made, there is another belief that EMI students' academic performance is better from the beginning, so they will naturally perform better than their peers who are studying and assessed in their own language.

Most research on the impact of EMI on university students' learning experience is based on the perceptions those same university students and their lecturers have of the process. Nevertheless very few systematic studies comparing the outcomes of students receiving Higher Education in their native languages versus foreign languages have been carried out. This paper presents a systematic comparative study that investigates undergraduate Business Administration students' outcomes of EMI versus non-EMI in a Spanish institution of higher education. While acknowledging that this study is contextual it has the potential to fill an important gap in research and add to the growing literature characterizing EMI initiatives not only in Spain, but also in different contexts across the world.

The setting for this research was the Faculty of Economics and Business Administration (Complutense University of Madrid, Spain) where the bachelor degree Business Administration program offers

students two identical options that differ only in their medium of instruction (English or Spanish). It provides, therefore, the perfect setting for the comparison of the academic results of English-taught students who follow an exactly equal program as their peers who are taught in their native language, so that conclusions can be drawn towards the effectiveness of English-taught programmes.

After reviewing the background and relevant literature in this particular situation, the second part of the paper outlines the setting for the present research, giving details about the context, participants, and methodology used. Results are then presented and, finally, some conclusions are drawn.

2 LITERATURE REVIEW/BACKGROUND

The most usually identified benefits of the EMI courses, in the many papers published on the subject, are “foreign language learning (particularly improvement in receptive skills), multicultural competence and a positive (emotional/affective) attitude toward foreign language learning” [1]. But when it comes to the students’ acquisition of disciplinary knowledge, in the medium of the native languages versus English language, in Higher Education the dispersion grows.

The predominant part of the studies related to EMI versus non-EMI in tertiary education is related to perception (see for example [2], [3] or [4]), either from the instructors or from the students’ point of view, stating that the majority think that EMI makes subject learning more difficult for students. Despite all the potential benefits, like to “make domestic students fit for global or international market” or “promote intercultural exchange” [5], there are some barriers to choosing EMI. Some authors argue that it is easier to learn in one’s mother tongue than to learn in English (see [6], [7] and [8]). This implies that students’ comprehension, participation, and exam performance could be negatively affected by EMI. On that same direction, Sert [9] found EMI to be effective in language skill development, but the research suggests that students and lecturers also think EMI fails to convey the academic content effectively. Similarly the study in Byun et al. [10] yields that the Korea University EMI students “felt that EMI was hindering their acquisition of knowledge to some extent” (p. 438). And all that while EMI programs lead to an increased workload for both lecturers and students [11], [12].

There are many papers, like those included in the previous paragraph, that are based on lecturers and/or student opinion surveys on EMI’s effectiveness. But studies related to the actual academic outcome of EMI versus mother-tongue students are scarce, and those that exist are mainly establishing comparisons for a specific course, taught both in English and in the country mother tongue by the same instructor (see [4], [13], [14], [15], [16]). Moreover, to the best of the authors’ knowledge, there are very seldom studies making a holistic approach to students’ academic results, namely only [17] and [18].

Finally, the gap in understanding between content taught in English and mother-tongue should narrow as the English proficiency increases, and therefore differences, if any, in academic results should also tend to disappear. The study is, therefore, guided by the following research question

RQ: Does the choice of English as medium of instruction impact the freshmen academic output?

3 THE RESEARCH CONTEXT

The present study was conducted at a state university in Spain where the students enrolling in the Business Administration undergraduate degree can chose between the English-Medium of Instruction (EMI) strand or the Spanish-Medium of Instruction (non-EMI) one, provided they have a sufficient enough proficiency level of English. So a student may choose to do all the courses in the English strand (EMI) or all in the Spanish strand (non-EMI), or he/she might choose to do some of the courses in English and some in Spanish.

This program was mainly taught in Spanish until 2009, when, due to changes related with the Bologna methodology some major changes were implemented, and an identical program with EMI was also introduced. The subjects, mostly Spaniards, shared similar cultural and educational backgrounds all with at least 12 years of education through the Spanish medium (primary and secondary studies).

Student admission process is competitive and has the same cut-off mark for both EMI and non-EMI cohorts. EMI students are additionally required to document English proficiency upon their registration, corresponding to a grade of B2 in the Common European Framework of Reference for Languages (This corresponds to 72-94 TOEFL points, 5-6 IELTS points or the Certificate in Advanced English – CAE).

The methodological approach of all the courses for EMI and non-EMI cohorts is primarily the same. The course syllabus for both types of programmes is also basically the same and there is a strong coordination among the teaching staff for each course ensuring that courses plans and learning achievements are similar despite the language of instruction, although there are unavoidable personal differences among lecturers.

4 THE SAMPLE

The initial data set consisted of the cohorts of students who first enrolled in the Bachelor Degree in Business Administration at the UCM in years 2009/10, 2010/11 and 2011/12. In total 359, 356 and 366, respectively, enrolled in the freshman year of the degree and they were taught in seven sections, one with EMI and the other six with non-EMI. Among them only 23, 33 and 49, of their respective cohort, did their entire freshman year courses in English.

In order to avoid the bias due to external factors, a paired design was chosen, so that the authors matched each and every of those 105 individuals to another individual from the same enrolment year non-English medium of instruction sections on the personal characteristics available, being first the gender, then the age (birth year), the access to university grade (a weighted average of access examination mark, called PAU, and high school academic achievement), region of PAU and finally type of enrolment (acting as a socio-economical proxy because Spanish Ministry of Education grantees need to verify some low rent requirements). Distribution by gender and age for the total of those 105 paired students are presented in Fig. 1 and 2.

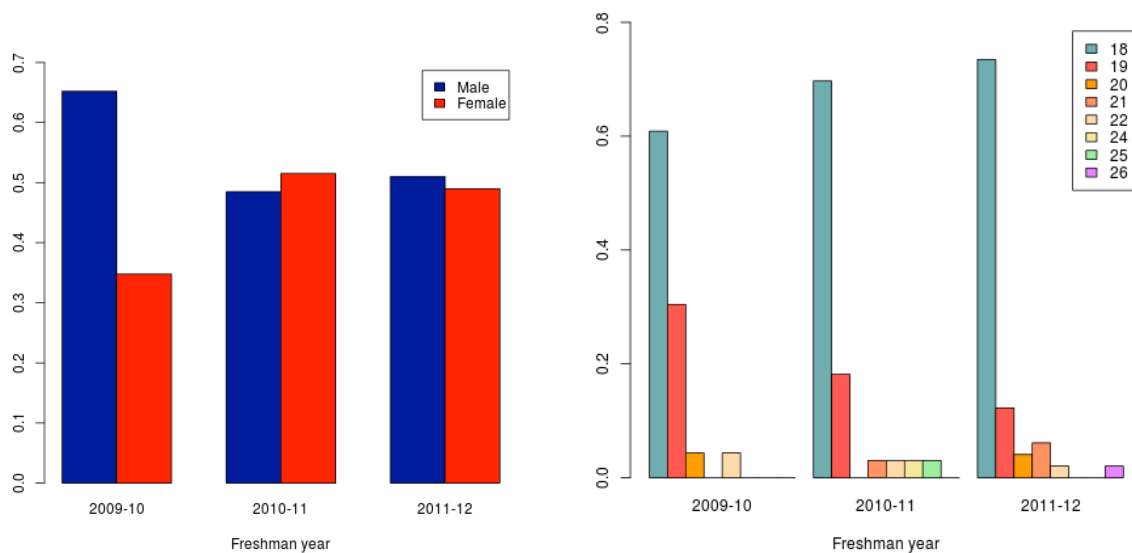


Figure 1 and 2. Distribution by gender and age

Before proceeding further, the authors tested whether both groups access to university grade, the main considered determinant of later academic performance (see for example [19], [20] and [21]), were sampled from populations with identical distributions using the two-sample Kolmogorov-Smirnov test. That test looks for any violation of that null hypothesis being different medians, different variances, or different distributions. As the D-statistic value ($D = 0.0571$) p-value is $p = 0.9955$ it cannot be assumed there is any difference between the distribution for the two samples (EMI and non-EMI), confirming the pairing was correctly done.

5 MEASURES

Academic output provides one way to measure students' learning outcomes in terms of their mastery level of disciplinary knowledge. Since their grades are used in practice to test students' acquisition of knowledge, the end-of-year final grades (a weighted average of continuous evaluation, active participation and the midterm and final examinations) were considered for each course, extracted from the student's academic record. This is the student detailed transcript of their 10 freshman year compulsory core courses specifying how well the student did in them, including if they had to retake the exam.

The UCM Academic Management system (GEA) provided the authors with the data already anonymized for the total of the students that had enrolled for their freshman year in the Business Administration degree of the Faculty of Economics and Business of the UCM on the academic years 2009/10, 2010/11 and 2011/12. GEA information consisted on three different files including some demographic information as well as the full account of the student's academic record.

Students' academic performance is, therefore, multidimensional and the authors will be considering all the information for those 10 freshman year core courses. However the authors also wanted to consider a simple numerical index summarizing each student academic performance for their freshman year, so a weighted grade point average (WGPA) will be used. A student's weighted grade point average (WGPA) is computed by multiplying the term ECTS¹ credits of each course by the grade points earned in each particular course and then dividing the total number of grade points by the total number of ECTS attempted.

A student that fails the course at the end of the semester is allowed to retake the final exam in an extraordinary call that takes place during June. Both the initial and the second grade are recorded on the student's permanent academic record and both grades are included in the calculation of the WGPA.

6 METHODS

Along with descriptive statistics, both graphical and analytical, that summarize data in a meaningful way such that patterns might emerge from the data, statistical inference methods such as Shapiro Wilks normality test or non-parametric methods such as the Kolmogorov-Smirnov test (K-S test), the paired Wilcoxon signed rank test, and the multivariate extension of the Mann-Whitney rank test will be used.

The two-sample K-S test is one of the most useful and general non-parametric methods for comparing two samples, as it is sensitive to differences in both location and shape of the empirical cumulative distribution functions of the two samples. The null hypothesis of both samples coming from a population with the same distribution is rejected (at significance level α) if $D_{m,n} > D_{m,n,\alpha}$ where $D_{m,n,\alpha}$ is the critical value.

The paired Wilcoxon signed rank test, both on its single or multivariate versions, assess whether the matched samples groups population mean ranks differ. In our particular context the z-ratio must include a " ± 0.5 " correction for continuity to accommodate the fact that the sampling distributions are intrinsically discrete.

Finally the Leach (1991) multivariate extension of the Mann-Whitney rank test (as cited by Sheu and O'Curry, [22]) is used, for equal sample sizes, to test whether the median of two populations is the same, without the assumption of normal distributions.

7 RESULTS

Characteristics for the main quantitative variable (WGPA) for this study are presented in Table 1 and Fig. 3. By language of instruction, on average, EMI group has higher WGPA value than non-EMI group with smallest deviation, for the whole sample and also by years. The same happens with the median and the first and third quartiles, being the median, first and third quartiles for the EMI group higher than those of the non-EMI group with a smallest median absolute deviation.

¹ ECTS (European Credit Transfer and Accumulation System) is a credit system designed to make it easier for students to move between different countries. It is a central tool in the Bologna Process, which aims to make national systems more compatible.

Table 1. Descriptive statistics

	Total Sample		2009-10		2010-11		2011-12	
	EMI	non-EMI	EMI	non-EMI	EMI	non-EMI	EMI	non-EMI
No. of observations	105	105	23	23	33	33	49	49
Minimum	0.5333	0	1.5	0	0.5333	0	0.6	0
Maximum	9.15	8.63	8.15	7.75	6.8909	8.63	9.15	7.97
Range	8.6167	8.63	6.65	7.75	6.3576	8.63	8.55	7.97
Mean	4.8746	4.0884	5.2132	4.3584	4.8022	4.2275	4.7644	3.8679
Standard deviation	1.7222	2.1854	1.9457	2.2436	1.4189	2.0283	1.8106	2.2805
Variation coefficient	0.3533	0.5345	0.3732	0.5148	0.2954	0.4798	0.38	0.5896
1st Quartile	3.8353	2.1059	3.75	2.2529	4.25	3.0714	3.8353	1.9143
Median	4.9643	4.5267	5.4417	4.7786	5.0308	4.4154	4.5867	3.8077
Median absolute deviation	1.6591	2.5414	2.4883	2.0926	1.1576	1.7677	1.4734	2.8500
3rd Quartile	5.925	5.6727	6.9054	5.6614	5.6385	5.225	5.8	5.73
Skewness (Pearson)	-0.2340	-0.1017	-0.3505	-0.2779	-1.0406	0.052	0.0431	-0.0348
Kurtosis (Pearson)	-0.1053	-1.0078	-1.1197	-1.0402	1.0515	-0.0515	-0.1541	-1.3700

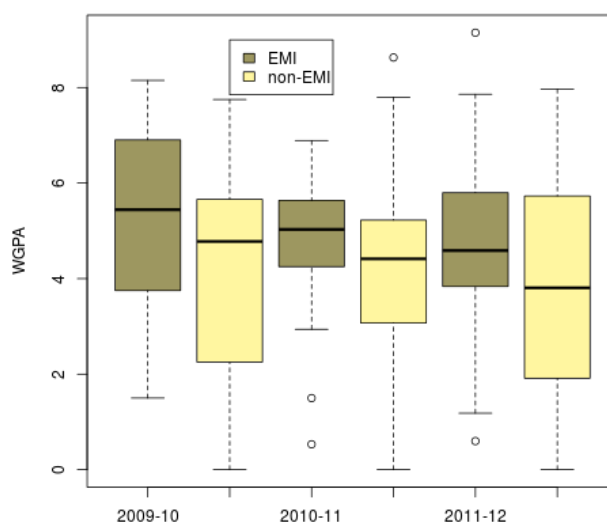


Figure 3. WGPA box plots by years

The WGPA grades of both the EMI and the non-EMI groups follow a continuous distribution, so before proceeding with further analysis it is necessary to test whether they follow a normal distribution. So a Shapiro Wilks test was implemented for both grades separately giving the results presented in Table 2.

Table 2. WGPA Shapiro Wilks normality test

EMI		non-EMI	
W	p-value	W	p-value
0.99	0.48	0.97	0.01

As the p-value for the EMI WGPA grade is larger than 0.05 it cannot be concluded that the distribution is not normal, while for the non-EMI WGPA grade the p-value is smaller than significance level so there is evidence to reject the null hypothesis of the distribution being normal, so a non-parametric method will

be used to see if there is no difference between the two groups WGPA. However, that difference in distribution function immediately suggests that there might be a difference between the two groups weighted GPA.

The performance outcomes of two groups are rarely identical, so the question that arises is if the slight difference that can be seen from the descriptive measures and the normality test is statistically significant. The two-sample Kolmogorov-Smirnov test output shows the maximum absolute difference is $D = 0.2286$ and the p -value = 0.008291. As the p -value is smaller than 0.05, there is evidence to reject the null hypothesis that the grades were drawn from the same continuous distribution, in favour of the alternative hypothesis that the distribution is different for both groups contradicting the initial authors hypothesis that the two distributions of WGPA for the EMI and non-EMI group were the same.

Knowing that there is a difference between the two groups, the questions that arises is if that difference is one-sided, in this particular case whether the WGPA of the EMI group is stochastically greater than that of the non-EMI group (the cumulative distribution function of the EMI group lies above and hence to the right of that for the non-EMI group). It can be seen that the results of K-S test give a very significant result ($D^{\wedge} = 0.2286$, p -value = 0.004146) testing in the "less" direction because the cumulative distribution function (CDF) of the EMI group is below that of the non-EMI group. But there was a warning stating that there were ties, and therefore the p -value will be approximate. The K-S test was constructed to work with continuous data where ties are theoretically impossible [23], as it is this particular case. Even though, results have to be interpreted cautiously. But the bootstrapped version of the K-S test, insensitive to ties [24], results ($D^{\wedge} = 0.2286$, p -value = 0.004146, n boots = 5000) also suggest a strong evidence for a difference in WGPA between the two groups, being the WGPA of the EMI group stochastically greater than that of the non-EMI group.

Also, for each student the final grades for each of the compulsory courses of their degree are known, thus the multidimensional comparison of the two samples averages measured for all the variables is also carried out. The grades of all subjects of both the EMI and the non-EMI groups follow a continuous distribution, so a Shapiro Wilks normality test was implemented for all subjects' grades separately giving the results in Table 3. As it can be seen all the p -values are smaller than the significance level so there is evidence to reject the null hypothesis of all the distributions, for EMI and non-EMI groups for all the courses, being normal.

Table 3. Shapiro Wilks normality test by course

Course Name	EMI		non-EMI	
	W	p-value	W	p-value
Business Law	0.9184	7.359E-06	0.8975	6.444E-007
Introduction to Economics	0.9028	1.156E-06	0.9417	0.0001672
Principles of Management Science	0.8987	7.343e-07	0.9229	1.296e-05
Economic History	0.9287	2.731e-05	0.9105	2.833e-06
Business Mathematics I	0.9273	2.275e-05	0.908	2.115e-06
Microeconomics	0.9359	7.31e-05	0.8968	5.988e-07
Financial Accounting I	0.9226	1.24e-05	0.9145	4.571e-06
Principles of Business Financial Management	0.9001	8.589e-07	0.8865	2.017e-07
Business Statistics I	0.9313	3.871e-05	0.9059	1.647e-06
Business Mathematics II	0.8806	1.101e-07	0.885	1.73e-07

As none of the variables is normally distributed, the way to test the null hypothesis of the distribution equality on the different subject grades is using a non-parametric procedure. In this specific case, as there is a multivariable paired sample, the Leach (1991) multivariate extension of the Mann-Whitney rank test (as cited by Sheu and O'Curry [22]) was implemented in R v. 3.0.2 ("Frisbee Sailing"). As the computed p -value (p -value=1.199804e-06, $D^* = 46.42749$, $df = 10$) is lower than the significance level ($\alpha=0.05$), the multivariate extension of the Mann-Whitney rank test for two paired samples allows

us to reject the null hypothesis, and accept the alternative hypothesis. So the two groups of marks are statistically different.

After this analysis however, the paired Wilcoxon signed rank test will be used to identify where those differences lie. This test endeavours to find what the chance is that random sampling would result in a median difference of the two samples in the entire population as far from zero as observed in this experiment. If the p-value is small, the idea that the difference is due to chance can be rejected, and conclude instead that the populations have different medians. Results for the difference between EMI and non-EMI group for each course appear in Table 4.

Table 4. Wilcoxon signed rank test by subject

Course Name	Wilcoxon signed rank test	
	V	p-value
Business Law	2692	0.6943
Introduction to Economics	2724.5	0.2901
Principles of Management Science	3606.5	0.0004809
Economic History	3374.5	0.03675
Business Mathematics I	4035	2.423E-09
Microeconomics	3177.5	0.00774
Financial Accounting I	3068	0.003461
Principles of Business Financial Management	2793.5	0.1339
Business Statistics I	2149	0.2559
Business Mathematics II	4365.5	2.502E-10

The p-value is bigger than the significance level only for Business Law, Introduction to Economics, Principles of Business Financial Management and Business Statistics I, therefore for those four subjects the data do not give any reason to conclude that the overall medians differ. But for the other six courses (in bold in Table 4) the idea that the difference is due to chance can be rejected, and conclude instead that the EMI and non-EMI groups have different medians. Therefore for Principles of Management Science, Economic History, Business Mathematics I, Microeconomics, Financial Accounting I and Business Mathematics II there is a significant difference between the two groups.

8 CONCLUSIONS

The results of the present study come against what the authors expected to find, namely that there was no difference in the academic output between the EMI and non-EMI groups as the two groups were initially equal due to the pairwise design. However this result is in line with Evans & Morrison [25] who find, for the case of Hong Kong, that the majority of EMI students not only complete their programmes successfully but also obtain respectable GPA, indicating that they are able to overcome the challenges posed by English-medium Higher Education. It is very well known that student motivation is one of the key factors affecting student performance and learning. Therefore, if students perceive some benefits to their learning, they will likely be more motivated to perform well, to work hard on chosen tasks that enhance their learning and attain their goals. And that might well be the case that can be found behind our results: that students do have an interest in English-medium and they do believe it applies to them or their future jobs.

Finally, it is worth highlighting that the subjects in which EMI versus non-EMI students have different academic results are both qualitative and quantitative.

These results have to be confirmed with the analysis of more cohorts of students and also the analysis of more disciplines.

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