From training practice in the professional world to university: characterization of Vocational Training students to retain them in university studies

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Abstract

This paper analyses the Vocational Training students who enroll at the School of Economics and Business Administration of the Public University of Navarre. For this purpose, a descriptive study of this admission profile has been carried out. In addition, their educational strengths and weaknesses have been studied, as well as whether accessing a Degree after having studied vocational training affects their performance and dropout.

According to the results, students mostly choose the Bachelor's Degree in Business Administration and the Bachelor's Degree in Economics, with a better performance in the subjects that are similar to those previously studied in Vocational Training. At the same time, they show deficiencies in the quantitative area, being the access route a determining factor in the result.

Keywords: Mathematics; economics; business; vocational training.

1. Introduction

The Lisbon Strategy (European Council, 2000), revised in 2004, was set with the intention of generating Europe as the most competitive and dynamic knowledge-based economy environment in the world, based on a sustainable growth model. To do so, modernisation had to be achieved through active investment in education and training systems; i.e., educational programmes had to be designed to ensure the employability, productivity and income-earnings of the target groups. Subsequently, the European Credit System for Vocational Education and Training (Official Journal of the European Union, 2009) was regulated, formalising the recognition and accumulation of learning outcomes in order to generate a qualification and, therefore, the inclusion of skills in the labour market.

The promotion of Vocational Education and Training (VET) means that, in the coming years, a greater number of Higher VET graduates will be able to access University through this type of non-university Higher Education. For this reason, facilitating the transition between VET and University is one of the goals on the agendas of educational institutions.

From an institutional perspective, efforts are currently being focused on the development of a regulatory framework that promotes the recognition of credits between both programs. Thus, the Public University of Navarre (UPNA) and, in particular, the School of Economics and Business Administration (FCEE), already have agreements binding both Higher VET programs. While this is an excellent measure to avoid duplicities and shorten the time in which students who have previously studied VET obtain a university Degree, it is necessary to complement these measures with others that facilitate the process of integration of the VET student into the university environment. (García et al., 2017; Panera et al., 2004).

To achieve this goal, it is necessary to evaluate what type of initiatives can be implemented by universities. The design of specific tools to strengthen the weaknesses of this less frequent student profile can help these students on starting university with a similar level of knowledge as their classmates who have completed their Baccalaureate studies. In this way, they will be able to achieve the potential student profile set out in the White Paper on Undergraduate Degrees in Economics and Business (2005). Educational innovation projects promoted by universities and other institutions can be decisive in achieving this goal.

In order to know where these kinds of measures should be considered, it is necessary to know which is the profile of students who enroll in university after completing these previous studies and which are their strengths and weaknesses regarding the Degree they are studying. This is precisely the objective of this work: analyze the profile of the students of the FCEE of the UPNA who access through VET. With this objective, the aim is to answer four fundamental questions: What is the profile of FCEE students who enroll in UPNA through VET? Which is their performance in the subjects throughout the Degree? Is admission

through VET a determining factor in passing the subjects of the first semester? Does having enrolled in the university through VET influence the dropout rate of students?

These questions will be answered through descriptive statistics and econometric relationships applied to the data provided by the Integrated University Information System for this purpose.

2. Methodology

Firstly, a quantitative analysis of the data provided by the Integrated University Information System (SIIU) and the internal data collected by the UPNA on academic performance per subject and Degree is done, on a sample of 3662 students.

For this purpose, there is one database with general information on students who have studied Bachelor's Degrees at the FCEE and another database on student performance in the subjects of the offered Degrees. Both databases have information from the academic year 2010/11 to 2019/20. For data analysis, R-Commander, Gretl and Excel were used.

2.1. Descriptive analysis of student profile

Univariate descriptive statistics are used to analyze individual variables such as gender, age or vocational group. In addition, frequencies and percentages of the students that enter university through the VET route of each Degree are calculated and it is determined if this type of student is distributed homogeneously among those Degrees or if it is concentrated particularly in some of them.

2.2. Performance analysis by subject

The analysis of performance by subject; that is to say, the pass rate, the success rate and the no-show rate are evaluated for the Bachelor's Degree in Business Administration (BBA) and the Bachelor's Degree in Economics (BEcon).

Subjects with success rates lower than 60%, pass rates lower than 50% or no-show rates higher than 35% will be reviewed. In addition, those subjects in which students coming from VET obtain better success rates than those coming from Baccalaureate are also reviewed.

2.3. Analysis of the relationship between VET access way and the passing of subjects.

The five subjects evaluated are those corresponding to the first semester of the Bachelor's Degree, since they represent the first challenge of their university academic career and which will determine the continuation of their studies. An econometric model with a limited dependent variable is proposed to determine the probability of failing each subject:

$$Pr\left(Y^j = 1\right) = \frac{1}{1 + e^{-(B_0 + B_1 \times VET + B_2 \times Country + B_3 \times Age + B_4 \times AccessMark + B_5 \times Non-passedECTS)}}$$

In this model, $Pr\,(Y^j = 1)$ appears as the dependent variable, which is interpreted as the probability of failing the subject Y^j (one model per subject), and the regressors are dummy variables ("VET" and "Country") and continuous qualitative variables ("Age", "Access Mark" and "NP ECTS"). VET is the variable interest and the remaining regressors are control variables that have a significant impact in the model, so their exclusion could invalidate the results. The model will be estimated by Maximum Likelihood.

2.4. Analysis of VET access way as a determining factor in dropout.

The following econometric model with a limited dependent variable is used to explain students' dropout from the BBA and the BEcon, according to the access route:

$$Pr\,(Dropout = 1) = \frac{1}{1 + e^{-(B_0 + B_1 \times VET + B_2 xNon-passedECTS)}}$$

In this case, $Pr\,(Dropout = 1)$, is interpreted as the probability of dropping out from the studies by students while "VET" is the variable interest and "NP ECTS" is the control one of the model. The model is also estimated by Maximum Likelihood.

3. Results

3.1. Descriptive analysis of student profile

Since 2010/11 and up to 2019/20 academic year, 422 people have accessed the School through a VET Degree. This is the second most frequent route, after the Baccalaureate (3097 people). About 60% of these students are women and the average age at which they access the studies is 22 years old, above the Baccalaureate students, who access between 18 and 19 years old. This profile is mostly enrolled in the BBA and the BEcon, with 79.62% and 18.48% of the total number of VET students, respectively. In contrast, this profile is quite infrequent in double Degrees and international programs. This may be explained, among other factors, by the fact that the admission grade for both Degrees is lower than either in double Degrees or in international programs.

The Vocational Groups with the highest frequency among VET students are Administration and Management (167 students) and Commerce and Marketing (61 students). These fields are the most similar to the Degree studies offered by the FCEE and those with the highest number of credits recognized between both Higher VET programs.

A total of 160 students, out of the 422 who entered the FCEE through VET access, have completed their Degree and 146 have dropped out, which represents a 34% of the students who are admitted by this route. This rate is significantly high and ten percentage points greater than the dropout rate for Baccalaureate students, who have a 24%. Regarding the data

by Degree, the dropout rate among VET students is 31.55% for Business Administration and 44% for Economics.

Among VET students, the average time to get the title is 4.77 years, which is similar to the average time of students with a Baccalaureate Degree. However, it is common for VET students to have ECTS credits recognised at the beginning of their studies, so it can be concluded that VET students find it more difficult to complete their Degree. The rates of graduates among VET students are better in the case of Business Administration than in Economics, with a percentage of 41.37% and 24.36% of graduates, respectively. In both cases, the rates are lower than those obtained by students who enter with a Baccalaureate Degree, whose graduation rates are 44.54% and 37%, respectively.

3.2. Performance analysis by subject

Graduates coming from VET show a notably good performance in accounting subjects in both Degrees, with 9 percentage points higher pass rates than those coming from Baccalaureate. The same results are obtained in the case of the subject of Financial Operations for the BBA, although the difference is more tenuous, around 5 percentage points.

However, the performance of those whose access is through VET is clearly lower in the subjects of Mathematics in the BBA and Mathematics I in the BEcon, with lower pass rates than those coming from the Baccalaureate (-14% in both cases), as well as higher no-show rates (about 13% in both cases).

Particularly, in the BEcon, negative results are transferred to subjects such as Introduction to Economics, Microeconomics, Mathematics II and Finance, because of the mathematical background they have.

3.3. Analysis of the relationship between VET access way and the passing of subjects.

From the five models proposed for each grade in *Section 2.3*, *Table 1* shows only those in which the VET variable is statistically significant at a significance level of 5%. As it is a logit model, the slope column must be studied, due to the fact that it shows the marginal effects when the rest of the variables take their mean value.

Table 1. Results of the analysis of the subjects.

	Vocational Training Access Students				
	Degree	Coef.	Signif. (5%)	Slope	R2 McF
Mathematics I	BEcon	1	True	0.287	0.589
Mathematics	BBA	0,630	True	0.131	0.596
Financial Operations	BBA	-0,787	True	-0.155	0.559

In the BBA case, the analysed subjects are financial Operations and Mathematics, where the signs of the coefficients are as expected: in the case of Financial Operations, the sign is negative, which implies that having studied VET previously increases the probability of passing, a result consistent with reality, due to the training context of the VET Degrees from which the students come. Specifically, coming from VET makes the student 15.45% more likely to pass this subject than a student who enters university through other studies, keeping the rest of the variables at their averages.

In the case of Mathematics, the effect of accessing university through VET has the opposite effect. The sign of the coefficient is positive, so that, in accordance with the slope, entering university through VET increases the probability of failing the subject by 13.07%, if the remaining variables of the model keep at their mean values.

The same effect happens in the subject of Mathematics in the BEcon; i.e., the sign of the coefficient is positive, since accessing university through VET causes an increase on the slope of 28.75% of failing this subject, compared to those who come from another educational pathway, with all remaining variables constant.

3.4. Analysis of VET access way as a determining factor in dropout.

In the BBA, the coefficients of the two regressors of the *Section 2.4* model are statistically significant at a significance level of 5%. Therefore, accessing university through VET studies influences the probability of the student dropping out; in this sense, given that the sign of the coefficient of the variable "VET" is positive, access through VET increases the probability of dropping out by 4%, keeping the rest of the variables constant.

For the BEcon, the variable VET is not statistically significant at 5% nor 10%, so it cannot be said that it is different from 0. This indicates that the VET access way has no effect on the probability of dropping out.

4. Discussion

Firstly, according to the descriptive analysis in *Section 3.1* of the students' profile, at least one out of ten students who entered the FCEE between 2010/11 and 19/20 did so with a VET qualification. Their minority position in mainly Baccalaureate formed groups means that their potential and shortcomings often go unnoticed. The analysis of the provided information builds an image of the students who access the UPNA's FCEE through this pathway, as well as identifies their educational strengths and weaknesses. In this way, the areas of knowledge in which actions can be carried out so that VET students can integrate into the university in an appropriate way and develop the syllabus satisfactorily have been discovered. This student profile essentially opts for the BBA, followed, distantly, by the BEcon.

In relation to their performance, these students present good results in subjects close to the modules taken in the Higher VET programs of the Vocational Groups of Administration and Management and Commerce and Marketing, the most common Groups of those who enter the Faculty. As can be seen in *Section 3.2*, they stand out in accounting subjects, presenting better results than their counterparts in the Baccalaureate. In this sense, similar results are obtained to those presented by García et al. (2017) in another branch of knowledge: students who come from Higher VET programs obtain good grades in specific subjects related to technical Degrees and lower grades in theoretical subjects.

In this line, the *Section 3.2* shows that VET students have greater difficulty in subjects related to the quantitative area, in which a high level of mathematical skills is necessary to pass them satisfactorily. Specifically, Mathematics subjects in the BBA and in the BEcon are those with the lowest pass rates and high failure rates. Comparing the data with those obtained from students who access the Degree through the Baccalaureate, it is shown that, although the results of the second one are not good either, they are substantially better, which is in line with the literature (Fernández et al. 2001, Gil et al. 2014, Pérez et al. 2013).

This deficit may be because some of the VET students have not taken Mathematics subjects since the 4th year of Secondary Education, either because they entered the following year to an Intermediate VET program or because they did not choose Mathematics in the Baccalaureate (Gil et al. 2014). Such shortcomings may condition performance in other subjects, as pointed out in the White Paper on the Bachelor's Degree in Economics and Business (2005). This is evident among VET students studying Economics, who have greater difficulties in subjects such as Introduction to Economics or Microeconomics, where functions and other mathematical tools are constantly used to build models.

The same conclusions are obtained in *Section 3.3* by studying the influence of the entry route on the probability of passing or failing a given subject. Coming from VET makes the probability of not passing the Mathematics subject significantly higher than coming from the Baccalaureate access way. This difference may be due to the fact that in Economics the admission marks are historically lower and, in addition, it has fewer similarities than Business Administration with Higher VET programs, so students who have enrolled in this Degree have done so with lower marks and, probably, it has not been the preferred option.

For this reason, it is considered that the main point of improvement should be to put on the same level the mathematical competences as those of their counterparts who entered by the Baccalaureate pathway, thus, covering the training deficit prior to the start of the Bachelor's Degree and, in this way, avoiding the deficiencies in the rest of the subjects.

For that purpose, an educational innovation project has been developed with the aim of creating a virtual platform to cover individualized training needs through gamification. The project *Digital Gamification to address pre-university mathematical training deficiencies in*

students of Economics and Business Degrees of the UPNA will be promoted during the following two years. The improvement that will be entailed by the implementation of the virtual platform may help to reduce the drop-out rate of these profiles, evidenced in *Section 3.4*. This is particularly of paramount importance in a context where greater accessibility to Higher VET programs and the expansion of their training offer will lead to an increase in the critical mass of students with Higher VET Degrees who enter university through this route.

Finally, note that the study was carried out at a single university and, therefore, the sample size in some cases did not provide conclusive results. There are also two future lines of research, one related to the replicability of the study in other universities and the other to the analysis of the impact of the virtual platform as a way of alleviating detected deficiencies.

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