

Document downloaded from:

<http://hdl.handle.net/10251/78219>

This paper must be cited as:

Hervás Jorge, A.; Guàrdia I Olmos, J.; Però, M.; Soriano Jiménez, PP.; Capilla Lladró, R. (2013). Psychometric study of a questionnaire for the assessment of factors associated with the choice of degrees and universities in the Spanish public system. ACM. doi:10.1145/2536536.2536577.



The final publication is available at

<http://dx.doi.org/10.1145/2536536.2536577>

Copyright ACM

Additional Information

© ACM 2013. This is the author's version of the work. It is posted here for your personal use. Not for redistribution. The definitive Version of Record was published in TEEM '13 Proceedings of the First International Conference on Technological Ecosystem for Enhancing Multiculturality. <http://dx.doi.org/10.1145/2536536.2536577>

Psychometric study of a questionnaire for the assessment of factors associated with the choice of degrees and universities in the Spanish public system.

Antonio Hervás

Instituto Matemática Multidisciplinar.
Universitat Politècnica de Valencia,
Valencia, Spain
+34 963879780
ahervas@imm.upv.es

Joan Guàrdia i Olmos

Departament de Metodologia de les
Ciències del Comportament
Universitat de Barcelona,
Institut de Recerca en Cervell,
Cognició i Conducta IR3C
Pas. Vall d'Hebrón, 171, Barcelona
+34 933125090
jguardia@ub.edu

Maribel Peró

Departament de Metodologia de les
Ciències del Comportament
Universitat de Barcelona,
Institut de Recerca en Cervell,
Cognició i Conducta IR3C
Pas. Vall d'Hebrón, 171, Barcelona
+34 933125077
mpero@ub.edu

Pedro Pablo Soriano

Departamento de Producción Vegetal
Universitat Politècnica de Valencia,
Valencia, Spain
+34 963877000 (Ext.:71013)
psoriano@upvnet.upv.es

Roberto Capilla

Departamento Ingeniería Electrónica
Universitat Politècnica de Valencia,
Valencia, Spain
+34 963877000 (Ext.:76088)
rcapilla@eln.upv.es

ABSTRACT

Many different factors are taken into account by students when choosing a degree and University. Some of these are general considerations, such as the quality of the degree course, ratio of available places and places in the degree course chosen as first choice, cut-off mark, etc. Others are subjective factors, such as friends studying the same degree or studying in the same university, etc. Knowledge of these factors and the importance given to them by students can provide a competitive advantage when carrying out activities aimed at advertising and attracting students. This paper presents a psychometric study of a questionnaire that has been developed to assess variables relating to social and personal aspects involved in the selection process and accessing the Spanish public university system. The questionnaire was evaluated by means of a pilot test, the results of which were used to generate a final scale, which was administered to a total of 1532 students from eight Spanish universities. These students can be divided into six major areas of training and courses from 2009-10 up to 2012-2013. All the students had recently graduated from high school and were in their first year at the university. The results showed that the reliability of the both the six factors taken into consideration (Consideration of the University; Perceived Utility; Social Impact; Vocational Aspects; Influence of Surroundings and Geographic Location) and an adjustment of the Confirmatory Factor Analysis used to estimate construct validity was high. Likewise, the results show high discrimination validity between groups defined by relevant variables such as gender or academic area of the university studies.

Categories and Subject Descriptors

K.3 [Computers and education]: General. Information Systems education.

General Terms

Management, Human Factors.

Keywords

College Selection, Confirmatory Factor Analysis, University Access, Higher Education Management.

1. INTRODUCTION

The factors that lead students or their families to choose a certain university and higher education degree have been studied by several authors, and especially by universities themselves, [10]. Knowledge of these factors can obviously lead to a competitive advantage when designing advertising campaigns and activities targeting potential clients. Using this kind of language, which relates more to commercial marketing than academic discourse, was frowned upon by some sectors of the academic community just a few years ago. However, the current competitive environment has led it to be assumed that such techniques and procedures should and are used to attract talent. With proper recruitment policies and guidance the cost of attracting students can be lowered while improving results. According to the European Access Network (EAN) (www.ean-edu.org) recruitment costs per student admitted varies from € 3.23 in some northern European countries, to € 7.23 in southern countries, or € 4.20 at the main universities in the USA.

The recruitment systems depend on several factors, the first of which include the procedure for accessing the university system, and the financing of the system itself. In Spain, there are both public and private universities. Access to private universities which freely set their prices, is based on the submission of an application and acceptance for admission by the private college based on its own criteria. On the other hand, the public university system is funded by the state, and students only pay approximately 10% to 15% of the actual estimated cost of their studies. The majority of students in Spain attend public universities and public universities also have the highest number of degrees. These public universities offer a certain number of places for each degree course. In order to be admitted, students are required to take a university entrance exam known as, PAU

(*Prueba de Acceso a la Universidad*) and may then request enrollment in a given maximum number of degree courses in order of preference. Based on the marks obtained on the PAU, students are then assigned a place in a university degree course. Consequently students use strategies to try to optimize their chances of being admitted into the desired degree course, since in the end they may not be accepted into the degree course they prefer or even be given a place in the University.

In other European countries, the students are required to pass an entrance exam for the specific degree course requested [16]. In the case of China, there is an entrance test called Gaokao, which is similar to the Spanish exam but is much more restrictive. In the USA recruitment systems are based on a system where applications are submitted and are either accepted or rejected, but in this case the financial resources of prospective students and scholarship and grant policies play a decisive role. This process has been studied from different points of view. The Gale-Shapley algorithm (1962) for the assignment of students to universities is considered to be a basic reference, [7] and has been refined and adapted to different systems [17]. From another point of view, Murphy and McGarrity, [14], carried out a descriptive study on 350 North American colleges, highlighting the concept of college selection as a key factor for students, who consider the quality of the system and trust in the institution to be decisive. Therefore recruitment activities are developed taking these factors into account. The results have been effectively tested in the case of engineering [20], or that of the recruitment of women and ethnic minorities, [19], [6]. Other authors delve into the problem by analyzing not only the recruitment process, but also the retention of these students [18], while others, [15], focus on socio-economic aspects and impact.

Noteworthy in Spain is the research work carried out by Guerra and Rueda [10] and Capilla [4], who see university demand as an assessment of the “social value” given to the degree, and to the University, as well as other quantitative values identified as indicators of quality, especially in the case of sought after degrees: cut-off mark, utility of the degree, etc. However, the behavior of these indicators differs in degrees with a low demand. Furthermore, students’ perceptions of such indicators do not seem to have been appropriately verified. In many cases utility is attributed to degrees that are not actually in great demand, and vice versa. Moreover, it has been found that although they appear repeatedly in studies and forums, personal factors and the social influence affecting decision-making, have not been adequately measured [10], [2], [3]. Also significant are the strategic actions taken by universities aimed at recruiting students either directly or indirectly through strategic plans in R + D + i, comprehensive management or a relationship with the environment, [5], [12]

2. OBJECTIVES

Our objective is to present a psychometric study of a questionnaire that has been developed for the study of variables relating to social and personal aspects involved in the university selection process and accessing the Spanish public university system. As shown by Guardia et al. [8], [9], or Hervás et al, [11], this process involves factors associated with mechanisms for pre-registration in Spain, such as cut-off marks, degrees offered, the number of places available for each degree and even the sex of students, since the first choices made are not independent from this variable. Therefore, in addition to these fundamental variables that can be defined as context variables, there are social and personal factors involved in choosing a university degree which

are systematically assessed by means of the questionnaire used in this study.

3. METHOD

3.1 Participants

From the academic year 2009-2010 to the current 2012-2013, various samples of different populations of first year students attending certain Spanish public universities were obtained in order to establish the different questionnaire analysis phases. An accidental non-probabilistic sampling was proposed in each university. For this purpose, questionnaires were first sent to the different faculties and colleges via the internet and various requests were made to first year students to complete it. After a few weeks the questionnaire was closed and the corresponding database per University was then made. Following the different sampling processes, the samples included a total of 1532 first year students, all of which accessed the University from Baccalaureate programs, since the questionnaires of those students accessing the university in other ways were not included in the sample. The resulting descriptive data are as follows:

Table 1. Final sample descriptive values

VARIABLE	DESCRIPTIVE
Gender	61% Female and 39% Men
Age	$M = 18.12$; $DT = 1.77$; Ranging from 17 to 25.
Year of Access	11% in 2009-2010 28% in the year 2010-2011 43% in 2011-2012 18% in the year 2012-2013 * * Sample not completed for this course
Academic area	Educational Sciences: 12% Experimental Sciences and Mathematics: 9% Health Sciences: 22% Social Sciences: 23% Humanities and Fine Arts: 12% Engineering and Architecture: 22%
University of Origin	Universitat Politècnica de Valencia: 30% University of Barcelona: 24% University Pablo de Olavide: 5% University of Salamanca: 8% University of Granada: 5% University of Oviedo: 11% Universitat Politècnica de Catalunya: 8% Universidad Complutense de Madrid: 9%

3.2 Questionnaire

The works of Capilla, [4], and Guerra [10], as well as those carried out by some universities, such as the University of Barcelona, the UPO Barometer Pablo Olavide University (Llera, 2010) or the study led by Ariño [1] at the University of Valencia, among others, are clear antecedents of the questionnaire used in this study. From the aforementioned studies, an initial proposal was made of items to be included in a Likert scale (1-6 points, defining a seventh option for “Do not know” or “No answer” in

order to correctly define missing values) to operationally define the following factors or latent variables a) Consideration of the University, b) Perceived Utility c) Social Consideration d) Vocational Aspects and e) Influence of Geographical Location. These six factors were considered to be taken in account by students when selecting a university degree, in addition to other personal factors and data relating to institutional variables: a) The previous year's degree access mark) The number of places available for the degree; c) the number of registered definitive first choices, and d) the first choice requests for a specific degree. With data derived from the questionnaire's latent variables and derivatives of variables of context, in addition to the sex of the students, a structural equation model was developed that takes into account the complex relationships between the different structures measured [8], [9], [11].

A first version was then developed made up of 59 different reagents (items) grouped as follows (Table 2).

Table 2. Distribution of items by factor in the first test scale

FACTOR	LATENT FACTOR	Number of items
Social Factors	Consideration of the University	12
	Perceived utility	10
	Social consideration	9
Individual Factors	Vocational aspects	14
	Influence of surroundings	9
	Geographic location	5

This test scale was sent to eight experts on the system for accessing different Spanish public universities, who were unaware that others had also been assigned the task of allocating each item to one of six proposed factors and to analyzing the wording and understanding of each reagent. For this purpose, they were provided with a simple response system to allocate latent variables and rate the wording and comprehension of each item on a scale of 1 (least difficulty) to 10 points (maximum difficulty). Data on the 59 items showed high agreement on the allocation of factors (*Kappa index* = .93) and low comprehension difficulties given that the item assessed as being most difficult showed an *M* = 4.21, *DES* = 0.81) which is relatively low considering the range of the proposed assessment.

From this first test scale, items for which there was no agreement with respect to allocation to factors and those with an average of over 4 in the evaluation of difficulty in understanding were eliminated. The resulting second scale of 49 test items was as follows (Table 3).

Table 3. Distribution of items per factor in the second test scale

FACTOR	LATENT FACTOR	Number of items
Social Factors	Consideration of the University	10
	Perceived utility	9
	Social consideration	8

Individual Factors	Vocational aspects	10
	Influence of surroundings	8
	Geographic location	4

The second scale was then applied to a pilot sample made up of first year students that met the criteria described in the section on participants. This sample consisted of 252 students (21% from the University Pablo de Olavide, 39% from the Universitat de Barcelona and 40% from the Universitat Politècnica de Valencia). Otherwise, the values relating to this test scale were the same as the values described in Table I. The responses to the 49 items by this pilot sample allowed for a psychometric study of the test taken, the following reliability values being obtained (Table 4):

Table 4. Values of reliability (Cronbach's α) for test scale.

FACTOR	LATENT FACTOR	Reliability
Social Factors	Consideration of the University	.88
	Perceived utility	.82
	Social consideration	.91
Individual Factors	Vocational aspects	.88
	Influence of surroundings	.91
	Geographic location	.94

The discriminability coefficients for each of the items was also analysed to evaluate the effect of their removal from the final scale. Those items whose discriminability coefficient values were less than 40 were eliminated from the test scale; leading to an increase in the reliability they were assigned. Also shown was a clear tendency to use the seventh category for items which should not generate complex or nonexistent responses, since the items relate to basic details for a student (for example, when assessing their level of satisfaction with the information received from the universities to aid in access to the university). The decision was finally made to eliminate this option and maintain a Likert scale of 1-7 points to encourage greater discriminability. Therefore, in view of all the above values and criteria, the final scale consisted of a total of 25 items assigned according to Table 5, and can be found in the annex to this work.

Table 5. Distribution of items per factor in the second test scale.

FACTOR	LATENT FACTOR	Number of items
Social Factors	Consideration of the University	5
	Perceived utility	3
	Social consideration	3
Individual Factors	Vocational aspects	4
	Influence of surroundings	8
	Geographic location	2

This final version was sent electronically via an "ad-hoc" application of the Universitat Politècnica de Valencia, which was

sent to various universities in the public system. The questionnaire was also administered on paper in some cases. Of the total questionnaires sent, about 56% completed questionnaires were received, of which 1532 accomplished the inclusion criteria and are described in the section on participants. This process was carried out from December 2012 to March 2013 and in all cases, none of the questionnaires using the final scale were completed by students who appeared in previous test scales.

4. RESULTS

4.1 Analysis of Reliability and Construct Validity.

A psychometric analysis of the data collected was carried out by first estimating reliability and construct validity through confirmatory factor analysis, estimating the parameters of the factor loadings (A_x) by calculating Maximum Likelihood (ML) based on the Spearman-Brown matrix of correlations due to the ordinal nature of the reference scale. Table 6 shows the measurement model adjustment values estimated using the MPlus program.

Table 6. Measurement model indices specifying reliability coefficients (n = 1532).

FACTOR	Items	Adjustments	Reliability (Satorra-Bentler)
Consideration of the University	1, 3, 16, 17 and 18	$\chi^2 = 1374.74$ $gl=321$ $p = .008$ $\chi^2/gl=4.282$ $NNFI = .991$ $NFI = .958$ $CFI = .979$ $RMSR = .03$	$\alpha = .779$
Perceived utility	21, 24 and 25		$\alpha = .767$
Social consideration	19, 20 and 23		$\alpha = .712$
Vocational aspects	12, 14, 15 and 22		$\alpha = .773$
Influence of surroundings	4, 5, 7, 8, 9, 10, 11 and 13		$\alpha = .744$
Geographic location	2 and 6		$\alpha = .788$

The above values evidence the reliability of each of the adjustment factors proposed as well as construct validity. Thus, Table 7 shows the factor loadings associated with each item in addition to the estimated factor loadings in the same model using *oblimin* rotation between factors.

Table 7. Factor loading of each item in relation to the assigned factor (All values λ_{ij} with $p < .001$)

Table 7-1	SOCIAL FACTORS		
ITEM	CONSIDERATION OF THE UNIVERSITY	PERCEIVED UTILITY	SOCIAL CONSIDERATION
1	.771		
16	.661		
17	.693		
18	.519		

19		.622
20		.699
21	.632	
22		
23		.588
24	.689	
25	.648	

Table 7-2	INDIVIDUAL FACTORS		
ITEM	VOCATIONAL ASPECTS	INFLUENCE OF SURROUNDINGS	GEOGRAPHIC LOCATION
2			.512
3			.599
4		.613	
5		.522	
6		.598	
7		.522	
8		.488	
9		.467	
10		.656	
11		.628	
12	.667		
13		.449	
14	.728		
15	.517		
22	.477		

The matrix of correlation between the six factors was also estimated to determine the effect of the relationship between factors, as shown in Table 8:

Table 8. Correlation between factors (n = 1532).

Table 8-1	Consideration of the University	Perceived employability	Social consideration
Consideration of the University	1		
Perceived utility	.458	1	
Social consideration	.412	.501	1
Vocational aspects	.171	.118	.078
Influence of surroundings	.121	.121	.101
Geographic location	.091	.093	.178

Table 8- 2	Vocational aspects	Influence of surroundings	Geographic location
Consideration of the University			
Perceived utility			
Social consideration			
Vocational aspects	1		
Influence of surroundings	.421	1	
Geographic location	.481	.512	1

4.2 Discriminant Validity

As in the previous analysis, the distribution of the six factors proposed by sex and academic area described in Table I was studied to evaluate the possibility of discrimination between groups. The other variables (university and age) are of no interest for analysis since the variability of age range is negligible and in the case of the University of origin, the sampling is incomplete. These six new scores were generated from the sum of the scores of the items comprising each factor. Despite the ordinal nature of the metric of the items, this is standard practice for estimating factor scores. The *t-test* of Student-Fisher and Analysis of Variance (ANOVA) statistical tests were used to study the differences between means, the results obtained being shown in Table 9 below:

Table 9. Comparisons between the means of the latent factors by sample groups (n = 1532).

(M = Mean STD = Standard Deviation)

Table 9-1		Consideration of the University	Perceived utility	Social consideration
Sex	Men	M = 32.12 STD=2.77	M = 15.14 STD = 1.12	M = 16.12 STD=1.20
	Women	M = 36.14 STD=2.31	M = 12.14 STD = 1.44	M = 14.11 STD=2.11
	Contrast	$t = 12.77$ $p < .001$ $r = .43$	$t = 21.77$ $p < .001$ $r = .51$	$t = 17.71$ $p < .001$ $r = .48$
Academic Area	Science Education	M = 30.12 STD=2.11	M = 11.11 STD = 1.43	M = 14.12 STD=2.44
	Experimental Sciences and Mathem	M = 31.21 STD=2.55	M = 10.12 STD = 1.67	M = 16.88 STD=2.54

	atics			
	Health Sciences	M = 34.27 STD=2.51	M = 14.12 STD = 2.01	M = 16.27 STD=2.01
	Social Sciences	M = 29.12 STD=2.14	M = 14.11 STD = 1.99	M = 16.21 STD=2.15
	Humanities and Fine Arts	M = 28.21 STD=2.71	M = 10.12 STD = 2.12	M = 12.11 STD=2.13
	Engineering and Architecture	M = 31.66 STD=2.99	M = 14.23 STD = 2.31	M = 14.33 STD=2.41
	Contrast	$F = 12.15$ $p = .038$ $\epsilon^2 = .231$	$F = 23.11$ $p = .001$ $\epsilon^2 = .487$	$F = 18.12$ $p = .027$ $\epsilon^2 = .298$

Table 9-2		Vocational aspects	Influence of surroundings	Geographic location
Sex	Men	M = 11.12 STD=1.44	M = 31.12 STD=2.04	M = 9.11 STD=1.12
	Women	M = 14.13 STD=1.12	M = 30.33 STD=2.77	M = 9.44 STD=0.91
	Contrast	$t = 17.02$ $p < .001$ $r = .47$	$t = 4.09$ $p = .412$ No Sig.	$t = 5.77$ $p = .231$ No Sig.
Academic Area	Science Education	M = 14.11 STD=1.51	M = 27.12 STD=2.04	M = 8.78 STD=1.07
	Experimental Sciences and Mathematics	M = 10.13 STD=1.27	M = 28.33 STD=2.78	M = 9.01 STD=1.44
	Health Sciences	M = 13.70 STD=1.37	M = 25.32 STD=2.91	M = 9.44 STD=1.23
	Social Sciences	M = 12.13 STD=1.34	M = 23.45 STD=3.23	M = 9.22 STD=1.55
	Humanities and Fine Arts	M = 14.02 STD=2.02	M = 24.11 STD=2.82	M = 9.65 STD=1.27
	Engineering and Architecture	M = 13.97 STD=2.11	M = 22.97 STD=2.49	M = 9.77 STD=0.92
	Contrast	$F = 15.73$ $p = .031$ $\epsilon^2 = .272$	$F = 7.72$ $p = .287$ No Sig.	$F = 6.11$ $p = .328$ No Sig.

Based on the above table it can be concluded that the factors are not distributed homogeneously by gender or academic area. Whereas the women tend to score university consideration factors ($t = 12.77, p < .001, r = .43$), and vocational aspects ($t = 17.02, p < .001, r = .47$) higher, men tend to score perceived utility factors ($t = 21.77, p < .001, r = .51$) and social consideration ($t = 17.71, p < .001, r = .48$) higher. There was no statistically significant difference in the case of influence of surroundings or geographic location. Regarding academic areas, statistically significant differences were found for the factors: consideration of the university which were scored higher by students of Health Sciences ($F = 12.15, p = .038, \epsilon^2 = .231$); perceived utility, which was scored higher by Engineering students ($F = 23.11, p = .001, \epsilon^2 = .487$); social consideration which was scored higher by Experimental Science students ($F = 18.12, p = .027, \epsilon^2 = .298$); and finally vocational aspects, which were scored higher by students of Educational Sciences ($F = 15.73, p = .031; \epsilon^2 = .272$). These results indicate that there is a need to study the above aspects more in-depth, and evidences the usefulness of the questionnaire for this purpose.

5. CONCLUSIONS

From the results obtained and in view of the statistical significances found, it can be concluded that the proposed questionnaire allows for the evaluation of factors relating to social and personal aspects involved in the process of choosing a university and degree in the Spanish public university system. Obviously, these are only two of the factors involved in this complex process of student decision making [8], [9], [11], which should be studied as a whole. The reliability and construct validity values evidence that this questionnaire is a good assessment instrument. Particularly interesting are the results obtained in the section on discriminant validity, which show that the various factors considered are not distributed symmetrically by academic area or by sex. Vocational aspects were found to be of more significance to students of Sciences or Health Education, while, for example, issues relating to utility are of more interest to students pursuing Engineering or Architecture degrees. High values were also shown for Geographic location, but without major differences between areas, this being a factor which was given importance by students regardless of their area of study.

In relation to the sex variable, women's scores were higher for vocational aspects or consideration of the university, while men gave less importance to these factors when deciding on which degree and university to choose.

Therefore it can be concluded that this preliminary assessment tool can be used for further analysis of the findings, allowing for a rigorous analysis of the factors that must be taken into account in the presence of the possible scenario of a new regulation for access to the public university system in Spain.

Finally, it should be borne in mind that this study has certain limitations that should be considered when generalizing the data. Firstly, there is a certain asymmetry between the universities included in the sample, meaning that there might be groups which are under-represented, such as smaller and more recently created universities. The same is true for the study of the impact of the universities or virtual supply phenomenon. Secondly, there is an obvious bias in the accidental non-probability sampling, since recruitment of students was voluntary and depended on factors not controlled by the authors. A broader sampling such as that being gathered for the 2012-2013 academic year should minimize this error.

The statistical effect of the six factors set forth in the questionnaire, and some of the grouping variables that have been included require further analysis, because in some cases the data is very relevant depending on the new access mechanism defined, including data on factors such as whether students are willing to change geographic location or the degree of information required to make a better decision on which degree and university to choose.

6. ACKNOWLEDGMENTS

This work forms part of the project entitled "A Longitudinal Model Impact Assessment of Variables Involved in selecting Studies and University. Academic achievement in high school, and university entrance exam, as predictors of initial performance at University", financed by the ICE at the University of Barcelona in the Redice 2012, with Code Number 1641-01.

The translation of this paper was funded by the *Universitat Politècnica de València*, Spain

7. REFERENCES

- [1] Ariño, A., Hernández, M., Llopis, R., Navarro, P., Tejerina, B. 2008 El oficio de estudiar en la universidad: compromisos flexibles, PUV, Valencia.
- [2] Barnes, N. G. and Mattson, E. 2009. Social media and college admissions: The first longitudinal study. Center for Marketing Research. Retrieved May, 5, 2009.
- [3] Bowden, J. and Wood, L. 2011 Sex doesn't matter: the role of gender in the formation of student-university relationships, *Journal of Marketing for Higher Education*, 21:2, 133-156. <http://dx.doi.org/10.1080/08841241.2011.623731>
- [4] Capilla, R. 2009. Análisis estratégico de los estudios TIC en la Universidad Politécnica de Valencia. Valencia: Universitat Politècnica de València. <http://riunet.upv.es/handle/10251/5767> (19/06/2013)
- [5] Corominas Subias, A., and Sacristan Adinolfi, V. 2011. Las encrucijadas estratégicas de la universidad pública española. *Revista de educación*, (355), 57-81.
- [6] Ford, D.Y. 2008. The underrepresentation of minority students in gifted education: Problems and promises in recruitment and retention. *The Journal of Special Education*, 31(1), 4-14.
- [7] Gale, D. y Shapley, L. S. 1962. College Admissions and the Stability of Marriage. *The American Mathematical Monthly*. Vol. 69, No. 1 (Jan., 1962), pp. 9-15. Article Stable URL: <http://www.jstor.org/stable/2312726> (19/06/2013)
- [8] Guàrdia, J.; Peró, M.; Hervás, A.; Capilla, R.; Soriano, P.P. Y Porras, M. 2012. Factores asociados con la decisión de cursar estudios universitarios de Psicología. Una aproximación mediante modelos de ecuaciones estructurales. *Anuario de Psicología*, Vol. 42, nº 1, marzo 2012, pp. 87-104
- [9] Guàrdia, J.; Peró, M.; Hervás, A.; Capilla, R.; Soriano, P.P. and Porras, M. 2013. Factores asociados con la elección de titulación en el sistema universitario público español. Estudio de un modelo de ecuaciones estructurales. Technical report. <http://riunet.upv.es/handle/10251/30128>. 26/06/2013).
- [10] Guerra, G. and Rueda, E.M. (2005). Estudio longitudinal de los jóvenes en el tránsito de la enseñanza secundaria a la universidad: orientación, expectativas, toma de decisiones y acogida de los nuevos estudiantes en la universidad. Extraído

de Programa Estudios y Análisis. Dirección General de Universidades. Ministerio de Educación.

http://www.uva.es/export/sites/default/portal/adjuntos/documentos/1145376143700_estudio_longitudinal_jovenes.pdf
(19/06/2013)

- [11] Hervás, A; Guàrdia, J.; Peró, M.; Capilla, R. and Soriano, P.P. (2013). A structural equation model for analysis of factors associated with the choice of engineering degrees in a Technical University. *Abstract and Applied Analysis*. Volume 2013, Article ID 368529, 7 pages
[dx.doi.org/10.1155/2013/368529](https://doi.org/10.1155/2013/368529).
- [12] León Serrano, G. 2011. Nuevos enfoques para la gestión estratégica de I+ D e innovación en las universidades. *Revista de educación*, (355), 83-108.
- [13] Llera Ramo, F.J. 2010. *UPO Barómetro. Estudio de Opinión*. Universidad Pablo Olavide. Sevilla.
- [14] Murphy, P.E. and McGarrity, R.A. (1978). Marketing Universities: A Survey of Student Recruitment Activities. *College and University*, 53 (3), 249-61.
- [15] Olavarría Gambi, M. and Allende González, C. (2013). Endeudamiento estudiantil y acceso a la educación superior en Chile. *Revista Española de Investigaciones Sociológicas (REIS)* . DOI: 10.5477/cis/reis.141.91
- [16] Parry J, Mathers J, Stevens A, Parsons A, Lilford R, Spurgeon P, et al. 2006. Admissions processes for five year medical courses at English schools: review. *BMJ* 332: 1005-9. (29 April.)
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1450044/>
(19/06/2013)
- [17] Sukegawa, N. and Yamamoto, Y. 2012. Preference profiles determining the proposals in the Gale–Shapley algorithm for stable matching problems. *Japan journal of industrial and applied mathematics*, 29(3), 547-560. DOI 10.1007/s13160-012-0077-x
- [18] Tinto, V. 2006. Research and practice of student retention: what next? *Journal of College Student Retention: Research, Theory and Practice*, vol. 8, no 1, p. 1-19.
- [19] Turner, C.S.V. and Thompson, J.R. (1993). Socializing Women Doctoral Students: Minority and Majority Experiences. *Review of Higher Education*, 6, 232-241.
- [20] Yurtseven, T. (2002) How does the image of engineering affect student recruitment and retention? A perspective from the USA. New York: *Global Journal of Engineering Education*. 6(1), 17-23.

ANNEX I: Questionnaire

(Original in Spanish. Note that this is the translation of a questionnaire on the Spanish public university system, which must be adapted for use in other countries or university systems)

This is a brief survey prepared by a group of researchers from different Spanish universities, aimed at evaluating some aspects related to University access by new students.

Please answer the following questions honestly without leaving any items blank. This questionnaire will only take you a few minutes

All information gathered is solely for research purposes and will be treated statistically, without dissemination of your specific data or answers:

TITULACIÓN/DEGREE: _____

SEXO/SEX Femenino/Female Masculino/Male

¿CUAL FUE TU NOTA DE ACCESO?/ WHAT WAS YOUR ACCESS MARK: _____

¿CUAL FUE LA RAMA DEL BACHILLERATO QUE CURSASTE?/ WHAT BACCALAUREATE AREA WERE YOU IN?:

Artístico/Arts Ciencias Sociales/Social Sciences Científico-Técnico /Scientific-Technical
 Salud/Health Humanidades/Humanities

LA TITULACIÓN QUE CURSO FUE MI PRIMERA OPCIÓN EN LA PREINSCRIPCIÓN/ THIS DEGREE WAS MY FIRST CHOICE WHEN PRE-REGISTERING:

SI/YES
 NO

LA UNIVERSIDAD EN LA QUE ESTUDIO FUE MI PRIMERA OPCIÓN/ THIS UNIVERSITY WAS MY FIRST WHEN PRE-REGISTERING

SI/YES
 NO

¿EN QUÉ AÑO INGRESASTE EN ESTA TITULACIÓN?/WHAT YEAR DID YOU ENROLL IN THIS DEGREE COURSE? :

LA NOTA DE CORTE HA INFLUIDO EN LA ELECCIÓN (MARCAR LA OPCIÓN DESEADA, SOLO UNA)/ THE CUT-OFF MARK HAS INFLUENCED MY CHOICE (CHECK ONLY ONE OF THE FOLLOWING OPTIONS):

Totally disagree 1	2	3	Partially agree 4	5	6	Totally agree 7	No answer.

¿SABÍA CUÁNTAS PLAZAS SE OFERTABAN?/ DID YOU KNOW HOW MANY PLACES WERE BEING OFFERED?

SI/YES NO

POR MI NOTA DE CORTE NO PUDE ELEGIR LAS TITULACIONES QUE QUERÍA/ IN VIEW OF MY ACCESS MARK, I COULD CHOOSE THE DEGREE I PREFERRED.

SI/YES NO

Marcar la opción deseada (solo una) en cada afirmación/
Mark only one option for each statement

Número /Number	ITEM	Totally Disagree						Totally Agree
		1	2	3	4	5	6	
1	Elegí entre las titulaciones en que sabía que podía ser admitido./ I chose from degree courses in which I knew I could be admitted.							
2	La proximidad del centro a mi domicilio fue un factor determinante./ How near the university is to my home was a decisive factor							
3	Prefería estudiar en otro lugar (ciudad, comunidad,...)/ I would prefer to study in another place (city, region, etc.)							
4	Mis compañeros influyeron en mi decisión./ My colleagues influenced my decision.							
5	El orientador me ayudó a tomar la decisión./ The counselor helped me to take a decision.							
6	Hubo algunos profesores que influyeron decididamente./ There were some teachers that decisively influenced me.							
7	La página Web de la Universidad me proporcionó la información necesaria./ The University website provided me with the necessary information							
8	La visita al centro/Universidad o la asistencia a las jornadas de acogida fueron determinantes./ A visit to the center / University or attendance at the welcome sessions were crucial.							
9	Mis padres/hermanos habían estudiado esa carrera./ My parents / brothers studied the same degree.							
10	Mis padres/hermanos habían estudiado en esa Universidad./ My parents / brothers studied in this same University							
11	Amigos que estaban o habían estudiado aquí influyeron positivamente./ Friends who had studied there positively influenced my decision							
12	Siempre he querido estudiar esta carrera./ I have always wanted to study this degree							
13	Fue una decisión de última hora./ It was a last minute decision							
14	Creo que mis habilidades personales son adecuadas al título que curso./ I think my personal skills are suited to the degree I am studying							
15	Siempre he sacado buenas notas en las asignaturas de bachillerato relacionadas con la titulación. / I've always been good at school subjects relating to this degree.							
16	La calidad y el prestigio de la Universidad fueron determinantes en mi elección. / The quality and prestige of the University were decisive in my choice.							
17	Le di más importancia al título que a la universidad./ I gave more importance to the degree than to the University.							
18	El hecho de ser titulado por una Universidad u otra da mayores posibilidades laborales./ Being a graduate of one university or another leads to more job opportunities.							
19	El título está prestigiado socialmente./ This degree is socially prestigious.							
20	El título es reconocido internacionalmente./ This degree is recognized internationally							
21	Da acceso a una profesión reconocida./ This degree will allow me to work in a recognized profession.							
22	He elegido el título porque me gusta sin preocuparme las salidas profesionales./ I chose the degree because I like it, without considering future professional opportunities.							
23	Creo que los salarios que se consiguen en esta titulación son mejores que en otras./ I think the salaries for jobs associated with this degree are better than with others.							
24	Creo que existe demanda de trabajo en el sector./ I think there is a demand for professionals working in this field							
25	Es más fácil encontrar trabajo./ It is easier to find a job							