Graduate competencies and employability: the impact of matching firms' needs and personal attainments.

Mercedes Teijeiro-Alvarez, Paolo Rungo, Mª Jesús Freire

Abstract:

Professional competencies are a key factor in gauging how employable a graduate is. This paper demonstrates that individuals who have best developed the competencies which firms feel to be most important are more likely to be in a position to obtain a job. To this end, we have developed an indicator that measures the proximity between the relative levels of both importance and attainments. Results confirm the feeling among experts that the most relevant competencies in the labour market are predominantly of the systemic type, i.e. transferable personal competencies, to the detriment of more instrumental competencies related to capacities and graduate education. This paper clearly points to the fact that universities must change their traditional focus and make a special effort to help their students to develop those competencies that best foster employability.

JEL classification: J21, J23, J24

Keywords: graduates; competencies; human capital; job matching

1. Introduction

Professional competencies are a key factor in gauging how employable a graduate is. They are also a requisite complement to the academic curriculum vitae and essential to the job selection process (Bradley & Nguyen, 2004; Freire & Teijeiro, 2010). These key

competencies can be obtained through experience, training or more informal means (Hartog, 2001; Rychen & Salganik, 2003; García-Aracil & Van der Velden, 2008).

Many studies point out that generic competencies related to the social domain, such as communication skills, leadership, customer focus, understanding, emotional intelligence, and so on, are directly related to labour market success (Kiong-Hock, 1986; Levy-Leboyer, 1992; Bethell-Fox, 1997; Le Boterf, 2001; Stasz, 2001). Further, there is a whole branch of literature that focuses on identifying the most important competencies for improving graduate employability. Cotton (2001), for instance, observes that employers require generic competencies such as teamwork, communication skills or problem-solving skills, in combination with specific competencies acquired through experience or formal education. Two important analyses, the CHEERS project (Careers after Higher Education – A European Research Survey, 1998) and the REFLEX project (The Flexible Professional in the Knowledge Society; New Demands on Higher Education in Europe, 2004), both financed by the European Commission, aim to study the conditions of graduate employment and the links between universities and the labour market, and the role competencies play in this relationship (Schomburg, 2007). In particular, they attempt to identify the set of competencies that graduates need in the knowledge society, and to analyse the role of universities in their development. Their results confirm that labour markets unified criteria long before education systems. Though a growing number of papers are dealing with these issues, there is no agreement about the best combination of competencies for enhancing labour market success (Strauss & Sawyer, 1986; Glytsos, 1990; Ashton & Green, 1996; Stasz, 2001; Semeijin, Boone, van der Velden & van Witteloostuijn, 2005; Barth, Godemann, Rieckmann & Stoltenberg, 2007; Biesma, Pablova, Van Merode & Groot, 2007; OECD, 2008; Kelly, O'Connell & Smyth, 2010; McGuinness & Solane,

2011). One possible reason underlying the lack of consensus is the difficulty in measuring competencies and the variety of approaches available for doing so, and this generates diverging results (Ashton & Green, 1996; Biesma, Pavloba, Van Merode & Groot, 2007).

The aim of this paper is threefold. Firstly, a single dataset is used which makes it possible to carry out a comparison between the evaluation performed by firms in a set of generic competencies and the level of graduates' attainment in the same set of competencies. Hence, the first objective of this paper is to assess the degree of matching between the competencies actually taught at universities, and those which the labour market demands. The results show that there is a huge difference between the demand and supply sides. Though unsurprising, the information that the results provide clearly indicates a path for improvement. The second goal of this paper is to demonstrate that individuals who have succeeded in more fully developing the requisite competencies are more likely to get employment. In other words, developing the right set of competencies increases employability. Another important contribution of this paper is the identification of a subset of competencies, related to personality characteristics which have the greatest effect on the likelihood of being employed. This paper clearly points to the fact that universities must change their traditional focus and make a special effort to help their students to develop those competencies that best foster employability.

The rest of the paper is organized as follows. Section 2 introduces the econometric methodology for analysing the effect of preference ordinals on generic competencies. Section 3 describes the empirical data used in the paper. In section 4, the key results of the analyses are presented. Finally, section 5 contains a summary of the main conclusions and potential future lines of research.

2. The basic framework

It is assumed that each student attends university and develops a set of competencies C_i = $\{c_1,\ c_2, \ldots,\ c_n\}$. The extent to which each component of C_i is attained depends on both the student's preferences and the University policy. The mix of individual preferences, academic policy and factors beyond the control of the agents results in a continuum of students with different skills and abilities. As a consequence, each student enters the labour market with her own characteristic set of competencies C_i.

Each firm in the labour market aims to employ the most productive graduates and, to this end, it looks for signals of expected productivity. It is assumed here that there is a consensus among firms about the optimal degree of development of each competence. In other words, there is a unique optimal "competence mix": $C_F = \{\bar{c}_1, \bar{c}_2, ..., \bar{c}_n\}$, which ensures the highest probability of being a productive worker. The optimal competence mix may vary across sectors, as will be shown in the next section. As will be shown in the next section, this is fairly realistic, given the context of the analysis. Note that c_j and $\bar{c}_j$ represent the acquired and required levels of the same competencies j, respectively. From a firm's perspective, the expected productivity of graduates depends, among other factors, on the "proximity" of the graduate's set of acquired competencies C_i to the mix of optimal competencies C_F. Let Γ be a measure of "proximity" between vector C_i and C_F; the propensity to be employed, or employability E_i, is assumed to be a function of Γ, among other explanatory variables,

$$E_i = \alpha + \phi'\Gamma + \beta' x - \varepsilon_i, \qquad [1]$$

where ϕ and β are K-vectors of parameters, x a vector of explanatory variables and ε_i a random shock. Due to firms' efforts in assessing graduate employability, it will be observed that an individual is actually employed when her employability is positive, that is when E_i>0, whereas a graduate is unemployed when $E_i \leq 0$. In other words,

$$W_i = \begin{cases} 0, when \quad E_i \leq 0 \\ 1, when \quad E_i > 0 \end{cases}, \qquad [2]$$

where W_i (Working) takes value 1 when individual i is employed, and 0 otherwise. Using these equations we obtain the probability of being employed,

$$\begin{aligned} &\pi_i \equiv \Pr(W_i = 1) = \Pr(E_i > 0) = \Pr(\alpha + \phi\Gamma + \beta' x - \varepsilon_i > 0) \\ &= \Pr(\varepsilon_i < \alpha + \phi\Gamma + \beta' x). \end{aligned} \qquad [3]$$

If the errors are independently distributed according to the unit-normal distribution, $\varepsilon \sim N(0;1)$, then

$$\pi_i = \Pr(\varepsilon_i < \alpha + \phi\Gamma + \beta' x). = \Phi(\alpha + \phi\Gamma + \beta' x), \qquad [4]$$

which is the probit model estimated in this paper.

It should be stressed that the key factor is the assessment of the measure of "proximity" between the firms' requirement and students' attainment, Γ. In fact, the basic framework discussed above assumes that both vectors C_i and C_F are observable, and that we can objectively measure the level of achievement of each competence. The set of competencies, however, is likely to include non-objectively measurable components and, thus, it is difficult to establish explicit levels of achievement. In addition, a direct comparison between C_i and C_F would be misleading, if they referred to levels of acquired and required competencies, respectively. In fact, the absolute

values cannot be compared across individuals and firms due to differences in response style. In other words, some graduates may indicate that their competence level is very high, although in fact it is not higher than the level of other graduates. Stated differently they use a different yardstick to measure their own competence level. By using a rank order, this problem is circumvented as they will only report the rank order of their skills level, and this rank order can be compared across individuals.

Hence, we make use of an *ad hoc* measure of proximity between rankings of competences. Specifically, a rank order is inferred from the relative level of importance/attainment given by either firms or graduates for each of the competencies. Once ordered lists of competencies have been obtained, we consider the number of competencies that are given the same rank by both the firm and job seeker as a measure of similarity between ranking orders. Graduates' rank ordering signals so as to indicate which competencies have been developed most, independently from the actual level acquired. Hence, for any given level of capacity, skill or factor that affects productivity at work, the similarity between ranking orders implies a closer match between firms' needs and job seekers' skills and abilities.

Agents' choices are represented by the vector $A = (a_1, a_2, ..., a_n)$, where a_j is the rank or priority assigned to alternative j. This method was used by Borda (1981), and is the basis for the tried and tested ''method of marks'', and later the Kendall scores method (for a review of representation of preferences in ordinal settings, see Cook, 2006). In addition, ties (weak ordering) are allowed by assigning the same value to different alternatives with the same ranking. For example, in the case of 4 alternatives, a, b, c, d, where a is in second place, b in the first, c in fourth, and d in third, the vector representation is A1 = (2, 1, 4, 3); alternatively, if a is in first place, b in fourth, and c

and d are tied for second and third positions, the representation is that given by A2 = (1, 3, 2, 2), where the 2 designation indicates that alternative c and d are tied for second places. Let $P_i = \{p_1,..., p_{n-1}, p_n\}$ and $P^F = \{\overline{p}_1,..., \overline{p}_{n-1}, \overline{p}_n\}$ be the ranking vectors of individual i and firms, respectively, where p_j and $\overline{p}_j$ represent the rank assigned to competence j by each individual and the firm. We say that competence j is given an equivalent rank by both an individual and the firm when

$$\left|p_j - \overline{p}_j\right| \leq \delta, \qquad [5]$$

where $\delta \geq 0$ is an "approximation" parameter. In particular, $\delta = 0$ implies that we consider the rankings of competence j to be equivalent when they are equal, $p_j = \overline{p}_j$, whereas $\delta > 0$ entails a weak concept of equivalence, that is, ranks given to a specific competence are considered equivalent when they are approximately the same (and parameter δ is thus a measure of the allowed approximation). Obviously, all competencies are assumed to have equivalent rank order for $\delta \geq n$. Approximate equivalence is particularly important when dealing with weak ordering, which implies ties and the consequent variation in rankings. Since results are likely to depend on the value of δ, we will study the sensitivity of the main results to changes in the value of the parameter.

From equation [5] we obtain variable γ_j, which is a dichotomous variable that assumes value 1 when competence j is assigned the same rank order by both the firm and individual i,

$$\gamma_j = \begin{cases} 1, when \ \left|p_j - \overline{p}_j\right| \leq \delta \\ 0, when \ \left|p_j - \overline{p}_j\right| > \delta \end{cases}. \qquad [6]$$

Finally, we obtain a measure of the similarity between the optimal competence mix and the individual self-assessment of competencies,

$$\Gamma = \sum_{j=1}^{n} \gamma_j . \qquad [7]$$

Hence, we obtain one ranking vector for firms and one priority vector for each individual in our dataset. We then assess the similarity between priority orders by using equations [6] and [7]. Measure Γ is expected to affect employability by equation [1] and thus, the probability of being employed as in equation [4].

An alternative approach to measuring the similarity between the firm`s requirement and individual competencies is by a measure of the distance between ranking vectors; for example, $d = \sum_{j=1}^{n} \left| p_j - \overline{p}_j \right|$. As pointed out by cook (2006) this distance function satisfies a set of desirable properties, and it is commonly used as a means for assessing consensus among individuals. We will use this alternative measure in order to verify the consistency of our results. In the present context however, we find Γ to be more accurate. In fact, the order of competences is derived from the assessed importance of each competence on a 1 to 7 scale, which generates a great number of ties in the ranking order. As a consequence, a measure of "proximity" like d, which takes into account the whole of the artificial distance caused by weak ordering, may not accurately evaluate the similarity between rankings. The measure given in equation [7] however, while highly correlated to measures of distance such as d, introduces some flexibility into the concept of equivalence and thus makes it easier to manage our particular dataset.

3. Project design and data

In order to assess the importance and the impact of competencies when trying to access the labour market, data was collected from both the supply and demand sides of the labour market: graduates from the University of A Coruña (UDC), Spain, and local firms where, if they are lucky enough to find employment, the bulk of graduates work[1].

In accordance with the study entitled, "Tuning Education Structures in Europe" (2007), we have classified the set of generic competencies according to three main domains: instrumental, interpersonal and systemic competencies (table 1). Instrumental competencies are defined as cognitive, methodological, technological and linguistic abilities, which are necessary for understanding, construction, operation and critical use in different professional activities. Interpersonal competencies are related to one's ability to interact and network with people, as well as the ability to actively participate in specific or multidisciplinary work groups. Systemic competencies are skills relative to systems, and require a combination of understanding, sensitivity and knowledge that allows one to see how the parts of a whole relate and come together. This paper considers a total of 19 competencies that simplify the common competencies for most professions and are related, as noted, to the implementation of skills, personality traits and knowledge that the employer regards as necessary for the development of a career. It was decided to include the same items with the same number of categories and values in the two questionnaires which are related, as noted, to the implementation of skills, personality traits and knowledge that the employer regards as necessary for the development of a career.

[1] In a study report by Employment Observatory of the University of A Coruña (www.observatorio.udc.es/insercion0809.pdf), we can see that 69.25% of the graduates of 2004/2005 have as workplace the province of A Coruña, this percentage increased to 73.44% for the courses 2005/2006 , 73.20% in 2006/2007 and 72.87% in 2007/2008.

[Table 1]

Questionnaires were designed to collect personal and socioeconomic data about graduates and basic information about local firms[2]. In particular, among other questions, graduates were asked to self-assess their level of achievement in each of the given competences on a 1-7 scale, were 1 = none at all, and 7 = ample or very high. The key variable on the firms' questionnaire was the assessment of the importance of each competence for succeeding in from the firm's point of view on the same 1-7 scale.

The UDC provided internal data about all graduates, which enabled the analysis to define the population being studied as the set of UDC students that obtained their degree between the academic years 2003/2004 and 2006/2007. The sample design was stratified according to degree and graduation year following the usual sampling techniques. We set the sample size by considering a confidence level of 98% and a margin of error of ± 2%. The final sample includes 1,052 UDC graduates.

In order to capture data from firms, general information was used from the census-directories of INE (National Institute of Statistics) and the IGE (Galician Institute of Statistics). The population of firms was defined as all of the companies in the province of A Coruña. The sampling design for companies varied depending on size. For small companies and micro-companies, random and independent sampling was performed using a sample rate of 7%. In medium and large companies, however, we worked with the entire directory, although the final sample did not manage to incorporate all of the firms from all strata.

[2] All questionnaires are available on the web page of the Employment Observatory of the University of A Coruña, Spain (www.observatorio.udc.es).

The final sample was stratified according to the number of employees and the different activities in each sector. At other levels, selection was random. Once various sample sizes were obtained, the size that provided a confidence level of 98% and a margin of error of ± 3% was selected. The final sample includes 907 observations. Data collection and fieldwork were carried out in June and July 2007.

[Table 2]

[Table 3]

4. Results

This section provides the most relevant results of the items analysed for each of the samples studied. It also contains the conclusions obtained by estimating the probability of being employed while taking into account the distance that exists between acquired and required competencies.

The assessment of required and acquired competencies is summarized in Table 4. The analysis of the information available in the sample of graduates refers to the mean scores of professional competencies that these young individuals claim to have acquired; acceptable results were observed. The total mean score for the items was 4.758, which was equivalent to having "reasonable and sufficient" competencies. Each of the individual scores for each item were also high, the evaluation ranging from a minimum of 4.31, equivalent to "reasonable" acquired competencies in decision making, to a maximum score of 5.441, in this case i.e. "sufficient or good capacity for learning."

[Table 4]

Table 4 presents the scores given by business professionals reflecting what they require of their workers by way of competencies. With the available information one can confirm that the evaluation of the competencies ranges from a minimum of 5.49 for the ability to work independently, to a maximum of 6.6 points for responsibility at work. Among the next highest values are, the ability to learn with a score of 6.326, which is only slightly higher than the two that follow: motivation to work and problem solving with 6.309 and 6.308, respectively. The rest of the items analysed score significantly lower than the scores mentioned.

The match between the competencies acquired by the graduates and those required by employers is average and the variation between some of the items is relatively extreme. In terms of the prioritization of competencies in one or more settings, clear asymmetries are observable in certain cases and, it should be noted that:

Among the competencies which companies consider to be most important, and whose acquisition from the point of view of the graduates is not particularly relevant, are: problem solving (ranked 4th highest for companies and 17th for graduates) and the ability to apply knowledge to practical situations (ranked 8th in importance for companies and 18th for graduates).

Among the competencies firms consider to be unimportant and whose acquisition by graduates is considered to be highly important, are: the ability to work independently (ranked 19th in importance for companies and 4th for graduates) and, interpersonal abilities (ranked 14th in importance for companies and 3rd for graduates).

It may be observed that there is a difference between those items most highly valued by graduates and those demanded by businesses. These results fulfil one of the goals of this research, which is to try and quantify the main differences in the levels of importance of competencies in the two samples. However, the conclusions obtained

with respect to these results cannot be extended much further because, as mentioned above, they are not directly comparable. Hence, the rest of the analysis considers variable Γ. Firstly, a unique ranking order of requisite competencies for all firms is considered. This is obtained by Borda's consensus. It could be argued that each firm, or at least each productive sector, requires a specific set of competences; if so, the definition of a unique set of competences that increase success at work would be meaningless. Table 5 shows, however, that the difference in the assessment of the importance of competences across sectors is not significant in almost all cases. In other words, almost all of the sectors are in agreement as to the relative importance of each of the competences included in this study. This result is in line with the conclusions of the Reflex project (2004) and this is why our model does not use belonging to a particular sector as an explanatory variable. However, from Table 5 it can be inferred that the relative importance given to each competence in the construction sector is slightly different from other productive sectors. Hence, we use different measures of proximity in order to account for this possible divergence. In particular, we will present results for variables of proximity in which the reference value is either the rank order obtained by general consensus of all firms or the specific rank order obtained by consensus among firms operating in the construction sector. This specific reference rank order is applied to graduates in architecture and civil engineering (90.5% of graduates working in the construction sector in our database are either architects or engineers).

[Table 5]

The scores given to each of the items acquired by UDC graduates according to gender are presented in Table 6. The total score awarded by all women (4.855) is higher than that awarded by men (4.628). There are only three significant exceptions where men's scores are higher: ability to analyse and synthesize, with a difference of 0.057, ability to work independently with a difference of 0.048 and problem solving with 0.016.

[Table 6]

Table 7 presents the scores of the competencies acquired by graduates broken down according to areas of knowledge. Higher scores are concentrated in the bio-health area (5.061), followed by humanities (5.043), sciences (4.886), engineering (4.608) and social sciences (4.582). The last column shows the difference between the maximum and minimum for each item of the set of all areas. The biggest difference is found in "ethical commitment" with a score of 1.242, where extreme values are observed in engineering (4.303) and bio-health (5.545). The second major difference is to be found in the ability to generate new ideas with a score of 0.948, where extreme values were obtained for the areas of social sciences (4.084) and humanities (5.032). There were also highly significant differences in the ability to communicate (0.915), between engineering (4.033) and humanities (4.948).

[Table 7]

Table 8 describes the variables obtained from questionnaire responses and used in this analysis. Our dataset includes individuals of about 28 years of age on average, 57% of whom are women. 27.5% were in possession of a 3-year-degree, as opposed to the rest of the sample which possessed a 5-year- degree. Another datum of interest is that,

on average, graduates coincided with firms in terms of ranking preferences in 3.73 competencies out of 19, while the maximum was 10. This result offers a preliminary view of the difference between firms' needs and graduate attainment.

[Table 8]

4.1. Competencies and employability.

In this section we provide answers to the core question posed in this analysis, that is; how do competencies impact on employability? This is done by estimating the model put forward in equation [4]. Table 9 shows the results of probit model estimations, where the main explanatory variables are COMP (column i), COMP.SECT (column ii), and DIST (column iii). As it can be observed, all estimations point to the same conclusion: a greater proximity (lower distance) among rank orders has a positive effect on the probability of being occupied. Same results are obtained in Table 10, which shows the results where the main explanatory variables are COMP (column i), COMP2 (column ii), and COMP3 (column iii). The objective of including COMP2 and COMP3 in the analysis is to provide some information about the sensitivity of results to the approximation factor δ (see equation [5]). The last column in table 10 presents the marginal effects when the main explanatory variable is COMP. As one can observe, the probability of being employed significantly increases with COMP. In other words, it is shown here that graduates who have gained a competencies profile that matches the set of requisite competencies are more likely to find a job. This is a highly significant result, in that it underlines the efficacy of helping students to develop a set of competencies that are compatible with the requirements of the labour market.

[Tables 9 & 10]

Figure 1 provides a graphical representation of this result and shows the estimated probability of being employed as a function of COMP, that is, the proximity between firms' needs and graduates' attainments. *Ceteris paribus*, the maximum level of COMP (19) implies a difference of almost 30% in the estimated probability of being employed, compared to the minimum level of COMP (0).

[Figure 1]

Results clearly show that women have a lower probability of being employed, and that holding a 3-year degree (rather than a 5-year degree) increases the probability of being employed.

On considering the sensitivity of results to the approximation factor, it can be observed that relaxing the definition of the equivalency of rankings generates a progressive loss of significance in the main explanatory variable, as expected. In fact, the higher the approximation factor, the lower the discrimination across different degrees of proximity between firms' needs and personal attainment. In the rest of the analysis we will thus use the variable COMP, which logically follows from the strictest definition of proximity.

The relevance of competencies for employability naturally poses another question, namely; what is the relative importance of specific groups of competencies? It was mentioned above that competencies can be classified into three main groups. In order to assess their relative impact on the probability of being employed, we have estimated the model presented in equation [4] for each group. Table 11 presents the results. The model predicts that only systemic competencies have a significant effect on

employment. In other words, it is the matching between firms' needs and individuals' attainments in this specific group of competencies that most influences employability.

[Table 11]

CONCLUSIONS

This paper falls very much in line with the European Higher Education Directive which stresses the need to develop professional student competencies in consonance with the demands of a company workforce. The goal of this paper has been to analyse the extent to which acquired graduate competencies coincide with those demanded by employers. The paper also studies the impact of a mismatch in competencies and the likelihood of gaining employment.

It would not be prudent to generalize the findings with respect to graduates in other graduate populations. While the competencies studied are "generic", it may be that, in some specific cases, depending on gender or area of knowledge, significant differences exist. Hence, acquired graduate competencies were broken down according to these factors. The differences appear to be of little relevance. Women claim to have acquired higher levels of competencies than men and there are higher scores in the bio-health area, and the lowest scores in the social sciences.

The results achieved reveal that there is a mismatch between acquired graduate competencies and those required by employers. This is particularly acute when it comes to the prioritization of the competencies required by companies and the level of these obtained at the UDC. Among the most important differences are problem solving, the ability to apply knowledge to practical situations, the ability to work independently and interpersonal abilities.

Taking these deviations as a starting point, the impact of the competency mismatches on employability was analysed. In order to do so it was assumed that the similarity between ranking orders implies a closer match between firms` needs and job seekers` skills and abilities. We have developed an indicator that measures the proximity between the relative level of importance/attainment assigned by either firms or graduates to each of the 19 competencies. This is an important overall finding, since it overcomes the problems that exist because absolute values cannot be compared across individuals and firms due to differences in response style (they use a different yardstick to measure their own competence level) and the comparison between levels of acquired and required competencies, which are not homogeneous quantities.

The results confirm that the probability of being employed significantly increases with the variable COMP, our measure of "proximity" between firms' requirements and graduates` achievements.

Generic competencies are made up of knowledge, skills and attitudes which are transferable and multifunctional. Individuals can learn and develop these competencies in different ways and learning environments, and apply them across a variety of job and life contexts. A well-known classification of competencies has been designed around a distinction between those that are instrumental, systemic and interpersonal. In order to assess their relative impact on the probability of being employed, we have estimated our model for each group, and the results predict that only systemic competencies have a significant effect on employment. These results reinforce the opinion of experts as to the importance of personality characteristics and non-transferable competencies in the labour market as opposed to instrumental competencies which are more closely related to graduate capacity and education. This is a relatively new finding for labour market

research and is in line with current job selection practices, where personality characteristics already constitute an integral part of job selection procedures.

Specifically, with regard to the UDC, it is important to note that the largest part of the mismatch in the competence ranking i.e. the lack of coincidence between graduate and employer preferences, are of the systemic type. Clearly, therefore, the focus should be on systemic competencies when it comes to enhancing education in the coming years.

The results clearly indicate that UDC universities need to be more closely aligned with the needs of the labour market. More research of this type is needed to meet the challenge inherent in the requirements of the European higher Education Area. This will involve improving the professional competencies of our universities and obtaining or creating resources that make graduates more employable in an increasingly difficult job market. Moreover, we consider a local economy with high unemployment rate. More research is needed in order to generalize conclusions.

Table 1
Types of competence.

Instrumental	1. Basic knowledge of the profession 2. Ability to communicate 3. Problem solving 4. Ability to organize and plan 5. Decision making 6. Information management abilities 7. Ability to analyse and synthesize
Interpersonal	8. Ability to work as a team 9. Interpersonal abilities
Systemic	10. Ethical commitment 11. Responsibility at work 12. Ability to learn 13. Motivation for work 14. Concern about quality and improvement 15. Ability to apply knowledge to practical situations 16. Motivation to reach goals 17. Ability to adapt to new situations 18. Ability to work independently 19. Ability to generate new ideas

Table 2.
Data collection UDC graduates

	Graduates	Target simple	Response rates
2006/2007	2.920	659	98,04%
2003/2004	3.309	455	89,29%
Total	6.229	1.114	

Table 3.
Data collection local companies

	Companies	Target simple	Response rates
Microcompanies (<10 workers)	51.401	1.193	35,21%
Small companies (10-49 workers)	2.120	697	43,62%
Medium companies (50-249 workers)	337	320	44,38%
Large companies (>250 workers)	41	41	100,00%

Table 4
Competencies acquired by graduates and required by companies.

	Acquired		Required	
	Means	Standard Deviation	Means	Standard Deviation
1. Problem solving	4.398	1.507	6.308	0.89
2. Ability to apply knowledge to practical situations	4.351	1.649	6.143	0.922
3. Responsibility at work	4.985	1.656	6.6	0.742
4. Ability to organize and plan	4.539	1.519	6.098	0.969
5. Motivation for work	4.801	1.625	6.309	0.911
6. Ability to communicate	4.469	1.502	5.961	1.02
7. Decision making	4.317	1.585	5.802	1.125
8. Basic knowledge of the profession	4.772	1.361	6.155	1.149
9. Ability to adapt to new situations	4.646	1.518	6.021	0.976
10. Concern about quality and improvement	4.866	1.648	6.202	0.948
11. Ethical commitment	4.636	1.748	5.887	1.221
12. Ability to generate new ideas	4.528	1.617	5.756	1.171

13. Motivation to reach goals	4.879	1.579	6.06	1.026
14. Ability to work as a team	5.057	1.615	6.232	0.972
15. Information management abilities	4.752	1.445	5.703	1.062
16. Ability to learn	5.441	-1.341	6.326	0.855
17. Interpersonal abilities	5.02	1.475	5.837	1.114
18. Ability to analyze and synthesize	4.951	1.391	5.559	1.159
19. Ability to work independently	4.99	1.538	5.49	1.293

Table 5
Rank order of competencies by productive sector.

	Rank order			
Competence (see table 1)	**General consensus**	**Consensus - Construction**	**Consensus - Industry**	**Consusus - Commerce and Services**
1	6	2	7	7
2	13	15	15	10
3	4	6	4	3
4	11	8	9	13
5	7	4	5	6
6	12	12	13	11
7	1	1	1	1
8	3	3	2	4
9	2	5	3	2
10	5	7	6	5
11	8	9	8	8
12	9	10	10	9
13	10	11	11	12
14	15	13	12	16
15	17	16	17	17
16	18	19	19	19
17	14	14	16	14
18	19	17	18	18
19	16	18	14	15

Table 6
A breakdown of the competencies acquired by UDC graduates according to gender

	Acquired competencies		Difference
	Women	Men	
Ability to analyse and synthesize	4.927	4.984	-0.057
Ability to work independently	4.970	5.018	-0.048
Problem solving	4.391	4.407	-0.016
Ability to learn	5.441	5.440	0.001
Ability to generate new ideas	4.549	4.499	0.050
Ability to apply knowledge to practical situations	4.385	4.307	0.078
Information management abilities	4.799	4.689	0.110
Motivation for work	4.866	4.713	0.153
Basic knowledge of the profession	4.853	4.664	0.189
Motivation to reach goals	4.975	4.751	0.224
Ability to adapt to new situations	4.745	4.513	0.232
Concern about quality and improvement	4.990	4.702	0.288
Decision making	4.474	4.109	0.365
Ethical commitment	4.805	4.411	0.394
Ability to organize and plan	4.711	4.309	0.402
Ability to communicate	4.644	4.236	0.408
Ability to work as a team	5.242	4.811	0.431
Interpersonal abilities	5.227	4.744	0.483
Responsibility at work	5.249	4.633	0.616
Total	4.855	4.628	0.226

Table 7
Comparison between acquired competencies by UDC graduates broken down according to areas of knowledge

	Social Sciences	Engineering	Sciences	Humanities	Bio health	(max-min)
Ability to learn	5.283	5.551	5.500	5.393	5.526	0.268
Ability to analyse and synthesize	4.919	4.912	4.905	5.147	4.877	0.270
Ability to adapt to new situations	4.541	4.623	4.651	4.684	4.851	0.310
Information management abilities	4.625	4.647	4.860	5.026	4.864	0.401
Ability to work independently	4.845	5.066	4.977	5.272	4.753	0.519
Motivation to reach goals	4.697	4.741	4.791	5.168	5.221	0.524
Problem solving	4.091	4.532	4.721	4.455	4.500	0.630
Ability to organize and plan	4.593	4.201	4.744	4.885	4.747	0.684
Concern about quality and improvement	4.635	4.627	4.860	5.325	5.318	0.698
Work Motivation	4.599	4.633	4.814	5.031	5.299	0.700
Decision making	4.162	4.047	4.651	4.764	4.604	0.717
Interpersonal abilities	4.963	4.682	5.349	5.356	5.409	0.727
Ability to work in a team	4.761	4.893	5.302	5.414	5.519	0.758
Ability to apply knowledge to practical situations	4.091	4.127	4.512	4.738	4.851	0.760
Basic knowledge of the profession	4.465	4.708	5.000	4.906	5.292	0.827
Responsibility at work	4.882	4.624	5.186	5.372	5.494	0.870
Ability to communicate	4.414	4.033	4.837	4.948	4.916	0.915
Ability to generate new ideas	4.084	4.606	4.500	5.032	4.578	0.948
Ethical commitment	4.401	4.303	4.674	4.895	5.545	1.242
Total	4.582	4.608	4.886	5.043	5.061	0.480

Table 8
Variables and descriptive statistics.

Variable	Description	Mean	Std. Dev.	Min	Max
W	1 = the individual is working, 0 = otherwise.	0.726	0.445	0	1
AGE	Individual age in year	28.202	4.236	22	57
AGE2	Square of individual age	813.332	274.746	484	3249
SEX	1 = female, 0 = male	0.572	0.494	0	1
3YEARSDIP	1 = the individual attained a 3-years Bachelor degree; 0 = the individual attained a 5-year Bachelor degree.	0.275	0.447	0	1
DIST	Distance between rank orders.	145.486	10.879	108	109
COMP	Number of competencies with approximate (δ=1) equivalent ranking in both individual self-assessment of acquired competencies and in firms' ranking of competencies.	3.731	1.647	0	10
COMP.SECT	Same as COMP using specific reference rank order for the construction sector.	4.161	2.066	0	12
COMP2	Same as variable COMP with δ=2	5.700	2.042	0	13
COMP3	Same as variable COMP with δ=3	7.519	2.199	1	15
COMP.INS	Number of instrumental competencies with approximate (δ=1) equivalent ranking in both individual self-assessment of acquired competencies and in the firms' ranking of competencies.	1.282	0.950	0	5
COMP.SYST	Number of systemic competencies with approximate (δ=1) equivalent ranking in both individual self-assessment of acquired competencies and in the firms' ranking of competencies.	1.994	1.201	0	7
COMP.INTER	Number of interpersonal competencies with approximate (δ=1) equivalent ranking in both individual self-assessment of acquired competencies and in the firms' ranking of competencies.	0.455	0.606	0	2

Table 9
Impact on employment of the proximity between required and acquired competencies, using different measures of proximity.

Variable	(i)	(ii)	(iii)
COMP	0.066*		
	(0.025)		
COMP.SECT		0.049*	
		(0.022)	
DIST			-0.008*
			(0.004)
AGE	0.268*	0.248*	0.238*
	(0.061)	(0.058)	(0.058)
AGE2	-0.003*	-0.003*	-0.002*
	(0.001)	(0.001)	(0.001)
FEMALE	-0.257*	-0.251*	-0.248*
	(0.092)	(0.092)	(0.092)
3YEARSDIP	0.449*	0.394*	0.428*
	(0.111)	(0.112)	(0.110)
N	1049	1049	1049
Wald chi2	85.42*	78.50*	83.77*

Table 10.
Impact on employment of the proximity between required and acquired competencies for different values of the proximity parameter δ

Variable	(i)	(ii)	(iii)	Mfx
COMP	0.066*			0.021*
	(0.025)			(0.008)
COMP2		0.046*		
		(0.020)		
COMP3			0.028	
			(0.019)	
AGE	0.268*	0.258*	0.258*	0.086*
	(0.061)	(0.061)	(0.061)	(0.019)
AGE2	-0.003*	-0.003*	-0.003*	-0.001*
	(0.001)	(0.001)	(0.001)	(0.000)
FEMALE	-0.257*	-0.257*	-0.256*	-0.081*
	(0.092)	(0.092)	(0.092)	(0.029)
3YEARSDIP	0.449*	0.436*	0.433*	0.133*
	(0.111)	(0.111)	(0.111)	(0.030)
N	1049	1049	1049	
Wald chi2	85.42*	83.85*	80.78*	

Note. Robust standard errors in parenthesis. * = significant at 95%. Marginal effects in the last column refer to the model in column (i).

Table 11.
Impact on employment of the matching between ranking orders for different groups of competencies.

Variable	(i)	mfx (i)	(ii)	mfx (ii)	(iii)	mfx (iii)
COMP.INS	0.065	0.021				
	(0.044)	(0.014)				
COMP.SYST			0.089*	0.028*		
			(0.037)	(0.012)		
COMP.INTER					-0.018	-0.005
					(0.069)	(0.022)
AGE	0.271*	0.087*	0.262*	0.084*	0.265*	0.085*
	(0.061)	(0.014)	(0.061)	(0.019)	(0.061)	(0.022)
AGE2	-0.003*	-0.001*	-0.003*	-0.001*	-0.003*	-0.001*
	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
FEMALE	-0.259*	-0.082*	-0.253*	-0.080*	-0.259*	-0.082*
	(0.092)	(0.029)	(0.092)	(0.029)	(0.092)	(0.029)
3YEARSDIP	0.422*	0.127*	0.455*	0.135*	0.422*	0.126*
	(0.110)	(0.030)	(0.112)	(0.030)	(0.110)	(0.030)
N	1049		1049		1049	
Wald chi2	80.99*		84.51*		79.28	

Note. Robust standard errors in parenthesis. * = significant at 95%.

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