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Competences Possessed by Spanish University Graduates and Qualification Requirements for Jobs: Do Higher Education Institutions Matter?

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Abstract

Contemporary teaching is concerned not only with imparting knowledge but also with developing skills and strategies for further learning. This paper looks at the Spanish graduates' views of their preparation for the labour market. The Flexible Professional in the Knowledge Society (REFLEX) data set is used, which contains information on almost 4,000 young Spanish graduates. Overall, graduates considered their levels of competence matched their current job requirements rather well. Econometric evidence from different *ordered logit models* proves that innovative modes of teaching and learning, and assessment used by higher education institutions play a key role in competence development. This is consistent with the view that education raises productivity somehow; a finding that refutes the economics literature which suggests that education – including higher education – may be no more than a screening device which allows employers to identify the more able potential employees from the rest. Besides the importance of formal academic institutions, families and firms also appear as sources of learning and skill formation.

Introduction

The human capital and abilities of citizens are critical for a country's economic development. An educated population is also thought to generate social spillovers. Policies to expand education have put pressure on gaining greater access to tertiary education in many OECD countries – universities can provide a range of options for acquiring advanced knowledge and skills. On average, in all OECD countries with comparable data, participation rates in tertiary education grew by seven percentage points from 1995 to 2005 (see OECD 2007). However, effective universities require the right combination of trained and talented personnel – and motivated students ready to learn, and adequate facilities (LCD projectors replacing old blackboards, well-equipped computer labs etc.). So money matters. In fact, OECD countries spend, on average, twice as much on education per student at the tertiary level than at the primary level, and expenditure per student at the tertiary level rose significantly between 1995 and 2004 in the majority of the countries, despite the overall growth in enrolments (see OECD 2007). Therefore, it is sensible to ask whether this substantial investment in higher education is efficiently justifiable.

External efficiency can be expressed in terms of economic, social and qualitative objectives. The economic objective, derived from the assumption that one of the important tasks of education system is to provide skilled labour, will be concerned with the educational investments required to meet specific economic needs (see Sadlak 1978). Evaluating external efficiency requires the assessment of universities' capacity to provide competences and to adjust graduates' skills to labour market requirements.[1] Today's rapidly-changing and highly competitive labour market requires higher education graduates to have a wide range of skills that transfer from university to the workplace.[2] Graduates are expected to be competent in a broad range of areas comprising both field-specific and generic skills, as well as technical abilities.

[1] Conversely, internal efficiency refers to what happens inside the educational system; it is concerned with the optimal use of resources – with what might be called the 'productivity' of the educational system (see Sadlak 1978, Johnes 2006). But it is not sufficient to evaluate the internal efficiency of education producers, it is also necessary to evaluate the external efficiency. For example, even supposing universities were able to produce the best game theory mathematicians and in a cheap way, it would be a waste of money for society (including employers) if it does not need them.

[2] Transferable skills are those ones that university graduates can take into the workplace.

Despite recent work which explores the skill requirements for jobs and competences possessed by university graduates (see Garcia-Aracil *et al.* 2004, Allen *et al*. 2007, Teichler 2007a, 2007b), little work has been done to conceptually or empirically identify the contribution of Higher Education Institutions (HEIs) in the development of those competences. In this paper, a simple theory of graduate competences is proposed which suggests that HEIs matter when they add value to their students. They add value by ensuring that their modes of teaching, learning, and assessment positively enhance the skills or abilities of their students which are important for the labour market. This is consistent with the view that education somehow raises productivity.

In order to analyse the way universities prepare graduates for the requirements of the labour market, in terms of competences or skills, this paper uses the data set provided by the European Commission funded project, the so-called REFLEX project (short for Research into Employment and professional FLEXibility).[3] Besides the importance of this issue in aspects related to efficiency (accountability), it is also key as the Bologna process had the central objective of creating a European Higher Education Area by 2010. Greater compatibility of the different national European education degree structures has been achieved through significant reforms, and now the challenge is to work on quality, namely the content and profile of qualifications. This paper focuses on the Spanish case, trying to identify the major competences that are required of graduates by employers and the extent to which Spanish HEIs have provided a solid basis for developing these competences.

The structure of the paper is as follows. The next section presents a brief literature review of the economics of skill formation, with special emphasis on the importance of competences for the labour market and economic growth. The work then focuses on the main results for Spain of the REFLEX project and the role of the Higher Education Institutions in the development of the key competences required by the jobs. The penultimate section explores the explanatory factors of skill requirements. The paper ends with a summary and policy recommendations.

[3] Further details can be found at the Weblink: http://www.fdewb.unimaas.nl/roa/reflex/

The Economics of Skill Formation

The growing importance of skills

In the second half of the 20th century, due mainly to computerisation and changes in work organisation, we started to move from economies that demanded manual and repetitive labour toward economies that demanded more flexible skills: physical strength has been replaced by 'mind strength'.[4] The competitiveness and performance of national economies became inherently linked to the productivity of its resources, considering that in many countries skilled workers are increasingly important for productivity.

In the early 1990s, Carnevale *et al.* (1990) highlighted the economic importance of 16 skills that employers considered were *workplace basics*, providing a theoretical basis for why these skills were important:

- learning to learn;
- reading, writing and computation;
- oral communication and listening;
- problem solving and creative thinking;
- self-esteem, motivation and goal setting;
- interpersonal skills, teamwork and negotiation;
- organisational effectiveness; and
- leadership

In short, technical competences, skills that enable people to communicate effectively on the job, adaptability skills that enable workers to be flexible in the workplace, the group effectiveness skills that enable people to work together productively, and the influencing skills that enable people to bring a task to completion were the essential skills employers wanted (see Carnevale *et al*. 1990).

The growing importance of skills in the labour market has encouraged many countries to make attempts to improve their educational and training institutions in the last decades. Rising education levels, mainly university education, actually improve skills – which is relevant for economic growth, but educational expansion is also seen

[4] The term 'skills' is generally interchangeable with 'competences', although the former occasionally refers to (acquired) vocational skills only, while the latter is sometimes understood in a broader sense to include innate abilities.

as an important policy tool when trying to reduce economic inequality (increased earnings associated with increased education). For example, Altonji et al. (2008) show recently how the supply of skills of American young adults has changed between 1980 and 2004 across the distribution of skills; overall the 1997 youth cohort is more skilled than the 1979 cohort. They compare various skill measures of participants in the NLSY-1979 panel survey and participants in the NLSY-1997 panel survey at age 22. They consider the standard skill measures of completed schooling and cognitive test scores, but they also look at factors that influence skill acquisition, such as parental education and growing up in a two-parent family.

However, the question remaining is to what extent rising education levels improve not only cognitive skills but also non-cognitive skills of the population. It is possible that non-cognitive skills may play an important role for learning and labour market outcomes. Bowles et al. (2001), Heckman et al. (2006) and Lleras (2008) review extensively this literature and provide empirical support. Still, little is known about the role of the educational institutions in the development of non-cognitive skills. Special attention is paid to these issues in the coming sections.

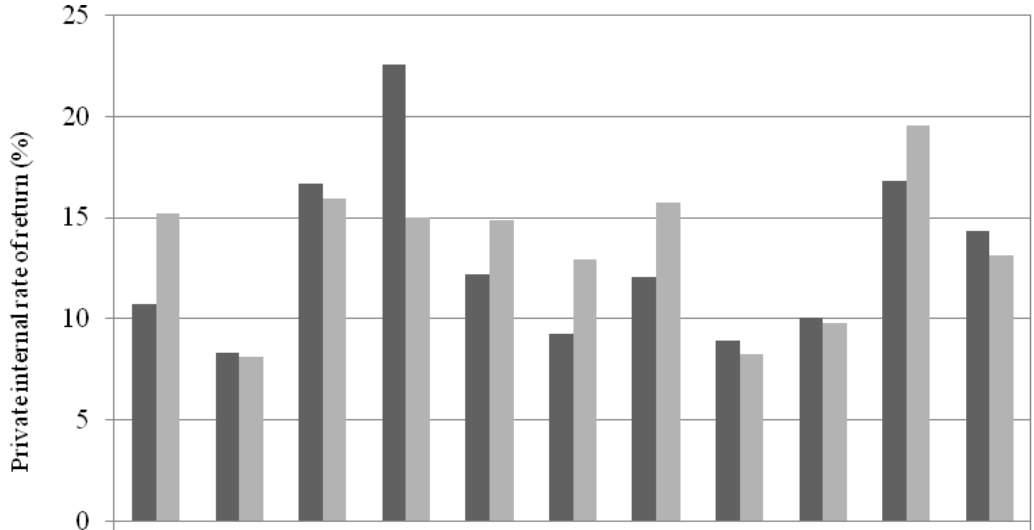
The impact of skills on labour market outcomes

People with more skills receive higher wages and have more job choices. It is demonstrated that there is an earnings advantage for college graduates (typically labelled 'skilled workers') over high school graduates ('less-skilled workers').[5] The earnings premium associated with additional education can be thought of as a 'rate of return' on that educational investment (see Heckman *et al*. 2008). There is no evidence that the recent expansion in higher education in the OECD countries has resulted in financial returns falling (see Graph 1), implying that the expansion in skill supply is keeping up with a growing demand for skills. However, this does not resolve the question of whether this return arises because more education makes people more productive, or because more productive people choose to get more education so as to distinguish themselves from the less productive in the eyes of employers.[6]

[5] In reasonably competitive labour markets, wage differences across individuals would be expected to reflect productivity differences.

[6] There is a positive correlation between earnings and education. 'Human capital theory' (Becker 1964) suggests that the correlation between education and wages is due to education enhancing productivity. In contrast, education may act merely as a signal of productivity according to the 'signalling theory' (Spence 1973). For instance, screening models maintain that schooling-completion levels represent

Graph 1: Private internal rate of return for an individual obtaining a university-level degree, 2003



	Belgium	Denmark	Finland	Hungary	Korea	New Zealand	Norway	Sweden	Switzerland	United Kingdom	United States
Males %	10.7	8.3	16.7	22.6	12.2	9.3	12.1	8.9	10.0	16.8	14.3
Females %	15.2	8.1	16.0	15.0	14.9	12.9	15.7	8.2	9.8	19.6	13.1

Rate of return when the individual immediately acquires the next higher level of education

Source: OECD (2007) and author's elaboration

The economics literature suggests that there is an impact of cognitive skills (and skill growth) on earnings. Using data from two longitudinal surveys of American high school seniors, Murnane *et al.* (1995) show that basic cognitive skills had a larger impact on wages for 24-year-old men and women in 1986 than in 1978. For women, the increase in the return to cognitive skills between 1978 and 1986 accounts for all of the increase in the wage premium associated with post-secondary education. However, more recent studies, both in the field and in the lab, indicate that non-cognitive skills are also associated with considerable economic advantages including wage premia (see Heckman and Rubinstein 2001). Much of the neglect of non-cognitive skills in analyses of earnings, schooling and other lifetime outcomes is due to the lack of any reliable measure of them. Heckman (2000) identifies non-cognitive skills with productive factors not captured by standardised tests or observable measures of human capital. These are the skills valued by employers or clients that do not involve technical or professional knowledge.

indicators of innately more productive individuals who remain at school longer to acquire 'signals' rather than to acquire skills.

Social benefits of learning

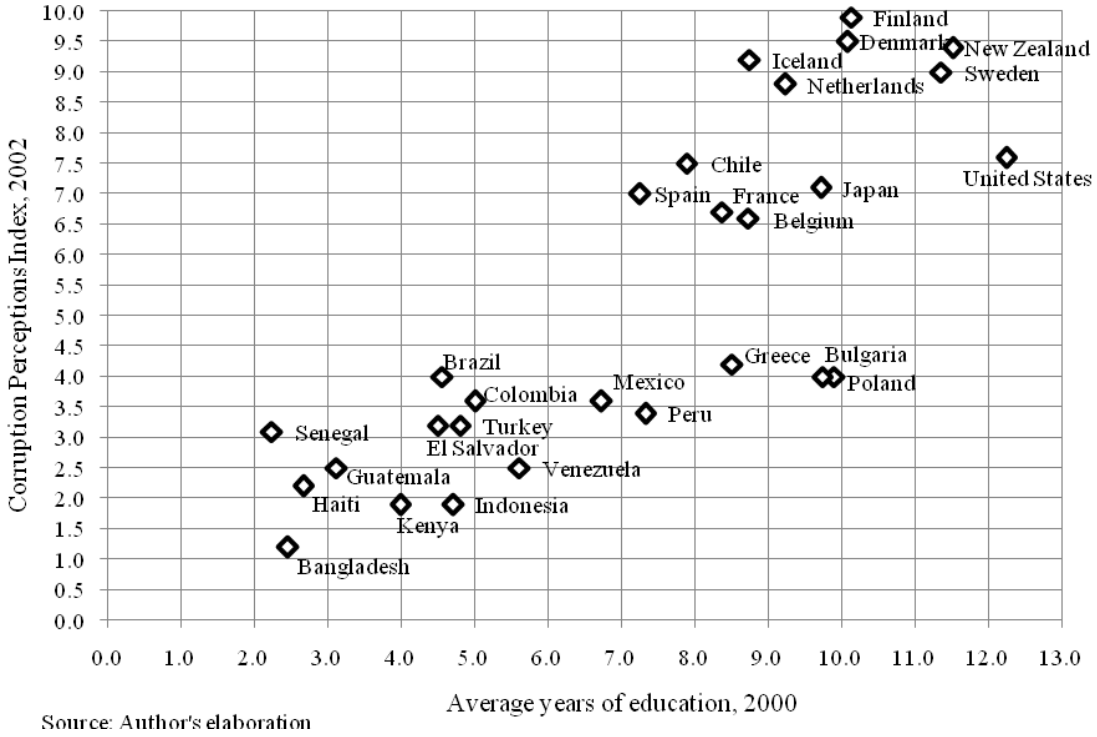
As well as helping to raise earnings and employability (which indirectly affect well-being), learning, knowledge and skills can also create wider, non-economic benefits to society as a whole. For example, there is a positive correlation between skills (proxied by levels of formal education) and (subjective) aggregate indices of well-being and trust in public institutions. In the latter case, the Corruption Perceptions Index (CPI) is positively related to higher levels of education, as we see in Graph 2 (a higher score of the CPI indicates a lower perceived corruption).[7] In fact, the Pearson correlation between both variables is 0.815 (significant at the 1%-level).[8] In the former case, the international evidence also suggests that skills (proxied by formal education) have positive effects on the feeling of happiness among individuals (see Graph 3).[9] In fact, in the last decade we have seen a growing interest in the relationship between education and subjective well-being or happiness. The empirical evidence reveals that education has positive effects, in the short and in the long-run, on happiness (subjective feeling). For example, Blanchflower and Oswald (2000) estimate 'happiness equations', that is, regressions which relate the subjective well-being with various individual characteristics. Their paper demonstrates that higher levels of happiness are associated with higher levels of education, taking into account income. For the USA, Putnam (2001), with state-level data, finds that the level of education of individuals as well as average education of each state have positive effects on happiness.

[7] Since 1995, Transparency International has published an annual Corruption Perceptions Index (CPI) ordering the countries of the world according to 'the degree to which corruption is perceived to exist among public officials and politicians' (the scoring ranges from 0 = highly corrupt to 10 = highly clean). Average years of education is from the data set on educational attainment provided to researchers by Robert J. Barro and Jong-Wha Lee.

[8] This coefficient is bounded between –1 and +1.

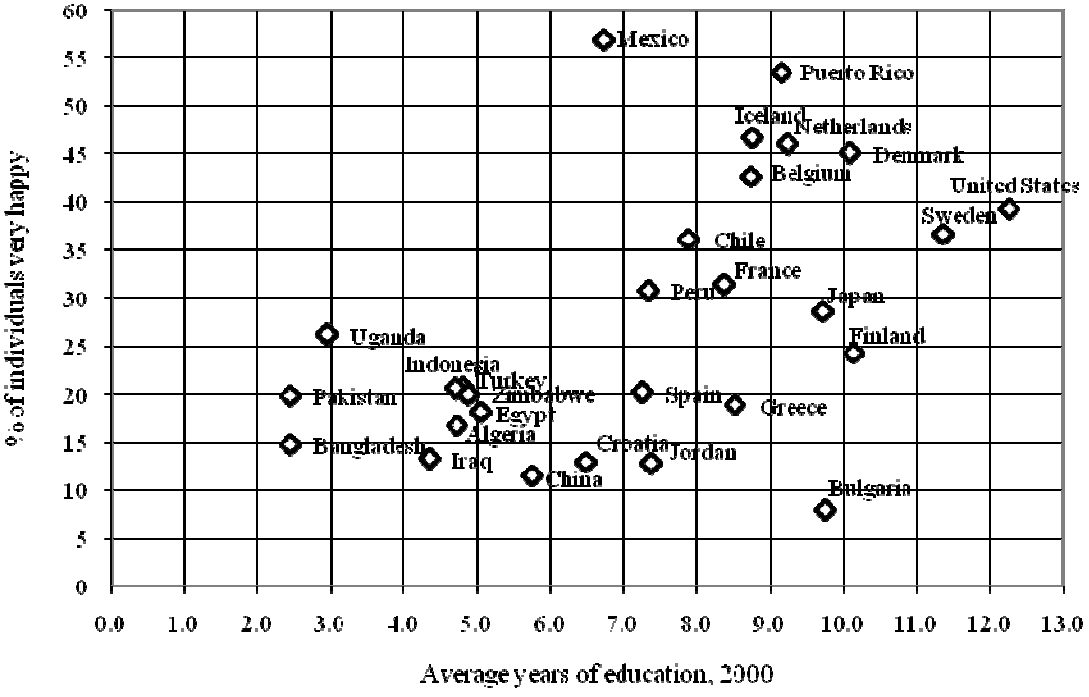
[9] Data on happiness is derived from the European and World Values Surveys (4th wave/1999-2004). The OY-axis measures the percentage of individuals in each country who answered 'very happy' to the question: 'Taking all things together, would you say you are: 1 Very happy. 2 Quite happy. 3 Not very happy. 4 Not at all happy'. Average years of education data are again from Robert J. Barro and Jong-Wha Lee. Pearson correlation is 0.497 (correlation is significant at the 1% level).

Graph 2: Education and corruption



Source: Author's elaboration

Graph 3: Education and happiness



Source: Author's elaboration

Skill formation and economic growth

Productivity gains can be seen as the main engine of growth. Productivity growth can be generated either by imitation or by frontier innovation, with innovation becoming increasingly important for growth as countries get closer to the world technology frontier (see Vandenbussche *et al.* 2006). Imitation and frontier innovation each require different institutions and policies. Thus, while investment in primary and secondary education is more likely to make a difference to a country's ability to implement existing technologies, higher (particularly graduate) education investment has a bigger effect on a country's ability to make leading-edge innovations. It is widely agreed that the productivity growth of the industrialised economies is mainly an ongoing intellectual achievement, a sustained flow of new ideas (see Lucas 2009).

Countries that have high skills in their workforces and are high tech are towards the top of the OECD productivity 'league tables'. The complementarity between skills and technology adoption is particularly strong, and is manifested through three channels. First, skilled workers are more adept at dealing with changing technologies. Second, the availability of more skilled workers creates incentives for firms to adopt and develop new technologies that are more skill intensive (see Acemoglu 1998). Third, skilled workers, engineers and scientists are required to produce adaptations of existing technologies and even more to create new ones.

In this way, teaching and research activities of universities are responsible for skill enhancement of the population and the development and transfer of technology. Therefore, governments should encourage people's participation in higher education. In fact, participation in tertiary education increased in almost all OECD countries in the late 1990s (OECD 2005). The increases in enrolment were mainly attributable to higher participation rates rather than an increase in population at the relevant ages. Yet, the investment gap in higher education between Europe and the United States is considerable. In 2005, the proportion of the total population with higher education amounted to 39 percent in the US compared to only 24 percent in the EU, although the gap is narrower for the younger population. This educational attainment gap is mirrored by a gap in expenditure, with the US devoting 3.3 percent of its GDP to higher education versus only 1.3 percent in the EU. In any case, the key question here is not how many years of education an individual has, but the relevant question is what this individual can do with the years of education he/she has. In other words, it is not simply going to school but only actual learning that counts for economic growth.

For example, Hanushek and Kimko's paper (2000) concentrates on the importance of labour force quality – measured by cognitive skills in mathematics and science – on economic growth. By linking international test scores across countries, a direct measure of quality is developed, and this proves to have a strong and robust influence on growth.

Obviously, if there are inefficiencies in the market for skill formation, and it is quite likely that there are, there is a potential case for some government intervention. If higher education and training activities do render educated/trained individuals more productive, and if improvements in productivity for some workers/activities spill over to others (positive externalities), then the government should subsidise both higher education and training. There may be spillovers both within and between firms so that gains to the economy as a whole exceed those accruing to the educated/trained individuals. For example, the employment-relevant skills which firms require from graduates may be 'general', which are transferable (with the employee) from firm to firm. For general skills, it is likely to be more efficient to provide these at the supra-firm level since the public good element of this type of knowledge will cause individual firms to under-invest in it. HE is therefore an obvious location for this type of training. The problem is how economists forecast skill needs, how the economy responds to a lack of skills and the economic consequences of not anticipating skills needs. More importantly, given that we do not fully understand the nature of the externalities, it is difficult to know how the optimal policy should look.

Evidence from the REFLEX Project

The relationship between higher education and the world of work was revived in the late 1990s as a major issue of debate in Europe. As mentioned earlier, the professional professions confronted by dramatic changes in terms of competences, mainly due to the globalisation of economies, moved towards a knowledge-based society and technical development. As education providers, the European universities were interested in exploring the competence needs of employers on the labour market and to what extent higher education institutions were providing students with those skills. For the first time, a major representative survey was undertaken in 1999. Graduates from a large number of European countries were surveyed about four years after graduation – graduates who finished their degrees in the 1994–1995 academic year.

The study was called CHEERS (Careers after Higher Education: An European Research Survey). An update of that project is the REFLEX project, a survey undertaken in 2005 covering more than 31,800 graduates in 13 European countries five years after they had left higher education. Austria, Belgium, Czech Republic, Estonia, Finland, France, Germany, Italy, Netherlands, Norway, Portugal, Spain and the United Kingdom took part in the project, and the analysis in this paper uses the data set generated by the research team focusing on the Spanish case.

Among other questions, the REFLEX survey addressed information with respect to demand for and supply of competences. Specifically, graduates were asked to rate on a scale from 1 (low extent) to 7 (very high extent) to what extent 19 different competences were required at their current job – the post held around five years after graduation, on the one hand, and to what extent they possessed those competences (own level), on the other hand. Overall, Spanish graduates considered their levels of competence matched their current job requirements rather well, although around a third felt their foreign language competence was underused.

The most significant competences for job effectiveness

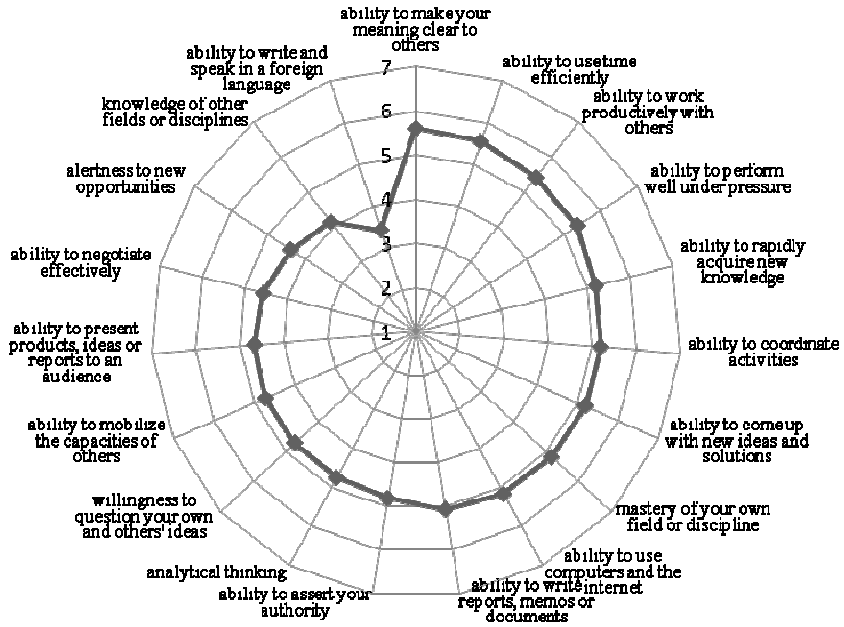
Responses to the question about the level of competences required in their current work (the required level of competence) provide self-reported measures about their immediate job situations five years after graduation. Graph 4 depicts the mean values of the ratings on an ordered seven-point scale from 1 (= lowest) to 7 (= highest) given by Spanish graduates. The competences rated as highly required related to:

- Mobilising their own capacities (using time efficiently, performing well under pressure).
- Mobilising others (working productively with others, coordinating activities, making meaning clear to others).
- Having good specialist knowledge (mastery of own field, ability to rapidly acquire new knowledge).

Therefore, reviewing the obtained results, it is noticeable that non-cognitive competences (such as making meaning clear to others or ability to work productively with others) appear to be more important at work than cognitive competences (such as ability to write and speak in a foreign language or knowledge of other fields or disciplines). The idea that non-cognitive skills are important for professional success appeared a long time ago. Perhaps the most famous example is Dale Carnegie's 1936

How to Win Friends and Influence People, which argues that financial success is due primarily to the ability to express ideas, to assume leadership and to provoke enthusiasm among people. At the same time that non-cognitive skills are more demanded in job positions than cognitive skills, the results indicate that the most required competences in the graduate labour market are mainly 'transferable skills', in other words, skills learned in one context that are useful in another. However, surprisingly, some competences that are believed to influence labour market activities, such as negotiation ability or languages, are not seen as important in the Spanish graduate labour market.

Graph 4: Competences required in the current job: self-assessment of Spanish graduates



Source: Author's calculations

In order to understand the results in the following sections, the meaning of the 'top six' competences are now explored:

1. The '*Ability to make your meaning clear to others*' can be seen as a broader competence than either oral or written communication skills. It refers to a graduate's ability to communicate complex information, ideas, etc. to colleagues, superiors, subordinates, clients, etc., such that the essence of the message has been fully comprehended. This aspect is strongly related to the demand for: (i) professional expertise – an expert should be better able than anyone else to explain the complexities of his/her own field to others; (ii) innovation and knowledge management – especially important for implementation and diffusion of new methods and ideas; and (iii) human

resource management – to deploy personnel effectively it is essential that they understand what is required of them.

2. '*Ability to use time efficiently*' can be defined as making the best use of one's time. This general definition can be functionally described as producing an outcome with a minimal waste of time. Time has become a critical feature of competitive organisational environments, and many organisations expect teams of employees to achieve high levels of performance under extreme time pressure. Because emphasis is often placed on deadlines and outcomes, it is imperative that graduates use their time efficiently; the inefficient use of time might result in several undesired or unpleasant outcomes, including psychological stress and employment termination.[10]

3. The '*Ability to work productively with others*' places emphasis on the ability to work effectively within a team environment – the productivity of a worker depends on the productivity of co-workers in the same team (see Mas and Moretti 2009). Because so many skilled jobs involve working in one or more work-groups, graduates must have the ability to work with others in a professional manner, be able to solve problems and to think creatively in a group, be able to interact effectively and to share responsibility with others, and be able to inspire confidence and to cope with undesirable behaviour in others.

4. The '*Ability to perform well under pressure*' is the graduate's capacity to adapt to or cope with tension and anxiety – created by the job that appears usually due to deadlines to complete tasks and because of the necessity of giving quick efficient solutions to unexpected complex problems. It also refers to the ability to deal with stressful situations that emerge in the relationships, sometimes difficult, with superiors and peers.

5. The '*Ability to rapidly acquire new knowledge*' is linked to the fact that, in modern society changes in legislation, technologies, market conditions, etc. are fast and skilled jobs require graduates with high learning skills. In this dimension, graduates are to be seen as professionals, trainees and researchers at the same time.

6. The '*Ability to coordinate activities*' is the ability to design, document, plan and complete projects (or events) productively, independently or with a project team, within an allotted timeframe. It also involves goal-setting (priorities) and budgeting (financial management).

Have higher education graduates gained these essential competences?

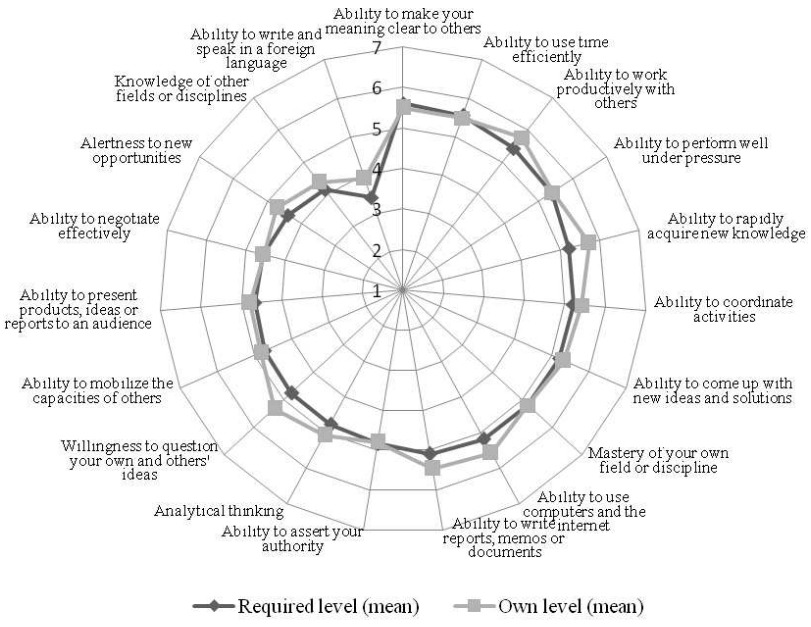
The teaching and research functions of institutions of higher education have an important role to play in national development, particularly in the development of a skilled workforce. The aim now is to focus on the acquisition of competences or skills: (i) do higher education graduates possess the essential competences required in

[10] Claessens *et al.* (2007) provide an overview for those interested in the current state-of-the-art in time management research.

the workplace? (ii) how have they acquired these competences? (iii) could one really observe a positive effect of the modes of teaching and learning, and assessment during higher education in this process? The REFLEX survey asks young graduates about their various personal characteristics and educational experiences – inside the university but also out of the campus – and allows an identification of their individual effect on the skills acquisition process.[11] In this section, the first question is considered. The other two questions will be answered in the next sections.

Graph 5 depicts the Spanish graduates' self-assessment to the question about the acquired level of competence. Graduates had to rate – on a seven-point scale – to what extent they possessed 19 competences. For comparison reasons, Graph 5 shows the results of the self-evaluation of both levels of competences, those required and those possessed by university graduates. With the exception of 'Ability to make your meaning clear to others', where Spanish graduates show a slight deficit, for the rest of competences there is a match, or even surplus, of competences (e.g. 'Willingness to question your own and others' ideas' or 'Ability to rapidly acquire new knowledge').

Graph 5: Competences required in the current job and competences possessed: self-assessment of Spanish graduates



Source: Author's calculations

[11] The CHEERS survey asked for information on 32 different items related to supplies of competences (the acquired level of competence) at the time of graduation. However, in the REFLEX survey graduates' responses to the question about the acquired level of competence refer to the moment of the interview (about five years after graduation).

The Role of Higher Education Institutions in the Development of Competences

A model of skill production at university

Most work in economics involves constructing models. An economic model is a simplified framework designed to illustrate complex processes, often but not always, using mathematical techniques. In this section, a simple model of skill acquisition at university is presented that is useful to define and interpret various parameters of interest that will be the focus of the next (applied) sections.

The competences possessed by university graduates, understood as those talents, skills and capabilities, *c*, can be seen as the output of a production process of human capital where the inputs include school resources, *x*, and non-school resources, *z*. School inputs are primarily those related to the Higher Education Institutions such as the number of academics, computers available to the students, etc., whereas non-school inputs are mostly exogenous factors to the HEIs which also contribute to development of competences in the individuals – e.g. years of education of the parents, books at home, etc. Although a vast literature has studied whether school resources are effective in raising educational outputs,[12] for our discussion here we will suppose that additional resources are useful and effective (their marginal productivity is positive):[13]

$$c = c\,(x,z), \quad \frac{\partial c}{\partial x}, \frac{\partial c}{\partial z} > 0$$

In much economic research dealing with issues of growth and productivity, econometric analysis is based on the production function. The most commonly used production functions are the Cobb-Douglas, Constant Elasticity of Substitution (CES) and Translogarithmic. The econometric modelling of skills acquisition process that involves a Cobb-Douglas type function can be set as:

$$c = A\, x^{\beta_1}\, z^{\beta_2}\, e^{u}$$

where: u = stochastic disturbance term; e = base of natural logarithm; the parameter A measures, roughly speaking, the scale of production: how much output we would get

[12] See for example the surveys contained in Hanushek (1996, 2002).

[13] The analysis assumes that inputs and outputs are measured in physical (continuous) units. For simplicity, for now, we abstract from the problem for unobservable data on inputs.

if we used one unit of each input; the parameters *beta* measure how the amount of output responds to changes in the inputs.

Taking logarithms in both sides, gives the log-linear regression model where the coefficients are estimated using the OLS technique.

$$\ln c = \ln A + \beta_1 \ln x + \beta_2 \ln z + u$$

or

$$\ln c = \beta_0 + \beta_1 \ln x + \beta_2 \ln z + u$$

However, in practice, some problems arise when describing the production of human capital. The most important difficulty is to find a proper quantitative measure of the output: skills or competences. Several approaches to skills measurement have been used in applied works (see Felstead *et al*. 2007): educational attainment, occupational classification, skill tests, self-assessment and job requirements. Alternatively, some studies have used earnings as the proxy for skills, assuming that workers are paid the value of their marginal product (e.g., Davis and Haltiwanger 1991, Dunne *et al*. 2004). Yet, what constitutes a suitable measure of skill is still quite controversial.

At the university level, because grades are measurable and may correlate positively with learning, some papers have used students' grades as a proxy for learning outcomes. The 'grade production function' specification implicitly assumes that the students choose the optimal amounts of effort inputs (class attendance and homework completion), given their ability and educational goals (see Douglas and Sulock 1995). In the database generated by the REFLEX project, average university marks are available. Nevertheless, we consider that grades are not a good proxy for the output of the educational production process since grading policies vary from one university to another, from one degree to another and from one instructor to another.[14] Alternatively, although there is information on wages earned by young university graduates, these are not proxying correctly for output because salaries also entail an important firm component that reflects things such as the firm's compensation policies, rent sharing and workers' bargaining power within the firm.[15]

[14] Also there is not only one dimension of the competencies but different competences or skills gained by the individuals: ability to solve problems, ability to work in teams, ability to write reports, etc.

[15] There is also an important percentage of graduates working for the public sector where salaries are not necessary a reflection of their productivity. Personnel classifications and wage structure in the Public Administration are mainly predetermined by the administrative legislation of public function.

Instead, the approach used to assess the skills acquisition process among university graduates will be based on the answers to the question '*How do you rate your own level of competence*?'[16] The ordered nature of the dependent variable (self-assessment of competence) recommends an ordered logit model to be specified. In this model, the categories are used directly as the dependent variable – a qualitative (polythomic) variable, such that the model to be estimated is (Greene 1997):[17]

$$Y^* = \beta' X + \varepsilon$$

where: X is the regressors vector (including the constant) that includes observable factors that contribute to the development of a competence, and the term ε is a random disturbance which follows a logistic distribution and represents certain non-observable factors (e.g. unobserved individual-level heterogeneity of learning ability).[18] The *beta* coefficients quantify the impact of the regressors used; positive coefficients mean that a higher value of the associated variable implies a greater probability of possessing a competence. All other things being equal or held constant, could one really observe a positive effect of the modes of teaching and learning, and assessment in the acquisition of a skill?

The competence production process at university level is depicted in Figure 1. Although graduates' responses to the question about the acquired level of competence provide a self-assessment of the level of competences built up during higher education, the acquisition of different abilities can also be obtained out of the campus. Life cycle skill formation is a dynamic process in which early inputs strongly affect productivity (Heckman 2006). Family environments play a key role in shaping cognitive and non-cognitive skills at different stages of the life cycle of the child. Production of individual human capital can also be associated with experiences in the neighbourhood, responsibilities held in student organisations or other clubs (Scouts, music bands…), internships, summer jobs, etc. In addition, it should be taken into account the fact that, unlike the CHEERS survey, graduates in the REFLEX survey

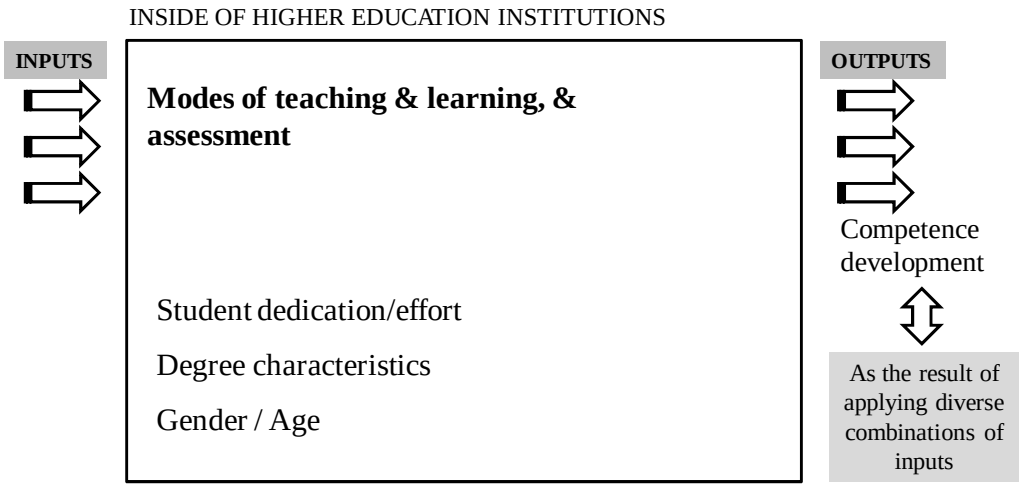
[16] On a scale from 1 to 7 (1 = very low, 7 = very high), they had to rate 19 competences. More details were given in the previous section.

[17] The discussion here is, of necessity, rather brief and interested readers are urged to consult McKelvey and Zavoina (1975) where the model and estimation procedure are described in detail.

[18] The variable Y* is a continuous latent variable which cannot be observed. In reality, what we have is a form of data censoring where parameters called μ have to be estimated alongside the betas. The Y variable, which is an observed variable, takes, in our case, the values on a seven-point scale given by the surveyed. See Greene (1997) for further details.

had to assess their level of competences at the moment of the interview (around five years after graduation), so their professional paths since they left the higher education system and, more recently, their current work, enables them to acquire or develop these skills. In short, since the information on the acquired level of competence is obtained from the source closest to the actual job situation, the analysis should consider the fact that personal skills can be acquired, developed and improved in the workplace through learning by doing and formal training programmes.[19]

Figure 1: The competence production process



Source: Author's elaboration

Sources of skill formation among Spanish graduates

The level of each skill acquisition is explained through ordered logit models, running equations separately for each of the six competences that Spanish graduates self-reported were the most required ones in their jobs. These skills were, as seen before:

[19] In the CHEERS survey, graduates were asked to indicate on an ordered scale ranking from 1 (not at all) to 5 (to a very great extent), the strength of a given competence (the acquired level of competence) at the time of graduation and the extent to which this given competence was required in their current work (the required level of competence). Bearing in mind that graduates made retrospective judgments in 1999 about their higher education degrees obtained in 1995 (four years after their graduation), the result obtained that, on average, graduates reported lower levels of competence than were required in their jobs (Garcia-Aracil and van der Velden 2008), was sensible.

1) ability to make your meaning clear to others; 2) ability to use time efficiently; 3) ability to work productively with others; 4) ability to perform well under pressure; 5) ability to rapidly acquire new knowledge; and 6) ability to coordinate activities.

The explanatory variables (control variables) used in the regressions are: gender and other personal characteristics of the respondents, such as age or father's education; educational background, such as secondary school grades, university degree or duration of the degree; experiences during higher education, such as internships or study abroad; and years of work experience since graduation. The variables of interest, the contribution of the universities to the skill development/enhancement, are proxied by the following modes of teaching and learning, and assessment:

- Continuous assessment
- Interactive learning
- Knowledge-focused teaching
- Examinations
- Lectures in large groups

These five methods come from the application of a principal component analysis (PCA) to the answers given by graduates to the question: 'To what extent were the following modes of teaching and learning emphasised in your study programme? (1 = not at all; 5 = to a very high extent)'. The options were:

- Lectures
- Group assignments
- Participation in research projects
- Facts and practical knowledge
- Theories and paradigms
- Teacher as the main source of information
- Project and/or problem-based learning
- Written assignments
- Oral presentations by students
- Multiple choice exams

Table 1: Component score coefficient matrix

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Lectures	0.00	-0.02	-0.08	-0.03	**0.80**
Group assignments	**0.29**	0.01	-0.03	0.05	0.10
Participation in research projects	0.14	**0.30**	-0.02	-0.02	-0.25
Facts and practical knowledge	-0.11	**0.47**	-0.03	0.13	0.09
Theories and paradigms	0.14	0.04	**0.71**	-0.04	-0.37
Teacher as the main source of information	-0.14	-0.04	**0.53**	0.00	**0.52**
Project and/or problem-based learning	-0.21	**0.61**	0.06	-0.14	0.01
Written assignments	**0.43**	-0.16	0.11	-0.08	-0.08
Oral presentations by students	**0.42**	-0.15	0.00	0.02	-0.07
Multiple choice exams	-0.01	-0.02	-0.03	**0.97**	-0.02
	Continuous assessment	Interactive learning	Knowledge-focused teaching	Examinations	Lectures in large groups

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalisation.
Source: Author's calculations

To incorporate directly this information would have led to serious problems of multicollinearity. Principal component analysis is precisely a variable-reduction procedure that creates factor scores that will account for most of the variance in the observed variables.[20] Table 1 presents the factor load matrix resulting from PCA where five factors capture 73 per cent of the overall variance.

Table 2 reports the maximum likelihood ordered logit estimates which provide information about the factors that contribute to the accumulation / development / enhancement of competences among young Spanish higher education graduates – skills which they self-reported as key to success in today's workplace. In each regression, the dependent variable is a seven category ordered measure of competence.[21] The results prove that Spanish HEIs really do matter – cultivating skills in their university students – after controlling for other factors that are also important in explaining competence development. Nevertheless, there are differences among the five pedagogical practices considered.

First, *ceteris paribus*, all teaching-learning strategies have a positive contribution (statistically significant) to the development of the '*Ability to make your meaning clear to others*'. Dunkin's (1983) review of the lecture research indicated that the appropriateness and effectiveness of the lecture method was primarily dependent upon teaching goals. In instances where the goals were student satisfaction

[20] The analysis provides orthogonal factor scores that are completely uncorrelated. See Dillon and Goldstein (1984) for further details.
[21] According to Table 2, the chi-squared test (LR statistic) is significant at the 5 percent level, indicating that the slope coefficients are significantly different from zero.

or factual learning, the lecture was as effective as discussion. However, in terms of higher-order thinking skills a lecture was less effective than discussions.[22]

Second, continuous assessment is an effective method to develop the '*Ability to use time efficiently*'. This skill is important in academic settings. Students are constantly faced with deadlines and have specific outcomes (e.g. assignments) to produce within a specified time period. Because emphasis is placed on deadlines and outcomes, it is imperative that individuals use their time efficiently; the inefficient use of time might result in several undesired or unpleasant outcomes, including low grades and psychological stress. Deadlines can also act as a catalyst for cognitive and behavioural habits development, such as motivation or self-discipline. However, the implementation of this methodology is not always easy. On the one hand, the majority of the Spanish public universities face a problem of massification where the format of the class is still lecture-oriented in the majority of degrees. On the other hand, many instructors see this method as a time-consuming activity, with no monetary reward, in a system where what really matters for academic promotion is the number of research papers that are published and the research grants obtained.[23]

Third, with respect to the '*Ability to work productively with others*', it is promoted by using continuous assessment, knowledge-focused teaching and examinations as modes of teaching and learning. In fact, the factor group labelled *continuous assessment* includes group assignments (see Table 1). Ability to work with others means that the student will work effectively with others, including people from diverse backgrounds, and contribute to group efforts by sharing ideas, suggestions and workloads. However, this kind of 'group production process' is delicate in the sense that because output is a function not of the effort of a single student, but of the combined effort of several students, it is difficult for an instructor to identify and reward the exact contribution made by each student – he/she cannot identify the free-riders. The instructor observes total output perfectly, but individual effort only imperfectly. In addition, in the workplace, teamwork also implies complex

[22] McKeachie *et al*. (1986) also concluded that the lecture, in comparison to discussion, was less likely to promote other learning outcomes such as critical thinking skills, problem solving and knowledge transfer.

[23] The assumption that the good researcher is a good teacher is causing a great deal of stress and distress in colleges of higher education still seeking university status, and in new universities, and has resulted in an increase in the number of publications during the 1990s on the topic of the link between research and teaching. Some research papers show a negative relation between research productivity and teaching effectiveness (see Ramsden and Moses 1992).

information processing activities, skill that can be developed on campus by knowledge-focused teaching. Examinations help students to develop competences such as positive work habits, along with cognitive skills, which are also important in the workplace.

Fourth, interactive learning enhances the '*Ability to perform well under pressure*' of graduates.[24] Small group teaching has become more popular as a means of encouraging student learning, but the tutor needs a different set of skills for that than used in lecturing and not all academic staff have had the opportunity to learn these skills.

Finally, the '*Ability to rapidly acquire new knowledge'* is developed by using interactive learning and knowledge-focused teaching, while the '*Ability to coordinate activities*' is developed by using continuous assessment, interactive learning and knowledge-focused teaching.

In addition to the identification of the pedagogical methods, the findings reveal that competence development varies according to the length of the degree. Short-cycle university degrees, which last theoretically three years in Spain (e.g. Nursing, Social Work, etc.) and are very practical, contribute positively, *ceteris paribus*, to the development of competences such as '*Ability to work productively with others*'. Conversely, longer-duration studies (e.g. Medicine, Engineering, etc.), which lead to better-paid professions and are generally more difficult,[25] contribute more to the development of competences such as '*Ability to perform well under pressure*'. There are also statistically significant differences across fields of studies: degrees related to Education contribute more than the rest of degrees to the development of competences – the results for the degree subject are given against the reference category of Education. Also all competences evaluated are developed when graduates considered that their programmes were generally regarded as demanding; and programmes with a broad focus contribute more to developing competences that are relevant to graduates' professional success such as '*Ability to coordinate activities*' and '*Ability to perform well under pressure*'.[26]

[24] Continuous assessment also has a positive impact, although significant at 10% level.

[25] It means that students must be prepared to take on a higher risk (greater probability of failure) on choosing this type of course, so students with the best High School curricula are more likely to follow a university degree of greater duration.

[26] Higher average study hours per week also contribute to developing the '*Ability to work productively with others*' and the '*Ability to rapidly acquire new knowledge*'.

Table 2: Factors explaining competence development among Spanish university graduates: the role of Higher Education Institutions

	Ability to make your meaning clear to others				Ability to use time efficiently				Ability to work productively with others			
	Coefficient	**t-ratio**		**Mean of X**	**Coefficient**	**t-ratio**		**Mean of X**	**Coefficient**	**t-ratio**		**Mean of X**
Constant	4.970	10.808	**		4.182	9.373	**		4.071	9.003	**	
Continuous assessment	0.140	3.753	**	0.00	7.77E-02	2.100	**	0.00	0.189	5.004	**	0.00
Interactive learning	8.13E-02	2.272	**	0.00	4.50E-02	1.270		0.00	4.56E-02	1.276		0.00
Knowledge-focused teaching	0.125	3.690	**	0.00	6.99E-03	0.208		0.00	6.91E-02	2.021	**	0.00
Examinations	0.122	3.272	**	0.00	2.44E-02	0.661		0.00	0.1149	3.080	**	0.00
Lectures in large groups	7.01E-02	2.063	**	0.00	1.83E-02	0.543		0.00	-1.89E-02	-0.554		0.00
Type of degree (short cycle programme)	-6.86E-03	-0.083		0.39	4.77E-02	0.581		0.39	0.193	2.299	**	0.39
Education	Ref.			Ref.					Ref.			
Humanities and Arts	6.52E-02	0.371		8.73E-02	0.101	0.573		8.76E-02	2.27E-02	0.127		0.09
Social sciences, Business and Law	-0.476	-3.595	**	0.33	-7.65E-02	-0.578		0.33	-0.373	-2.781	**	0.33
Science, Mathematics and Computing	-0.481	-2.907	**	0.14	-0.433	-2.658	**	0.14	-0.194	-1.170		0.14
Engineering, Manufacturing and Construction	-0.681	-4.192	**	0.15	-0.573	-3.528	**	0.15	-0.294	-1.786	*	0.15
Agriculture and Veterinary	-0.790	-3.988	**	4.27E-02	-0.503	-2.513	**	4.24E-02	-0.422	-2.082	**	0.04
Health and Welfare	-0.346	-2.314	**	0.12	-0.129	-0.863		0.12	-0.124	-0.818		0.12
Services	-0.407	-1.007		7.17E-03	0.101	0.251		7.17E-03	-1.05E-02	-0.026		0.01
Programme was generally regarded as demanding	0.151	3.426	**	3.69	0.278	6.302	**	3.69	0.216	4.856	**	3.69
Programme had a broad focus	5.30E-02	1.569		3.55	-3.36E-02	-0.991		3.55	5.30E-02	1.553		3.55
Average study hours per week	-9.93E-04	-0.468		37.86	2.83E-03	1.355		37.86	4.35E-03	2.055	**	37.87
Participated in work placement/internships	-2.40E-02	-0.311		0.56	2.04E-02	0.267		0.56	4.30E-02	0.558		0.57
Spent time abroad during higher. education for study/work	9.36E-02	0.948		0.14	3.68E-02	0.374		0.14	-2.62E-02	-0.266		0.14
Study-related work experience during higher education	9.17E-02	1.170		0.23	4.60E-02	0.586		0.23	0.170	2.115	**	0.23
Interrupting the study programme for 4 or more months	4.71E-02	0.347		7.11E-02	-0.209	-1.587		7.11E-02	7.94E-04	0.006		0.07
Woman	5.40E-02	0.741		0.64	0.403	5.557	**	0.64	0.265	3.616	**	0.64
Age	1.10E-02	0.979		29.85	-1.26E-02	-1.198		29.85	-1.56E-02	-1.450		29.85
Father with higher education	4.14E-02	0.539		0.25	0.145	1.892	*	0.25	6.98E-02	0.914		0.25
Average final examination grade secondary education	3.20E-02	0.860		2.88	5.79E-02	1.556		2.88	-8.12E-02	-2.166	**	2.87
Enrolled in additional formal study/training programmes	4.05E-02	0.607		0.57	7.53E-02	1.133		0.57	3.77E-02	0.558		0.57
No paid work since graduation	Ref.				Ref.				Ref.			
Less than 2 years of experience	-0.497	-2.931	**	9.11E-02	-9.33E-02	-0.550		9.13E-02	0.146	0.861		0.09
Between 2 and 4 years of experience	-0.250	-1.743	*	0.31	0.244	1.677	*	0.31	0.291	2.024	**	0.31
More than 4 years of experience	-9.50E-03	-0.068		0.54	0.442	3.110	**	0.54	0.357	2.530	**	0.54
Mu(1)	1.441	11.558	**		1.260	10.627	**		1.120	11.647	**	
Mu(2)	2.597	32.480	**		2.658	37.350	**		1.836	23.770	**	
Mu(3)	4.048	86.656	**		3.942	86.778	**		2.974	57.694	**	
Mu(4)	5.389	141.507	**		5.206	138.860	**		4.122	105.165	**	
Mu(5)	7.236	148.286	**		6.919	146.824	**		5.817	130.662	**	
Dependent variable: 'How do you rate your own level of competence?'					Asterisks indicate coefficients that are significant at the 5% level (**) and 10% level (*)							
Number of observations		3207				3208				3205		
Log likelihood function		-4642.885				-4762.14				-4520.96		
Chi squared		142.7187				184.5142				175.46		
Prob[ChiSqd > value] =		0.0000				0.0000				0.0000		
Source: Author's calculations												

Table 2: Factors explaining competence development among Spanish university graduates: the role of Higher Education Institutions (cont'd)

	Ability to perform well under pressure				Ability to rapidly acquire new knowledge				Ability to coordinate activities			
	Coefficient	t-ratio		Mean of X	Coefficient	t-ratio		Mean of X	Coefficient	t-ratio		Mean of X
Constant	3.647	8.145	**		5.064	11.226	**		3.249	7.334	**	
Continuous assessment	6.28E-02	1.689	*	0.00	4.16E-02	1.106		0.00	0.180	4.828	**	0.00
Interactive learning	0.106	2.997	**	0.00	7.19E-02	1.990	**	0.00	0.104	2.924	**	0.00
Knowledge-focused teaching	4.83E-02	1.439		0.00	0.171	4.980	**	0.00	6.70E-02	1.974	**	0.00
Examinations	2.88E-02	0.776		0.00	5.84E-02	1.544		0.00	5.28E-02	1.420		0.00
Lectures in large groups	-3.00E-02	-0.888		0.00	-2.74E-02	-0.798		0.00	2.30E-02	0.675		0.00
Type of degree (short cycle programme)	-0.136	-1.662	*	0.39	8.23E-02	0.992		0.39	1.63E-02	0.199		0.393
Education	Ref.				Ref.				Ref.			
Humanities and Arts	0.394	2.242	**	8.73E-02	0.459	2.596	**	8.79E-02	-5.63E-02	-0.320		8.69E-02
Social sciences, Business and Law	0.107	0.803		0.33	9.60E-02	0.714		0.33	-0.320	-2.411	**	0.333
Science, Mathematics and Computing	-5.81E-02	-0.355		0.14	0.220	1.317		0.14	-0.370	-2.243	**	0.145
Engineering, Manufacturing and Construction	0.133	0.821		0.15	1.93E-02	0.117		0.15	-0.168	-1.028		0.150
Agriculture and Veterinary	-0.400	-1.999	**	4.27E-02	-0.204	-1.011		4.21E-02	-0.419	-2.124	**	4.25E-02
Health and Welfare	9.25E-02	0.619		0.12	-0.107	-0.706		0.12	-0.572	-3.808	**	0.121
Services	-9.06E-02	-0.245		7.17E-03	-5.43E-02	-0.141		7.17E-03	0.529	1.269		6.88E-03
Programme was generally regarded as demanding	0.211	4.806	**	3.69	0.235	5.209	**	3.68	0.240	5.437	**	3.68
Programme had a broad focus	6.45E-02	1.914	*	3.55	1.51E-02	0.44		3.55	7.57E-02	2.237	**	3.55
Average study hours per week	2.21E-03	1.040		37.84	4.46E-03	2.08	**	37.86	-7.07E-04	-0.331		37.87
Participated in work placement/internships	7.56E-02	0.998		0.56	-1.80E-02	-0.232		0.57	9.69E-02	1.268		0.57
Spent time abroad during higher education for study/work	0.105	1.097		0.14	0.182	1.849	*	0.14	0.222	2.260	**	0.14
Study-related work experience during higher education	0.189	2.415	**	0.23	8.31E-02	1.041		0.23	0.125	1.575		0.23
Interrupting the study programme for 4 or more months	-0.124	-0.929		7.07E-02	-0.2823933	-2.125	**	7.07E-02	9.86E-03	0.074		7.10E-02
Woman	-0.149	-2.087	**	0.64	-1.29E-02	-0.176		0.64	0.337	4.633	**	0.64
Age	-2.65E-02	-2.489	**	29.85	-2.41E-02	-2.258	**	29.84	2.51E-03	0.243		29.85
Father with higher education	9.99E-02	1.327		0.25	0.108415	1.403		0.25	0.103	1.348		0.25
Average final examination grade secondary education	7.00E-03	0.188		2.87	7.00E-02	1.853	*	2.88	-3.88E-02	-1.037		2.88
Enrolled in additional formal study/training programmes	0.175	2.642	**	0.57	0.1723498	2.538	**	0.57	0.194	2.903	**	0.57
No paid work since graduation	Ref.				Ref.				Ref.			
Less than 2 years of experience	-0.234	-1.396		9.13E-02	7.01E-02	0.402		9.10E-02	5.57E-03	0.033		9.10E-02
Between 2 and 4 years of experience	0.237	1.646	*	0.31	0.122	0.826		0.31	0.254	1.775	*	0.31
More than 4 years of experience	0.512	3.644	**	0.54	0.254	1.752	*	0.54	0.458	3.273	**	0.54
Mu(1)	0.927	11.750	**		1.225	7.533	**		0.956	9.987	**	
Mu(2)	1.957	32.619	**		2.209	19.469	**		2.135	31.792	**	
Mu(3)	3.105	73.004	**		3.914	69.373	**		3.384	75.840	**	
Mu(4)	4.256	115.455	**		5.406	134.030	**		4.707	124.3	**	
Mu(5)	5.925	125.513	**		7.385	156.236	**		6.532	131.2	**	
Dependent variable: 'How do you rate your own level of competence?'					Asterisks indicate coefficients that are significant at the 5% level (**) and 10% level (*)							
Number of observations		3209				3209				3199		
Log likelihood function		-4975.5				-4263.2				-4765.2		
Chi squared		172.924				146.721				187.86		
Prob[ChiSqd > value] =		0.0000				0.0000				0.0000		
Source: Author's calculations												

The results from the ordered logit models allow us to investigate several hypotheses in terms of influences on the development of competences generated outside the HE system. Of more interest, though, are the prior, possibly causal influences on graduates' skills. For example, higher average final examination grades in secondary education are related positively with the '*Ability to rapidly acquire new knowledge*'.[27] Similarly, family background is commonly cited to explain many behavioural traits and, in turn, its effect on personal development. The status effect is captured in terms of education and occupation including a dummy variable for those with a graduate parent (father with higher education). The estimations show a positive effect (statistically significant) of a higher socio-economic status in the development of the '*Ability to use time efficiently*'.

Graduates' responses to the question about the acquired level of competence also provide a self-assessment of the level of competences built up during HE. The regressions confirm the significant and positive impact of experiences abroad on the development of competences. Students who spent time abroad during higher education for study or work develop the '*Ability to coordinate activities*' and '*Ability to rapidly acquire new knowledge*'.[28] Likewise, study-related work experience during higher education allows graduates to accumulate productive capacities: '*Ability to work productively with others*' and '*Ability to perform well under pressure*'.[29]

Finally, the professional path of graduates since they left HE and their current situation may be an important effect on their assessment of competences. Graduates who enrolled in additional formal study/training programmes after graduation in 1999-2000 exhibit, *ceteris paribus*, higher competences in the '*Ability to perform well under pressure*', '*Ability to rapidly acquire new knowledge*' and '*Ability to coordinate activities*'. Likewise, a higher number of years of experience in the labour market since graduation in 1999-2000 exercises a positive impact on competence development – with the exception of the '*Ability to make your meaning clear to others*'.

[27] However, negatively with the '*Ability to work productively with others*'.

[28] Evidence on the economic returns to studying abroad can be found in Oosterbeek and Webbink (2006). Among other findings, the authors show that studying abroad is associated with an increase in the probability of finding a job in which international contacts are important. See also Salisbury *et al.* (2009) for recent research about the factors that influence students' predisposition to study abroad.

[29] The '*Ability to rapidly acquire new knowledge*', all else being equal, is lower for those interrupting the study programme for four or more months.

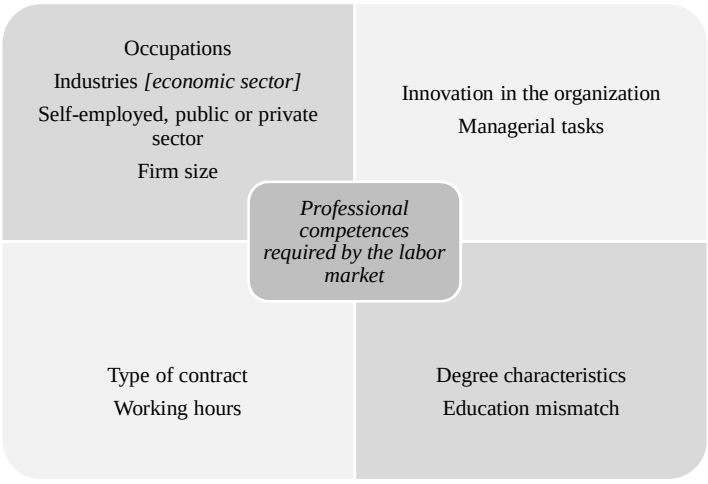
In summary, on this evidence, the effects of HE modes and length of study are evidently important, but also circumstances outside the classroom. In any case, interpretation of the responses must be cautious. The question asked individuals to evaluate the contribution of their HE. Such evaluation is contingent on expectations: these are clearly not the same as what might actually be fostered by HE.

Competences Required in the Workplace

Qualification requirements for jobs

The demand for skills by employers cannot be neglected. Having identified the skills and abilities that individuals possess, we concentrate now on the required competences in the graduate labour market. To what extent do skills vary among field of studies, industries and firm specific factors – such as posts or size of business. It should be remembered that respondents were asked to rate on a seven-point ordered scale the extent to which a given competence on a list of 19 was required in their current work (see Graph 5). Responses to this question provide self-assessment measures about their immediate job situations. In order to model the level of competences required, ordered logit models are used again. Figure 2 illustrates the independent variables included in the regressions which explain the professional competences required by the labour market (dependent variable).

Figure 2: Identification of factors which explain the most important required competences of young higher education graduates



Source: Author's elaboration

Explanatory factors of skill requirements in the Spanish graduate labour market

This section investigates graduates' views on what they consider the six most important competences for employment. Table 3 presents the estimates of the six ordered logit models. The regressions yield a series of interesting results.

Exploring the results, the first finding is that professionals and workers in the education and financial intermediation sectors, and to a lesser extent graduates in social and personal service activities, have an increased probability of being in posts requesting the '*Ability to make your meaning clear to others*', *ceteris paribus*. Likewise, this competency is more required the larger the size of the company. There is thus a bias towards larger firms and specific graduate jobs with generally higher salaries. Nevertheless, the skill level regressions provide no statistically significant support for differences by type of employer.

Additionally, econometric evidence is provided in support of the hypothesis that this skill is required in establishments/works that are characterised by innovation with respect to knowledge/methods in the production process, *ceteris paribus*. Similarly, managerial activities – graduates responsible for deciding work strategies for the organisation and for damage to the organisation if major mistakes happen, demand this competence. Finally, compared to those workers with qualifications on Health and Welfare programmes, this competence is more required for degrees on Humanities and Arts, and Services – they work with others teaching or servicing. However, the competence is less required if the individual is not matched. Interestingly, the competence is more required for female graduates than for males, and less required for older workers.

Table 3: Explanatory factors of competences required in the workplace

	Ability to make your meaning clear to others				Ability to use time efficiently				Ability to work productively with others			
	Coefficient	**t-ratio**		**Mean of X**	**Coefficient**	**t-ratio**		**Mean of X**	**Coefficient**	**t-ratio**		**Mean of X**
Constant	2.446	4.845	**		2.505	5.041	**		1.348	2.793	**	
Professionals	0.417	3.137	**	0.32	0.124	0.931		0.32	8.81E-02	0.676		0.32
Technicians and associate professionals	0.130	1.048		0.37	0.174	1.392		0.37	0.293	2.405	**	0.37
Clerks	Ref.				Ref.				Ref.			
Others	0.133	0.921		0.12	-0.125	-0.865		0.12	0.139	0.964		0.12
Agriculture / Fishing / Mining	-7.05E-02	-0.329		0.05	-0.303	-1.374		0.05	-0.105	-0.484		4.82E-02
Manufacturing	-0.148	-0.81		0.09	-9.25E-02	-0.491		0.09	-8.64E-02	-0.472		9.13E-02
Construction	Ref.				Ref.				Ref.			
Wholesale and retail trade	0.218	0.993		0.05	-0.102	-0.451		0.05	0.388	1.746	*	5.43E-02
Communications	2.46E-02	0.118		0.06	-0.160	-0.752		0.06	-0.117	-0.567		5.62E-02
Financial intermediation	0.438	2.049	**	0.07	5.30E-02	0.243		0.07	0.147	0.692		7.01E-02
Real estate	0.195	1.117		0.14	-2.82E-02	-0.157		0.14	0.199	1.135		0.14
Public administration and defence	-0.195	-0.904		0.07	-0.446	-2.019	**	0.07	-0.370	-1.703	*	7.20E-02
Education	0.874	4.444	**	0.18	-3.88E-02	-0.196		0.18	0.218	1.129		0.18
Health and social work	1.37E-02	0.058		0.10	-0.241	-0.996		0.10	0.356	1.488		0.10
Social and personal service activities	0.360	1.816	*	0.09	-0.127	-0.626		0.09	0.342	1.706	*	9.36E-02
Others	0.344	1.190		0.03	-0.219	-0.779		0.03	0.455	1.586		2.50E-02
Self-employed	-0.149	-0.871		0.09	0.144	0.857		0.09	-0.398	-2.343	**	9.17E-02
Private sector	-7.06E-02	-0.615		0.62	7.96E-02	0.707		0.62	8.35E-03	0.074		0.62
Public sector	Ref.				Ref.				Ref.			
Small firm (under 50 workers)	Ref.				Ref.				Ref.			
Medium firm (50 - 249 workers)	0.250	2.291	**	0.18	-1.57E-02	-0.145		0.18	0.231	2.1500	**	0.18
Large firm (250 workers +)	0.347	3.643	**	0.48	0.2127	2.236	**	0.48	0.434	4.5900	**	0.48
Current type of contract (=1 if unlimited term)	9.43E-02	1.112		0.65	1.96E-02	0.232		0.65	8.13E-02	0.971		0.65

Hours in main employment per week	5.63E-03	1.659	*	40.31	1.12E-02	3.267	**	40.31	1.35E-02	3.947	**	40.31
Innovation with respect to knowledge or methods	0.174	4.764	**	3.32	0.301	8.208	**	3.32	0.328	8.996	**	3.32
Supervise other staff members	0.133	1.619		0.39	0.244	2.967	**	0.39	0.332	4.027	**	0.39
Responsible for deciding work strategies	0.224	7.145	**	2.59	0.189	6.042	**	2.59	0.195	6.207	**	2.59
Damage for the organisation if major mistakes	0.148	4.272	**	3.59	0.274	7.946	**	3.59	0.152	4.391	**	3.59
Education	0.142	0.715		0.11	0.306	1.544		0.11	0.117	0.592		0.11
Humanities and Arts	0.442	2.109	**	0.08	0.330	1.585		0.08	-0.178	-0.854		7.90E-02
Social sciences, Business and Law	0.192	1.114		0.34	0.206	1.193		0.34	-0.179	-1.039		0.34
Science, Mathematics and Computing	-8.12E-02	-0.427		0.14	0.139	0.729		0.14	-0.268	-1.424		0.14
Engineering, Manufacturing and Construction	-4.02E-03	-0.021		0.17	-0.129	-0.659		0.17	-0.141	-0.724		0.17
Agriculture and Veterinary	0.288	1.204		0.04	0.141	0.586		0.04	-3.29E-02	-0.136		4.08E-02
Health and Welfare	Ref.				Ref.				Ref.			
Services	0.942	2.037	**	0.01	0.272	0.564		0.01	-4.64E-02	-0.097		7.70E-03
Education mismatch	-0.771	-6.356	**	0.17	-0.444	-3.634	**	0.17	-0.263	-2.197	**	0.17
Woman	0.353	4.385	**	0.62	0.560	6.944	**	0.62	0.507	6.343	**	0.62
Age	-2.06E-02	-1.706	*	29.90	-4.20E-02	-3.606	**	29.90	-2.74E-02	-2.461	**	29.90
Mu(1)	0.936	10.401	**		1.191	12.986	**		1.176	17.732	**	
Mu(2)	1.730	23.184	**		2.006	27.454	**		1.842	32.191	**	
Mu(3)	3.085	60.244	**		3.267	63.937	**		2.780	59.641	**	
Mu(4)	4.220	99.668	**		4.424	104.862	**		3.685	88.719	**	
Mu(5)	5.614	112.168	**		5.866	116.715	**		4.982	100.566	**	
Dependent variable: 'What is the required level of competence in your current work?'					Asterisks indicate coefficients that are significant at the 5% level (**) and 10% level (*)							
Number of observations		2591				2590				2596		
Log likelihood function		-3799.227				-3833.771				-4090.528		
Chi squared		441.732				446.386				437.785		
Prob[ChiSqd > value] =		0.0000				0.0000				0.0000		
Source: Author's calculations												

Table 3: Explanatory factors of competences required in the workplace (cont'd)

	Ability to perform well under pressure				Ability to rapidly acquire new knowledge				Ability to coordinate activities			
	Coefficient	**t-ratio**		**Mean of X**	**Coefficient**	**t-ratio**		**Mean of X**	**Coefficient**	**t-ratio**		**Mean of X**
Constant	0.752	1.494			1.589	3.190	**		1.415	2.842	**	
Professionals	0.216	1.622		0.33	-2.09E-02	-0.160		0.33	0.159	1.206		0.32
Technicians and associate professionals	9.71E-02	0.779		0.37	-0.245	-1.988	**	0.37	0.242	1.951	**	0.37
Clerks	Ref.				Ref.				Ref.			
Others	0.398	2.767	**	0.12	-6.05E-02	-0.419		0.12	0.102	0.703		0.12
Agriculture / Fishing / Mining	-0.138	-0.637		4.81E-02	7.98E-02	0.362		4.83E-02	-0.418	-1.924	*	4.80E-02
Manufacturing	-9.84E-02	-0.537		9.09E-02	0.111	0.589		9.12E-02	-0.135	-0.725		9.17E-02
Construction	Ref.				Ref.				Ref.			
Wholesale and retail trade	-0.215	-0.971		5.43E-02	-6.20E-02	-0.280		5.41E-02	-0.138	-0.622		5.46E-02
Communications	0.212	1.000		5.58E-02	0.251	1.183		5.64E-02	-0.247	-1.17		5.65E-02
Financial intermediation	0.638	2.964	**	7.01E-02	0.502	2.356	**	6.99E-02	-0.390	-1.808	*	7.00E-02
Real estate	0.199	1.122		0.14	0.566	3.145	**	0.14	-0.107	-0.598		0.14
Public administration and defence	-0.233	-1.080		7.20E-02	-3.46E-02	-0.158		7.19E-02	-0.448	-2.054	**	7.24E-02
Education	-0.223	-1.150		0.18	0.166	0.849		0.18	4.49E-02	0.227		0.18
Health and social work	0.180	0.755		0.10	-5.56E-02	-0.237		0.10	-0.723	-2.994	**	0.10
Social and personal service activities	-1.36E-02	-0.068		9.28E-02	-1.18E-02	-0.059		9.23E-02	-5.17E-02	-0.254		9.21E-02
Others	6.26E-02	0.224		2.50E-02	-2.66E-03	-0.01		2.51E-02	-0.225	-0.787		2.48E-02
Self-employed	0.289	1.724	*	9.16E-02	-6.99E-02	-0.418		9.08E-02	-5.49E-02	-0.325		9.17E-02
Private sector	0.230	2.061	**	0.62	-7.37E-02	-0.669		0.62	6.35E-02	0.559		0.62
Public sector	Ref.				Ref.				Ref.			
Small firm (under 50 workers)	Ref.				Ref.				Ref.			
Medium firm (50 - 249 workers)	0.133	1.234		0.18	-2.47E-02	-0.232		0.18	0.203	1.877	*	0.18
Large firm (250 workers +)	0.312	3.335	**	0.48	0.261	2.788	**	0.48	0.287	3.057	**	0.48
Current type of contract (=1 if unlimited term)	-1.04E-02	-0.125		0.65	-0.178	-2.129	**	0.65	-3.33E-02	-0.394		0.65

Hours in main employment per week	2.36E-02	6.698	**	40.31	1.60E-02	4.615	**	40.33	5.60E-03	1.651	*	40.31
Innovation with respect to knowledge or methods	0.236	6.479	**	3.32	0.490	13.355	**	3.32	0.335	9.224	**	3.32
Supervise other staff members	0.313	3.803	**	0.39	-3.90E-02	-0.475		0.39	0.673	8.199	**	0.39
Responsible for deciding work strategies	0.118	3.787	**	2.59	0.135	4.357	**	2.59	0.336	10.697	**	2.59
Damage for the organisation if major mistakes	0.378	10.844	**	3.59	0.251	7.286	**	3.59	0.185	5.391	**	3.59
Education	-6.16E-02	-0.311		0.11	-0.271	-1.396		0.11	2.56E-02	0.128		0.11
Humanities and Arts	0.431	2.068	**	7.89E-02	-2.42E-02	-0.117		7.88E-02	0.104	0.495		7.86E-02
Social sciences, Business and Law	-2.47E-03	-0.014		0.34	-0.101	-0.593		0.34	5.07E-02	0.288		0.34
Science, Mathematics and Computing	-5.19E-02	-0.274		0.14	7.39E-02	0.396		0.14	-0.118	-0.612		0.14
Engineering, Manufacturing and Construction	-3.81E-03	-0.020		0.17	-0.137	-0.705		0.17	-8.76E-02	-0.444		0.17
Agriculture and Veterinary	-0.264	-1.095		4.08E-02	-3.98E-03	-0.017		4.02E-02	0.180	0.769		4.06E-02
Health and Welfare	Ref.				Ref.				Ref.			
Services	0.395	0.890		7.70E-03	-0.227	-0.553		7.73E-03	0.671	1.417		7.35E-03
Education mismatch	-0.471	-3.904	**	0.17	-0.920	-7.600	**	0.17	-0.859	-7.133	**	0.17
Woman	0.262	3.288	**	0.62	0.276	3.470	**	0.62	0.469	5.904	**	0.62
Age	-2.23E-02	-1.886	*	29.90	-1.48E-02	-1.267		29.89	-2.20E-02	-1.856	*	29.91
Mu(1)	1.006	14.125	**		1.301	16.338	**		1.156	17.038	**	
Mu(2)	1.896	32.097	**		2.373	39.422	**		1.977	34.425	**	
Mu(3)	2.970	63.420	**		3.549	76.711	**		3.037	64.962	**	
Mu(4)	3.940	93.695	**		4.757	113.091	**		4.215	98.738	**	
Mu(5)	5.316	103.401	**		6.201	114.889	**		5.755	104.073	**	
Dependent variable: 'What is the required level of competence in your current work?'				Asterisks indicate coefficients that are significant at the 5% level (**) and 10% level (*)								
Number of observations		2597				2588				2584		
Log likelihood function		-4036.152				-4069.679				-4047.635		
Chi squared		567.414				572.306				704.2812		
Prob[ChiSqd > value] =		0.0000				0.0000				0.0000		
Source: Author's calculations												

Second, the '*Ability to use time efficiently*' is an important skill in work settings. Individuals routinely face deadlines that are accompanied by a specific amount of work that should have been produced in that time. The inefficient use of time might result in several undesired or unpleasant outcomes, decreased revenues, psychological stress and employment termination. Again, everything else being constant, this competency is highly required by graduates working for organisations or holding positions with a high degree of innovation with respect to knowledge or methods, and responsible for managerial tasks (including those workers responsible for the supervision of other staff members). Although statistically significant differences are not found between occupations, type of employer and degrees, nevertheless the competence is less required in the public administration/defence and if the person is badly matched to the job – and more required for female graduates than for males ones.

Third, the '*Ability to work productively with others*' is more required among technicians and associate professionals and, compared with the construction sector, in wholesale and retail trade, and social and personal service activities, but less required in the public sector and defence. The results also confirm something quite evident: the ability to work in a team is less required by self-employed individuals, *ceteris paribus*. The requirement for this skill increases with the size of the organisation/firm.

The econometric results also show again that the '*Ability to work productively with others*', everything else being constant, is highly required by graduates working for organisations – or holding positions – with a high degree of innovation with respect to knowledge or methods, and responsibility for managerial tasks. Nevertheless, even though these are not statistically significant differences among degrees, this competence is less required if the individual is badly matched to the employment – and more required for female graduates than for males ones.

Fourth, the '*Ability to perform well under pressure*' is required in the financial intermediation sector, in the private sector – and to a less extent among self-employed workers – and in large companies. Yet again, this competence is highly required by graduates working for organisations – or holding positions – with a high degree of innovation with respect to knowledge or methods, and responsibility for managerial tasks. Although there are differences by degrees – more required by graduates from Humanities and Arts, statistically significant differences by occupations are not found.

Finally, this competence is less required if the individual is badly matched to the employment – and more required for female graduates than for males ones.

Fifth, the '*Ability to rapidly acquire new knowledge*' is more required in the industries of financial intermediation and real estate, and in large companies – however no statistically significant differences are found according to the type of employer. This competence is more required by those higher education graduates working for organisations, or holding positions, with a high degree of innovation with respect to knowledge or methods, and by those responsible for managerial tasks (responsible for deciding work strategies for the organisation and for damage to the organisation if major mistakes occur). Again, the competency is less required if the individual is not matched – also among technicians and associate professionals – and more required for female graduates than for males ones. But statistically significant differences between degrees are not found.

Finally, the '*Ability to coordinate activities*' is more required by graduates occupied as technicians/associate professionals, and less required, compared with construction, in the public administration and defence, and in the health and social work sectors. The larger the size of the company the more this competence is required; however there are no statistically significant differences according to the type of employer. The skill is highly required by those graduates working for organisations, or holding positions, with a high degree of innovation with respect to knowledge or methods, and by those responsible for managerial tasks. Although statistically significant differences between degrees are not found, the competence is less required if the graduate is badly matched to the employment – and more required for female graduates than for males ones.

Conclusion and Policy Recommendation

The employability of graduates is related to the skills they bring to the workplace. Although every employer is looking for a specific set of skills from job-seekers that match the skills necessary to perform a particular job, beyond these job-specific technical skills, certain skills are nearly universally sought by employers. Using data on Spain from the European REFLEX project, this paper finds that the most required competences of graduates are: a) mobilising their own capacities (using time efficiently, performing well under pressure); b) mobilising others (working

productively with others, coordinating activities, making meaning clear to others); and c) having good specialist knowledge (mastery of own field, ability to rapidly acquire new knowledge).

Do higher education institutions provide graduates with the required competences? Although in relation to the requirements of the workplace various studies have indicated employer dissatisfaction with the development of such skills in (under)graduates (see Roizen and Jepson 1985) and a recognition by (under)graduates of their weakness in these skills (see Brennan and McGeevor 1988), this paper proves that Spanish graduates possess those skills to some extent and universities play a key role in competence development. However, evidence shows that continuous assessment, in contrast with traditional modes of teaching, such as lectures in large groups and examinations, is the most effective mode of teaching and learning for developing labour market competences among graduates.

These results have clear implications for policy in the Bologna process. The reform of higher education in Spain will have important consequences for students, academics and the labour market. Developing transferable skills that university graduates can take into the workplace will become a major concern for Spanish universities in the coming years. One of the main challenges facing higher education institutions is to transform their current pedagogical practices – the lecture continues to be the dominant teaching method – into competence-based teaching as a responsiveness of HEIs to labour market needs. Although the teaching of transferable skills is neither easy nor certain, learner-centred instruction, which incorporates active teaching methods, is more expensive to implement compared with the traditional ones – it demands more resources, smaller groups, more instructors, etc. – but it is indeed less cost-effective.

In any case, popular discussions of skill formation almost always focus on expenditure on schools or on educational reforms but neglect important non-institutional sources of skill formation, which are equally, if not more, important producers of the varieties of skills that are useful in a modern economy. This paper demonstrates that not only academic institutions, but also families and firms appear as sources of learning and skill formation.

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References

Acemoglu, D. (1998) 'Why do new technologies complement skills? Directed technical change and wage inequality', *Quarterly Journal of Economics*, 113, 4, 1055-1089.

Allen, J., Inenaga, Y., van der Velden, R. and Yoshimoto, K. (Editors) (2007) *Competencies, Higher Education and Career in Japan and the Netherlands (Higher Education Dynamics),* Springer, Dordrecht: The Netherlands.

Altonji, J.G., Bharadwaj, P. and Lange, F. (2008) 'Changes in the characteristics of American youth: implications for adult outcomes', NBER Working Paper Series No.13883, National Bureau of Economic Research, Cambridge, MA.

Becker, G.S. (1964) *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education*, National Bureau of Economic Research: New York.

Blanchflower, D.G. and Oswald, A.J. (2000) 'Well-being over time in Britain and the USA', NBER Working Paper Series No.7487, National Bureau of Economic Research, Cambridge, MA.

Bowles, S., Gintis, H. and Osborne, M. (2001) 'Incentive-enhancing preferences: personality, behavior and earnings', *American Economic Association Papers and Proceedings*, 91, 155-158.

Brennan, J. and McGeevor, P. (1988) *Graduates at Work: Degree Courses and the Labour Market*, Kingsley: London.

Carnevale, A.P., Gainer, L.J. and Meltzer, A.S. (1990) *Workplace Basics. The Essential Skills Employers Want*, Jossey-Bass Publishers: San Francisco.

Claessens, B.J.C., van Eerde, W., Rutte, C.G. and Roe, R.A. (2007) 'A review of the time management literature', *Personnel Review*, 36, 2, 255-276.

Davis, S.J. and Haltiwanger, J. (1991) *Wage Dispersion between and within U.S. Manufacturing Plants, 1963-86,* Brookings Papers on Economic Activity: Microeconomics, pp. 115-80.

Dillon, W.R. and Goldstein, M. (1984) *Multivariate Analysis: Methods and Applications*, John Wiley & Sons: New York.

Douglas, S. and Sulock, J. (1995) 'Estimating educational production functions with correction for drops', *Journal of Economic Education*, 26, 2, 101-112.

Dunkin, M.J. (1983) 'A review of research on lecturing'. In J.P. Powell (Ed.), *Higher Education Research and Development*, 2, 1, 63-78. (ERIC Document Reproduction Service No. ED240897).

Dunne, T., Haltiwanger, J.C. and Troske, K.R. (2004) 'Technology and jobs: secular changes and cyclical dynamics', Carnegie-Rochester Conference Series on Public Policy 46 (June), pp. 107-78.

Felstead, A., Gallie, D., Green, F. and Zhou, Y. (2007) *Skills at Work, 1986 to 2006*, ESRC Centre on Skills, Knowledge and Organisational Performance, University of Oxford: Oxford.

Garcia-Aracil, A. and van der Velden, R. (2008) 'Competencies for young European higher education graduates: labor market mismatches and their payoffs', *Higher Education*, 55, 2, 219-239.

Garcia-Aracil, A., Mora, J.G. and Vila, L.E. (2004) 'The rewards of human capital competences for young European higher education graduates', *Tertiary Education and Management*, 10, 4, 287-305.

Greene, W.H. (1997) *Econometric Analysis*, Prentice-Hall: Upper Saddle River, NJ.

Hanushek, E. (1996) 'Measuring investment in education', *Journal of Economic Perspectives*, 10, 4, 9-30.

Hanushek, E. (2002) 'Publicly provided education', NBER Working Paper Series No.8799, National Bureau of Economic Research, Cambridge, MA.

Hanushek, E.A. and Kimko, D.D. (2000) 'Schooling, labor-force quality and the growth of nations,' *American Economic Review*, 90, 5, 1184-1208.

Heckman, J.J. (2000) 'Policies to foster human capital', *Research in Economics*, 54, 1, 3-56.

Heckman, J.J. (2006) 'Skill formation and the economics of investing in disadvantaged children', *Science*, Vol. 312, 30 June.

Heckman, J.J. and Rubinstein, Y. (2001) 'The importance of noncognitive skills: lessons from the GED test program', *American Economic Review*, 91, 2, 145-149.

Heckman, J.J., Lochner, L.J. and Todd, P.E. (2008) 'Earnings functions and rates of return', *Journal of Human Capital*, 1, 1, 1-31.

Heckman, J., Stixrud, J. and Urzua, S. (2006) 'The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior', *Journal of Labor Economics*, 24, 3, 411-482.

Johnes, J. (2006) 'Data envelopment analysis and its application to the measurement of efficiency in higher education', *Economics of Education Review*, 25, 3, 273-288.

Lleras, C. (2008) 'Do skills and behaviors in High School matter? The contribution of noncognitive factors in explaining differences in educational attainment and earnings', *Social Science Research*, 37, 3, 888-902.

Lucas, R.E. (2009) 'Ideas and growth', *Economica*, 76, 301, 1-19.

Mas, A. and Moretti, E. (2009) 'Peers at work', *American Economic Review*, 99, 1, 112-145.

McKeachie, W.J., Pintrich, P.R., Lin, Y-G. and Smith, D.A.F. (1986) *Teaching and Learning in the College Classroom: A Review of the Research Literature*, National Center for Research to Improve Postsecondary Teaching and Learning, Technical report No. 90-B-003.1, Ann Arbor, Mich.

McKelvey, R.D. and Zavoina, W. (1975) 'A statistical model for the analysis of ordinal level dependent variables', *Journal of Mathematical Sociology*, 4, 103-120.

Murnane, R.J., Willett, J.B. and Levy, F. (1995) 'The growing importance of cognitive skills in wage determination', *Review of Economics and Statistics*, 77, 2, 251-266.

OECD (2005) *Education at a Glance 2005: OECD Indicators*, OECD: Paris.

OECD (2007) *Education at a Glance 2007: OECD Indicators*, OECD: Paris.

Oosterbeek, H. and Webbink, D. (2006) 'Assessing the returns to studying abroad', CPB Discussion Paper No. 64.

Putnam, R. (2001) 'Social capital: measurement and consequences'. In Helliwell, J.F. (Editor) *The Contribution of Human and Social Capital to Sustained Economic Growth and Well-Being: International Symposium Report*, Human Resources Development Canada and OECD: Ottawa.

Ramsden, P. and Moses, I. (1992) 'Associations between research and teaching in Australian higher education', *Higher Education*, 23, 3, 273-295.

Roizen, J. and Jepson, M. (1985) *Degrees for Jobs: Employer Expectations of Higher Education*, Society for Research into Higher Education & NFER-Nelson: Guildford.

Sadlak, J. (1978) 'Efficiency in higher education – concepts and problems', *Higher Education*, 7, 213-220.

Salisbury, M.H., Umbach, P.D., Paulsen, M.B. and Pascarella, E.T. (2009) 'Going global: understanding the choice process of the intent to study abroad', *Research in Higher Education*, 50, 119-143.

Spence, M. (1973)'Job market signalling', *Quarterly Journal of Economics*, 87, 355-74.

Teichler, U. (2007a) 'Does higher education matter? Lessons from a comparative graduate survey', *European Journal of Education*, 42, 1, 11-34.

Teichler, U. (Ed.) (2007b) Careers of University Graduates. Views and Experiences in Comparative Perspectives, *Higher Education Dynamics*, Vol. 17, Springer, New York, US.

Vandenbussche, J., Aghion, P. and Meghir C. (2006) 'Growth, distance to frontier and composition of human capital', *Journal of Economic Growth*, 11, 2, 97-127.