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“This is an Accepted Manuscript version of the following article, accepted for publication in Studies in Higher Education. Perez-Encinas, A., & Berbegal-Mirabent, J. (2022). Who gets a job sooner? Results from a national survey of master’s graduates. Studies in Higher Education, 48(1), 174–188.. It is deposited under the terms of the Creative Commons Attribution-NonCommercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited.”

Who gets a job sooner? Results from a national survey of master's graduates

This study investigates the factors that influence how long it takes for master's-level graduate students to find employment. The original contribution stems from questioning whether the structure and content of university programmes play a role in graduates' ability to secure jobs. To this end, we focus on three dimensions at three points in time after graduation: competence acquisition, teaching methods and programme characteristics. The dataset comes from a large-scale study on graduates' employability by the Observatory for University Employability and Employment (OEEU) and contains detailed information about master's degree graduates in Spain. A multinomial logit estimated by the maximum likelihood method is used to identify the critical factors influencing the likelihood of acquiring a job sooner. The findings indicate that educational programmes fail to provide the necessary competencies to ensure a smooth transition from the university to the job market and that study programme initiatives related to active learning and internships make a difference in this transition. We believe that these results shed light on specific characteristics of academic programmes and should be considered during programme design to enhance graduates' employability and faster labour market insertion.

Keywords: higher education, graduate employability, master's graduates, competence development, teaching method, study programme

Introduction

Over the past years, society's expectations about universities' responsibility to produce highly qualified graduates have increased substantially (Clarke, 2018). Against this backdrop, this study is centred on graduates' employability. 'Employability' can be defined as a set of competencies, understanding and personal attributes that render graduates more likely to gain employment and be successful in their chosen occupations, thus benefiting themselves, the workforce, the community and the economy (Yorke 2006). As stated both in the OECD report *Enhancing the Higher Education System Performance* (2017) and in Bridgstock's (2019) work, HEIs are

expected to foster the learning outcomes that employers value by developing student's employment skills.

This study investigates the factors affecting the time it takes for master's degree graduates to obtain their first jobs after completing their academic programmes. Building upon existing literature on graduate employability, we scrutinise three core factors, namely competence development, teaching methods and programme characteristics in relation to three profiles for master's graduate students: those who found employment within six months after graduation, those who found employment within six months to one year and those who had failed to secure employment over one year after graduation. The novelty of our approach resides in integrating the analyses of the aforementioned dimensions, which have been either overlooked by previous researchers or examined in isolation. Moreover, we contribute to expanding the limited number of studies in which master's graduates' employability is assessed.

The empirical application considers the case of Spain. Data come from a pioneering survey on graduate employability run by the OEEU. According to Lindberg (2007), the use of graduate surveys is most appropriate for measuring the employability of graduates, provides useful information for stakeholders and is a mean for benchmarking and comparing institutional performance.

Literature review

A comprehensive review of the existing literature – including scholarly articles and relevant grey literature – was conducted to determine the factors that enhance graduates' chances of finding a job. The review brought to light a variety of factors, which were grouped into three categories: competence acquisition, teaching methods and programme characteristics. We elaborate on each of these pillars below.

Competence development

Higher education is expected to contribute to the development of a variety of complex competencies that enhance the stock of human capital and foster national economic well-being (Wickramasinghe and Perera 2010). Although students still view higher education credentials as positioning them favourably in the labour market, graduates' competencies have increasingly become more important than their academic credentials in the recruitment process (Succi and Canovi 2020). A recent study analysing 21 million job advertisements in the UK (Brown and Souto-Otero 2020) confirms the importance given to job readiness as opposed to showing a minimum level of attainment.

Employers seek sets of personal and professional competencies that fit with the requirements of the job market. In this research we use the five categories of generic competencies provided by the OEEU Barometer: *technical skills* related to the field or discipline, *skills and attitudes* (e.g. information and communication technology skills, communication abilities, foreign languages, planning, organising), *systemic competencies* (e.g. creativity, personal initiative, leadership, adaptability, innovation), *cognitive and methodological competencies* (e.g. problem-solving, analytical thinking, working under pressure), and *interpersonal competencies* (e.g. the ability to work in teams or in an international context, appreciation of diversity, multiculturalism).

As stressed in the Bologna Declaration in 1999, one of the key questions to address is how to develop a model in which curricula ensure a meaningful preparation for the labour market (Sarkar et al. 2020). Notwithstanding, although competencies play a key role when evaluating prospective candidates for a job offer, there is still limited evidence regarding which types are more decisive and in which contexts, and how they should be introduced in course curricula. Accordingly, our first hypothesis (H1) posits that the larger the variety of competencies acquired during a master's programme, the higher the likelihood of finding a job sooner.

Teaching methods

Teaching methodologies can impact the learning process and the future employability of graduates. Various voices argue for a renewal of the teaching process (Hyun et al. 2017). The outdated and irrelevant curriculum in the higher education system has led to university graduates being ill-prepared (Tran 2015; Osmani et al. 2015). Teaching should go beyond pouring knowledge into a student's head. In this context, the use of student-centred active learning strategies is seen as an effective way to foster higher employment rates (Jackson and Bridgstock 2021; 2018; Roderick 2019). Active learning and experiential learning are alternative teaching strategies that break with traditional methodologies and include practical action, either by participating or by doing, mimicking real work situations.

Current pedagogical trends tend to inspire lecturers to incorporate skill development opportunities into curricula design. Recent studies (e.g., Kelly et al. 2019; Rohanai et al. 2019) further support the belief that active learning methods as well as boosting university-industry collaboration through the teaching mission (Bergebäl-Mirabent et al. 2020) provide students with the opportunity to apply newly learnt knowledge to practical situations, thereby simultaneously developing and reinforcing employability skills. In line with these arguments, our second hypothesis (H2) states that students following master's programmes in which active learning methods have a prominent role have a greater chance of securing a job soon after graduation. To test this, we classified teaching methods into three categories – traditional, moderate and active learning – based on the intensity of the student-centric approach.

Characteristics of the programme

Since the creation of the European Higher Education Area in 1999, HEIs have invested

considerable resources in improving students' employability skills by enriching academic programmes with a variety of activities. These include work-based learning experiences or internships and mobility programmes, and there is widespread agreement about the unique opportunities these experiences provide to students, employers and HEIs alike (Byrne 2022).

Internships are believed to offer an autonomous, multifaceted context for learning that fosters professional maturation (Petzold 2021; Wilton 2012). According to Bittmann and Zorn (2020), there are three main theoretical corpuses that could help explain why internships should improve labour market outcomes. On the one hand, the human capital theory (Becker 2009) suggests that, given that knowledge and skills are not learnt only in educational institutions, work placements help students to acquire practical competencies, raising their market value. Second, according to the signalling theory (Spence 1973), graduates with internships signal motivation, relevant abilities and productivity, which are positively evaluated by future employers. Finally, following the social capital theory and its application in higher education (Fuller et al. 2011), internships increase one's social capital, and larger social networks are associated with superior labour market outcomes. In the Spanish context, internships in master's programmes are typically part of the study plans but tend to be optional.

Spending a period abroad at a different university is another characteristic of academic programmes. International mobility is not only a personally enriching experience, but can also widens career opportunities abroad and at home as an overseas qualification does often lead to substantial labour market rewards (Brooks and Waters 2011). International mobility also enhances an individual's network and cultural and linguistic knowledge of the foreign country. Although results are inconclusive regarding the specific value of study abroad for employment prospects (Wiers-Jenssen and Støren

2008; Pinto 2022), there is a general belief that employers tend to credit candidates who spent a period of their studies abroad because it shows that they are able to leave their comfort zones and face new challenges. In Spain, Iriondo (2020) found that in the medium term Erasmus study mobility had a positive impact on graduates' employment prospects and resulted in them receiving salaries that were 10-12% higher than those of non-participants.

In light of the above considerations, we argue that the time it takes to secure their first job is shorter for master's graduates who have a mobility period during their studies (H3). Similarly, those students who benefit from an internship placement with an industry partner as part of their master's programme are more likely to find a job sooner (H4).

Data and methods

Context: The Spanish higher education system

The focus of this study is on Spanish students who have completed a master's degree. Master's programmes are at ISCED (International Standard Classification of Education) level 7. Their length ranges between one and two academic years (60 and 120 ECTS respectively). Candidates must hold an official university degree to qualify for admission at this level. Universities have autonomy to design the curricula of these programmes as long as they fulfil a set of requirements established by the National Agency for Quality Assessment and Accreditation (ANECA), which, in turn, are aligned with the principles set by the European Higher Education Area.

Spain is an interesting case to study because universities are bridging long-term integration with the labour market (Di Meglio et al. 2022). In fact, Spanish graduates at

master and doctoral levels have the highest employment rates at 84% and 90% employment respectively (CYD Foundation 2019).

Sample

The data come from a survey on employability run by the OEEU. We used the OEEU's Barometer, which analysed the employability of master's degree graduates who had completed their studies during the 2013/2014 academic year in Spain. It had yielded responses from 6,738 graduates from 50 Spanish public and private universities. The dataset merged the administrative records of the universities with those of a survey in which graduates were asked about their work trajectory, the training they had received, and the relationship between their training and employment. To have a complete dataset, we deleted those observations from which information of interest was missing. A final sample of 1,672 completed records met the requirements.

Measures

Dependent variable

The dependent variable (see Table 1) was the time it took recent master's graduates to get their first job. The criteria for the selected cut-off points (six months and one year) follow the National Association of Colleges and Employers' (NACE, 2014) requirements, which were adhered to for several national surveys around the world, such as the 'UK First-destination Returns' (see also Støren and Wiers-Jenssen 2016; Di Meglio et al. 2022). Additionally, the annual employability report executed by Adecco (2020) set the criteria as employment within six months, between six months and one year, and beyond one year.

Insert Table 1 about here

Explanatory variables

Competencies. The OEEU Barometer paid special attention to a list of generic competencies that university graduates are expected to acquire. For the purpose of this study, we were interested in a question that required the participants to rate the extent to which their master's programmes had contributed to the development of these competencies according to a 7-point Likert scale (see Table 2).

Insert Table 2 about here

Teaching method. The survey also included a question regarding the extent to which various teaching and learning methods were implemented in the respondents' master's programmes. These methods were grouped into three categories (see Table 3). Traditional approaches refer to instruction modes in which students are passive recipients of knowledge from an expert. Conversely, in active learning methods, students are asked to become active agents in the learning process and to engage in diverse activities. Moderate approaches are placed in-between.

Insert Table 3 about here

To verify the suitability of these groupings, a principal component analysis was conducted. Both Bartlett's sphericity test ($\chi^2 = 3133.263$ with 45 degrees of freedom, p -value = 0.000) and the Kaiser-Meyer-Olkin value test (KMO = 0.728, p -value = 0.000) validated our approach. Next, an exploratory factor analysis was conducted, retaining three factors with eigenvalues greater than 1. The teaching methods were grouped according to the expected categories, with loadings greater than 0.5 in all instances.

Characteristics of the programme. Two variables were included. First, we considered whether the students spent a period abroad during their master's (*mobility*) programmes. Second, we distinguished between programmes that included a training period in a company (*internship*) and those that did not. These two variables were coded as dummy variables (1 if yes, 0 otherwise).

Control variables. We included a variable (*performance*) capturing the students' levels of attainment. Unfortunately, the Barometer did not include students' numerical grades, but rather distinguished between students who were graded with a pass (coded as 1), very good (2) or honours (3). We also controlled for potential differences due to *gender* (1 males, 0 females), studying and working (*study&work*) simultaneously (1 if yes, otherwise 0), and the *ownership* of the university in which the students were enrolled (1 public, 0 private). Moreover, we included a categorical variable to differentiate areas of knowledge (*discipline*).

Table 4 contains the descriptive statics of all these variables.

Insert Table 4 about here

Methodology

Scale validation

Our first step involved testing the suitability of the competence groupings in the categories listed in Table 2 as this classification was proposed in the Barometer and we did not find any empirical analysis verifying the validity of this approach. We analysed the unidimensionality of each factor. In all instances, the analysis extracted only one factor, corroborating the adequacy of the approach (see Table 5). Both the Cronbach's alpha and the composite reliability (CR) exceeded the cut-off point of 0.7, indicating

good internal consistency. The average variance extracted (AVE) also exceeded the recommended threshold (>0.5) for all the factors.

Insert Table 5 about here

The analysis of the discriminant validity confirmed the suitability of these factors. Table 6 shows the correlation matrix, in which the square root of each of the AVEs – shown in italics on the diagonal – was greater than the elements outside the diagonal. The only exception was interpersonal competencies, which showed some overlap with systemic and cognitive skills. Thus, while the grouping was correct and served the purposes of this study, future researchers are advised to revise the instrument that captures this information. This is a limitation of this study but, as noted by Heckman (2000), some skills are not yet well captured by standardised scales. Given that the OEEU study was the only survey capturing this sort of data at a national level, we decided to proceed with the analysis.

Insert Table 6 about here

Multinomial logit

To correctly test the hypotheses, we used a multinomial logit estimated by the maximum likelihood method, as shown in Equation [1]:

$$Pr(Y_i = k) = \frac{e^{\beta_j X_i}}{\sum_{j=0} e^{\beta_j X_i}} \quad [1]$$

where k ($k = 0, 1, 2$) refers to the situations under analysis: finding a job within the first six months after graduation (coded as 0), within six months to one year (1) and after more than 12 months (2). The full model to be estimated is shown in Equation [2]:

$$\begin{aligned} \text{Time to employment}_i = & \beta_0 + \beta_1 \text{Competences} + \beta_2 \text{Teaching method} + \\ & + \beta_3 \text{Characteristics of the programme} + \beta_4 \text{Control variables} + \varepsilon_i \end{aligned} \quad [2]$$

In equation [2], β_0 is the constant term, β_j refers to the vector of parameter estimates for the j th independent variable and ε_i is the logistic distributed disturbance term for the i th observation. The variables related to the competencies acquired by students (β_1) during their master's programme included specific competencies of the field (*technical*), skills and attitudes (*attitudes*), systemic competencies (*systemic*), cognitive and methodological competencies (*cognitive*), and interpersonal competencies (*interpersonal*). The teaching method variables (β_2) included students' perceptions of the extent of the application of different teaching methods within the programme, and the characteristics of the programme (β_3) captured whether a student undertook a mobility period abroad and/or an internship during their master's programme. The control variables corresponded to the final grade achieved by the student in the programme, their gender, whether they had studied and worked simultaneously, university ownership and a categorical variable indicating the area of knowledge.

Results

The results in Table 7 suggest that the students who indicated that the master's programme helped them to develop interpersonal skills were less likely to remain unemployed for more than one year. The development of cognitive skills raises the probability of finding a job one year after graduation but not within the first six months. The marginal effects (Table 8) contribute additional insights. For attitudes, an increase

of one unit in this skill is associated with being 3.2% less likely to fall into the middle group (finding employment between six months and one year post-graduation) and 4.2% more likely to struggle for more than one year to find a job. These results partially support our first hypothesis: competence development is relevant; however, not all competencies have the same effect. Some competencies that were believed to influence labour market activities, such as negotiation ability or languages, are not seen to be particularly relevant in the Spanish graduate labour market.

Insert Table 7 about here

Insert Table 8 about here

Regarding teaching methods, the results support our second hypothesis that active learning methods are crucial. The importance of introducing student-centred approaches in place of teacher-centric methods increases students' probabilities of finding a job sooner.

Turning to programme-specific features, no effect was found for the variable accounting for participation in exchange or mobility programmes; thus, there was no support for hypothesis 3. Contrary to our initial intuition, when looking at the effect of internships, we found that the students who participated in work placement programmes were more likely to take longer to find a job (>1 year). Thus, hypothesis 4 is rejected.

Finally, the control variables revealed no differences due to gender, but a significant effect was found for the variable *study&work*. A simultaneous combination of study and work was more commonly found for students who found a job within the first six months after graduation. Concerning university ownership, a short unemployment period was more likely for graduates who had attended a private

university. However, this effect was weak. When distinguishing by level of accomplishment, the results indicated that the students who performed well (grading: very good) were more likely to find a job between the first six months to one year after graduating. Similarly, excellent students were negatively associated with long periods of unemployment. In terms of field of study, the engineering students were less likely to be without employment for more than one year.

Given that the results were quite similar between groups 2 and 3 we carried out a robustness check to further investigate potential differences in employment opportunities for students in these groups. In brief, the findings obtained with this new configuration do not differ significantly from the results already reported. The full results are reported in the Appendix.

Discussion and implications

HEIs are becoming increasingly more concerned with the integration of their graduates into the labour market and with designing institutional mechanisms to facilitate students' transition from higher education to the job market (Silva et al. 2016). While this phenomenon has been largely documented in the literature, previous research efforts have overlooked the role that HEIs play in this process. With a view to filling this gap, this study comprises an examination of how the structure and the content of university master's programmes influence the time it takes for master's degree graduates to obtain their first job. By doing so, we go beyond the monolithic discourses that tend to dominate public debates and limit the study of employability to skills development. Similar to Jackson and Bridgstock (2021), we acknowledge the relevance of skill acquisition, but we also broaden the concept of employability to other dimensions.

Our results have several implications for managerial considerations. First, they suggest that skill acquisition – measured in terms of self-appraisal – has low predictive power in relation to employment. Among the various skills categories, cognitive and systemic skills were found to play a role, albeit in opposite directions, while interpersonal skills appeared to be more important at work than cognitive competencies (also seen in Salas-Velasco (2014) and Petzold (2021)). These findings call into question the effectiveness of competence development at HEIs to facilitate students' transition from university to the workforce. In Spain, as in many other countries, the higher education system is still largely focused on the provision of technical knowledge. A clear example is found in the indicators used to assess students' performance, most of which are designed to evaluate the acquisition of knowledge rather than the students' experience and skill development. While knowing and understanding the principles of a discipline are fundamental, one cannot underestimate the importance of the progressive demand for non-technical skills. The main challenge lies in how to adequately balance technical and non-technical skills in curricula and provide a variety of learning activities that promote social connectedness (Bridgstock 2019).

Although universities are increasingly encouraging their teachers to update their practices, the system is still oriented to the long tradition of professor-centred approaches. The Covid-19 pandemic has accelerated this debate and moved education forward to a new paradigm of teaching. Our study provides evidence that active learning methods do make a difference, complementing the works of Jackson and Bridgstock (2021), Kelly et al. (2019) and Rohanai et al. (2020). Thus, it is imperative to enrich students' learning experiences with more hands-on activities, giving them the opportunity to learn while doing, vocalise their knowledge, and learn with and from others. A higher concentration of student-centred learning activities, in combination

with social interactions (Bridgstock 2019), can enhance graduates' employability.

However, in order to transform traditional pedagogical practices into competence-based teaching and shift to a more student-centred approach, the higher education system must provide academic staff with more resources, time and facilities to update their courses.

Another remarkable finding is that the positive association between mobility and employment in undergraduate programmes seems to dilute, as observed by Wiers-Jenssen and Støren (2021) and Van Mol et al. (2021). Master's programmes are shorter than bachelor's programmes; thus, employers may pay little attention to international experiences. Instead, they prioritise what students have gained from the programme and how this new knowledge and/or skills can be applied. It is important to recall that master's programmes tend to have a higher share of foreign students. Thus, even when domestic students do not travel abroad, they have the opportunity to work in an international and multicultural environment in their home institutions. Accordingly, we argue that master's programmes should adopt a global perspective that includes the chance to unite participants – students, professors or guest speakers – from various nationalities in the academic offerings. Such an approach will enhance the social capital of the participants, blur geographical and linguistic borders and extend their network.

Additionally, our findings indicate that the effect of job placements on student employability might not be straightforward. Several interpretations should be considered. First, companies might not fully capitalise on the opportunities inherent in internships. According to Di Meglio et.al (2022), only 7.6% of interns are converted to fulltime employees by the companies at which they did their internships. Likewise, data from the Servicio Público de Empleo Estatal platform in 2019 indicate that only three out of 10 student interns are hired full-time by the company following their internships. Although the goal should be to make full-time hires from interns, various factors might

prevent them from doing so (e.g., there are no full-time positions open at that time or the company cannot afford to hire them). An alternative explanation relates to the human and signalling theories. Work experience obtained through internships contributes to raise graduates' market value. However, the offer is limited, and one might observe a mismatch between graduates' expectations of their first jobs and what companies are looking for, resulting in a situation of overqualification (Livanos 2020). A third explanation is that the master's programme might be seen as mandatory step for career trajectories, such as students who intend to pursue doctoral degrees having to first complete a master's programme or workers enrolled in upskilling programmes in their companies. In the latter case, master's students already have a job before starting their master's programme (CYD Foundation 2019). Consequently, once they graduate, they return to their company, benefiting from the new knowledge and skills acquired. This is a fairly common practice in certain disciplines with a high labour insertion rate in Spain. Fourth, it is relevant to question whether the typology of the internship plays a role. Voluntary or extracurricular internships have been found to display highly significant positive effects in relation to labour market outcomes (Jackson 2018), yet, no effects were observed for mandatory internships (Bittmann and Zorn 2020). Unfortunately, our data did not contain information concerning voluntary internships; therefore, our results should be interpreted with caution. We encourage further studies to be conducted in this direction as one of the selling points of master's programmes is the inclusion of job placements as a bridge to stable employment.

Finally, there are three additional characteristics that deserve attention. Students from private universities seem to be in an advantageous position compared to those attending public universities because the time between graduation and employment is more likely to be shorter for them. Official statistics support this finding (Ministerio de

Ciencia, Innovación y Universidades 2019). A similar pattern was observed for engineering students, who typically found a job sooner (<1 year). This result is also unsurprising because engineering skills are among the most in demand in Spain (CYD Foundation 2019; Adecco 2020). Students in the experimental sciences are more likely to find a job in six to 12 months after completing their master's degrees. Similar results for engineering students and those in the experimental sciences were found by Livanos (2020). Finally, when controlling for the simultaneous effect of working and studying, we observed that this combination had a positive effect, suggesting that students either keep their jobs once they finish their master's programmes or that this working experience has helped them to develop networks within their chosen industries (as explained by both the social capital and signalling theories).

Concluding remarks

This study interrogates the extent to which the structure and content of university programmes play a role in preparing graduates to enter the workforce. We analysed the impact of competence development, teaching methods and programme characteristics on the employment probabilities of master's degree graduates at three points of time. The empirical analysis was based on a large-scale national survey in Spain.

Our results are subject to a number caveats that should be acknowledged. First, our database comprised detailed information about master's degree graduates in a given country. To guarantee the respondents' anonymity, the survey did not solicit any information concerning the universities attended, with the only exception of university ownership. Moreover, there was no information about territory; consequently, we cannot infer from which university (or region) students graduated. While controls such as the characteristics of the region, status, prestige and size of the university might provide relevant insights concerning employers' recruitment practices and students'

mobility decisions, the existing surveys seem to have neglected the importance of collecting such information. Likewise, the inclusion of personal and psychological attributes or contextual factors constitute a promising area for future research. We are aware that the absence of these controls in our study constitutes an important shortcoming. However, given the uniqueness of this dataset and the lack of studies at master's level, we believe our approach captures, with the highest possible level of accuracy, the situation of master's graduates who are seeking their first job. Another direction for future research involves analysing the effect of work-based learning experiences abroad and at multinational companies. Finally, knowing more about the profile of graduates who require more than one year to get a job is a matter of interest for policymakers and education leaders. Unfortunately, the limited data did not allow for this type of analysis. Therefore, future researchers might consider collecting data in a more comprehensive way, which might, in turn, require qualitative techniques for the analysis.

All in all, we believe the outputs of this study can assist educators, policymakers and employers to make more informed decisions about course design and the type of university-industry partnerships required to ensure that graduates are equipped with the right skills, knowledge and tools to secure jobs. The results might also be valuable for graduate students because they point to some specific characteristics of academic programmes that should be considered when looking for a master's programme.

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List of Tables

Table 1. Operationalization of the dependent variable and responses in each category.

Time to employment	Frequency	Percentage (%)
Within the first 6 months	1,106	66.1
Between 6 months and 1 year	196	11.7
>1 year (including those that did not find a job)	370	22.1

Table 2. List of competencies.

Competence	Item	Description	Mean	Standard deviation
Technical skills (<i>Technical</i>)	T	Mastery of your own field or discipline	4.87	1.699
Skills and attitudes (<i>Attitudes</i>)	A1	Technological abilities	4.03	1.807
	A2	Oral and written communication skills	4.43	1.690
	A3	Oral and written communication skills in a foreign language	2.71	1.822
	A4	Planning and organising	4.13	1.726
	A5	Social skills	4.22	1.730
	A6	Ethical commitment	4.36	1.871
	A7	Sensitivity towards environmental and social issues	3.71	1.974
Systemic competencies (<i>Systemic</i>)	S1	Ability to learn autonomously	4.90	1.736
	S2	Ability to adapt to and act in new situations	4.68	1.799
	S3	Capacity to generate new ideas (creativity)	4.23	1.868
	S4	Ability to come up with new solutions and alertness to new opportunities (innovation)	4.33	1.874
	S5	Ability to evaluate and maintain the quality of work produced	4.58	1.891
	S6	Personal initiative	4.69	1.823
	S7	Ability to work autonomously and independently	4.82	1.798
	S8	Ability to mobilise the capacities of others (leadership)	4.01	1.867
Cognitive and methodological competencies (<i>Cognitive</i>)	C1	Ability to identify, pose and resolve problems	4.71	1.751
	C2	Ability to make reasoned decisions	4.53	1.809
	C3	Analytical thinking	4.89	1.715
	C4	Ability to perform well under pressure	4.30	1.899
Interpersonal competencies (<i>Interpersonal</i>)	I1	Ability to work in a team	4.84	1.756
	I2	Ability to work in interdisciplinary teams	4.50	1.894
	I3	Appreciation of and respect for diversity and multiculturalism	4.17	1.998
	I4	Ability to work in an international context	3.52	2.066
	I5	Taking responsibilities	4.54	1.819
	I6	Ability to be critical and self-critical	4.83	1.730

Table 3. List of teaching methods.

Category	Item	Teaching method	Mean	Standard deviation
Traditional mode (<i>Traditional</i>)	TM1	Theories, concepts and paradigms	3.04	0.822
	TM2	The teacher as the main source of information	2.82	0.836
	TM3	Written works	3.16	0.813
Moderate approaches (<i>Moderate</i>)	MM1	Class attendance	3.12	1.049
	MM2	Group work	3.03	0.960
	MM3	Oral presentations	2.84	0.993
Active learning methods (<i>Active</i>)	AM1	Participation in research projects	2.31	1.104
	AM2	Internships in companies or institutions	2.42	1.169
	AM3	Practical and methodological knowledge	3.03	0.829
	AM4	Project or problem-based learning	2.69	0.943

Table 4. Descriptive statistics for the main variables.

Variable	Mean	Standard deviation	Min	Max
Employment	1.56	0.830	1	3
Internship (1: yes, 0: no)	0.62	0.485	0	1
Mobility (1: yes, 0: no)	0.03	0.164	0	1
Performance (3: with honours, 2: very good, 1: pass)	2.13	0.507	1	3
Gender (1: male, 0: female)	0.56	0.497	0	1
Study&work (1: yes, 0: no)	0.50	0.500	0	1
Ownership (1: public, 0: private)	0.83	0.374	0	1
Discipline	3.59	1.154	1	5

Table 5. Analysis of reliability.

Factor	Item	Loading	Reliability analysis
Skills and attitudes (<i>Attitudes</i>)	A1	4.03	Cronbach's alpha: 0.912 Range of Cronbach's alpha if one item removed: 0.889 - 0.911 Range of correlations between items and total corrected scale: 0.643 - 0.826 CR: 0.970 AVE: 0.752
	A2	4.43	
	A3	2.71	
	A4	4.13	
	A5	4.22	
	A6	4.36	
	A7	3.71	
Systemic competencies (<i>Systemic</i>)	S1	4.90	Cronbach's alpha: 0.954 Range of Cronbach's alpha if one item removed: 0.944 - 0.950 Range of correlations between items and total corrected scale: 0.781 - 0.877 CR: 0.983 AVE: 0.787
	S2	4.68	
	S3	4.23	
	S4	4.33	
	S5	4.58	
	S6	4.69	
	S7	4.82	
	S8	4.01	
Cognitive and methodological competencies (<i>Cognitive</i>)	C1	4.71	Cronbach's alpha: 0.934 Range of Cronbach's alpha if one item removed: 0.899 - 0.936 Range of correlations between items and total corrected scale: 0.779 - 0.889 CR: 0.970 AVE: 0.864
	C2	4.53	
	C3	4.89	
	C4	4.30	
Interpersonal competencies (<i>Interpersonal</i>)	I1	4.84	Cronbach's alpha: 0.918 Range of Cronbach's alpha if one item removed: 0.895 - 0.911 Range of correlations between items and total corrected scale: 0.716 - 0.821 CR: 0.937 AVE: 0.712
	I2	4.50	
	I3	4.17	
	I4	3.52	
	I5	4.54	
	I6	4.83	

CR: Composite Reliability. AVE: Average of the variance extracted. All loadings are significant at 1%.

Table 6. Matrix of correlation of latent factors.

Factors	1	2	3	4
1. Attitudes	0.867			
2. Systemic	0.851	0.887		
3. Cognitive	0.810	0.906	0.929	
4. Interpersonal	0.832	0.850	0.851	0.844

Table 7. Multinomial logit

	Between 6 months and 1 year	> 1 year
Competencies		
Technical	0.069 (0.069)	0.002 (0.053)
Attitudes	-0.253 (0.159)	0.227 (0.141)
Systematic	-0.048 (0.231)	-0.292 (0.182)
Cognitive	0.168 (0.206)	0.414 (0.174)**
Interpersonal	-0.006 (0.185)	-0.536 (0.153)***
Teaching method		
Traditional	0.111 (0.090)	-0.043 (0.072)
Moderate	-0.123 (0.103)	0.122 (0.085)
Active learning	0.051 (0.102)	-0.252 (0.087)***
Characteristics of the programme		
Mobility	-0.631 (0.554)	-0.468 (0.442)
Internship	0.340 (0.173)**	0.393 (0.152)***
Control variables		
Student performance		
With honours	0.633 (0.461)	-0.573 (0.283)**
Very good	0.895 (0.434)**	-0.256 (0.248)
Gender	0.077 (0.172)	-0.097 (0.141)
Study&work	-1.495 (0.189)***	-1.757 (0.153)***
Ownership	0.450 (0.287)	0.281 (0.232)
Discipline		
Experimental sciences	0.855 (0.371)**	0.054 (0.315)
Medical sciences	-0.058 (0.378)	0.201 (0.268)
Social sciences	0.377 (0.309)	0.054 (0.229)
Engineering	0.093 (0.357)	-0.533 (0.281)*
Intercept	-3.120 (0.699)***	-0.532 (0.492)
Regression statistics		
Pseudo R2	0.1239	
χ^2 (degrees of freedom)	305.83 (38)	
Prob> χ^2	0.000	
Log likelihood	-1257.4153	
Number of observations	1,672	

Baseline group: Students that find a job within the first 6 months. Robust standard error is presented in brackets. The omitted student performance variable is “pass” and the discipline category that is missing is “arts and humanities”. *, **, *** indicate significance at the 10%, 5% and 1%, respectively.

Table 8. Marginal effects

	< 6 months	Between 6 months and 1 year	> 1 year
Competencies			
Technical	-0.005 (0.009)	0.007 (0.007)	-0.002 (0.008)
Attitudes	-0.010 (0.022)	-0.032 (0.015)**	0.042 (0.020)**
Systematic	0.037 (0.030)	0.004 (0.022)	-0.042 (0.026)
Cognitive	-0.060 (0.027)**	0.004 (0.019)	0.056 (0.025)**
Interpersonal	0.063 (0.024)*	0.016 (0.017)	-0.079 (0.022)***
Teaching method			
Traditional	-0.002 (0.012)	0.012 (0.009)	-0.010 (0.010)
Moderate	-0.006 (0.014)	-0.016 (0.010)	0.022 (0.012)*
Active learning	0.026 (0.014)*	0.013 (0.010)	-0.039 (0.012)***
Characteristics of the programme			
Mobility	0.097 (0.069)	-0.047 (0.054)	-0.050 (0.065)
Internship	-0.069 (0.023)***	0.021 (0.017)	0.048 (0.022)**
Control variables			
Student performance			
With honours	0.045 (0.046)	0.057 (0.026)**	-0.102 (0.044)**
Very good	-0.009 (0.023)	0.073 (0.022)***	-0.064 (0.041)
Gender	0.006 (0.023)	0.011 (0.016)	-0.017 (0.020)
Study&work	0.307 (0.019)***	-0.092 (0.017)***	-0.214 (0.020)***
Ownership	-0.063 (0.036)*	0.035 (0.028)	0.028 (0.034)
Discipline			
Experimental sciences	-0.070 (0.052)	0.091 (0.038)**	-0.021 (0.045)
Medical sciences	-0.024 (0.045)	-0.010 (0.028)	0.033 (0.041)
Social sciences	-0.030 (0.038)	0.033 (0.025)	-0.003 (0.034)
Engineering	0.054 (0.043)	0.021 (0.30)	-0.075 (0.038)**

Delta-method standard errors in parentheses. The omitted student performance variable is “pass” and the discipline category that is missing is “arts and humanities”. *, **, *** indicate significance at the 10%, 5% and 1%, respectively.

Appendix

Using the available data, it is feasible to differentiate between different groups of students based on the length of the post-graduation unemployment period. These groups are mutually exclusive, and a student cannot be classified in more than one group. To further corroborate differences between groups, we scrutinized the existence of potential differences between students in group 2 (between six months and one year to find a job) and group 3 (more than one year of unemployment) using the independent of irrelevant alternatives (IIA) test.

The IIA test assumes that the characteristics of a chosen alternative do not impact the relative probabilities of choosing other alternatives. In our context, its application allows us to verify whether omitting categories in the dependent variable yields to more consistent and efficient parameter estimates (Hausman and McFadden 1984). More specifically, the null hypothesis is that all coefficients of the estimated parameters are equal for students in groups 2 and 3; consequently, students in these two groups may be analyzed together. The underlying reasoning behind this assumption is that some of the most relevant reports in this field in Spain¹ tend to either not report on more than two groups (less than or more than six months to find employment) or found no relevant characteristics to explain differences in employment beyond the six-month timeframe.

The Hausman test was calculated as shown in Equation (3), where s denotes the estimator obtained with the restricted model and f the estimator obtained with the model using the set of all possible alternatives. \hat{V}_s and \hat{V}_f are the estimators of the asymptotic covariance matrices.

¹ For an example, see the Adecco and Fundación CYD reports.

$$\chi^2 = (\hat{\beta}_s - \hat{\beta}_f)' [\hat{V}_s - \hat{V}_f]^{-1} (\hat{\beta}_s - \hat{\beta}_f) \tag{3}$$

The results are displayed in Table A1 and indicate that $\hat{\beta}_s - \hat{\beta}_f = 0$ both when category 2 (employment between six months and one year after graduation) and 3 (more than one year of unemployment) are eliminated in the restricted models. Accordingly, in line with our initial prediction, these two categories can be merged into one group (more than six months to find a job) since no significant differences are observed in the estimated parameters (see Table A1). Consequently, a Logit and Tobit model were preferred for the analysis.

Table A1. Results of the Hausman test

		Full model	
		y=2	y=3
Restricted model (y≠2)	y=3	$\chi^2 = 20.46$ Prob $\chi^2 \geq 0.368$	
Restricted model (y≠3)	y=2	$\chi^2 = 13.41$ Prob $\chi^2 \geq 0.817$	

The new results are reported in Table A2 and operationalize the dependent variable as a dichotomous variable with the value of 1 if the length of post-graduation unemployment is no longer than six months; 0 is used for all other constellations.

Table A2. Results of the Logit and Tobit models

	Logit		Tobit
	Coefficient β	Marginal effect $\frac{dy}{dx}$	
Competencies			
Technical	-0.023 (0.047)	-0.004 (0.009)	-0.005 (0.013)
Attitudes	-0.057 (0.119)	-0.010 (0.022)	-0.020 (0.034)
Systematic	0.209 (0.160)	0.039 (0.030)	0.063 (0.046)
Cognitive	-0.325 (0.149)**	-0.060 (0.027)**	-0.091 (0.041)**
Interpersonal	0.343 (0.132)***	0.063 (0.024)***	0.097 (0.037)***

Teaching method			
Traditional	-0.010 (0.062)	-0.002 (0.011)	-0.003 (0.018)
Moderate	-0.033 (0.073)	-0.006 (0.014)	-0.005 (0.020)
Active learning	0.144 (0.074)*	0.027 (0.014)*	0.038 (0.021)*
Characteristics of the programme			
Mobility	0.544 (0.375)	0.100 (0.069)	0.170 (0.090)*
Internship	-0.375 (0.126)***	-0.069 (0.023)***	-0.100 (0.033)***
Control variables			
Student performance			
With honours	0.242 (0.253)	0.044 (0.046)	0.063 (0.067)
Very good	-0.059 (0.226)	-0.011 (0.042)	-0.019 (0.060)
Gender	0.035 (0.122)	0.006 (0.022)	0.008 (0.034)
Study&work	1.658 (0.128)***	0.306 (0.19)***	0.497 (0.035)***
Ownership	-0.334 (0.193)*	-0.062 (0.036)*	-0.064 (0.043)
Discipline			
Experimental sciences	-0.363 (0.272)	-0.069 (0.052)	-0.106 (0.085)
Medical sciences	-0.113 (0.243)	-0.021 (0.045)	-0.032 (0.070)
Social sciences	-0.164 (0.206)	-0.031 (0.038)	-0.053 (0.059)
Engineering	0.308 (0.245)	0.054 (0.044)	0.071 (0.065)
Intercept	0.650 (0.433)		0.440 (0.117)***
Regression statistics			
Log likelihood	-916.623		-1560.998
Wald chi2	246.37***		
Pseudo R2	0.1435		0.0905
F			16.49***
Number of observations		1,672	

Robust standard error is presented in brackets. The omitted student performance variable is “pass” and the discipline category that is missing is “arts and humanities”. *, **, *** indicate significance at the 10%, 5% and 1%, respectively.

The results are generally consistent with those obtained in the multinomial logit. The development of interpersonal skills and a low acquisition of cognitive skills are associated with increased chances of getting a job sooner. No significant effect is found for the other competencies investigated. Regarding teaching methods, the use of active learning approaches is linked to a reduced unemployment period. With relation to the specific characteristics of the master’s programme, both models provide additional evidence of the negative effect of completing an internship on finding a job, whereas—

similarly to the multinomial logit model—simultaneously studying and working reduces the length of unemployment.

Contrary to the previous analysis, the level of students' achievement seems to be irrelevant to explaining post-graduation unemployment length; this absence of significance is consistent in both the Logit and Tobit models. This result reflects the reality of the Spanish context (compared to other countries such as Italy), in which students' final score obtained at graduation is rarely included on CVs or in job interviews. Lastly, students who completed their master's at a private university seem to have better chances of finding a job sooner than those at public universities, although this association is only significant in the Logit model.