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Academic Learning and Professional Skills: Transition to Work of Higher Education Graduates in Engineering, Manufacturing and Construction

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ABSTRACT

The aim of the present paper is to focus on university graduates' trajectories in the «Engineering, Manufacturing and Construction» area (ISCED 1997), in what it concerns to transition to work five years after obtaining their academic degree. We aim to describe this transition in both objective and subjective perspectives, the career trajectory and satisfaction with work and work centrality (Herzberg, 1971, MOW Group, 1987, Schwartz 1999). We also aim to present a conceptual and theoretical reflection about the «competence model», as well as the data related to skills that graduates consider as having been more developed at university, in comparison with skills required by the labor market. The data were collected via an enquiry between November 2010 and January 2011 by CESNOVA – Centre for Sociological Studies of the Universidade Nova de Lisboa. The sample comprises graduates who have completed their degrees in 2004/2005 academic year from two of the main Portuguese public universities (Universidade de Lisboa and Universidade Nova de Lisboa), through a project named «Graduates' transition to work trajectories: objective and subjective relations with work» project (PTDC/CS-SOC/104744/2008), financially supported by Foundation for Science and Technology. The results seems to confirm the hypothesis that the courses in the field of «Engineering, Manufacturing and Construction» have a curriculum aimed at developing skills that are valued in the labor market, taking into account the specificities of profession «Engineer».

Key-words: Graduate employment, work trajectory, work centrality, engineers.

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INTRODUCTION

Graduates' transition to work trajectories has attracted the interest of the academic community in both European and Portuguese contexts, due to structural and cyclical changes occurring in the job market and also due to the need to question the role of higher education in contemporary societies, strongly relying on the knowledge economy. In a context where one lives in the so called «knowledge society», domain knowledge and technology became the required skills for the social and economic development of countries, then affecting individuals' lives conditions.

Technological advances allow individual creativity, flexibility and distinction in work, a feature that will be reflected not only in personal development but also on the political and social development of a country. For this reason, in the context of work organization, with changes due to several convergent factors, such as internationalization and interdependence of economies or the exploration of technological advancement, one of the most typical groups of professionals is the graduates in «Engineering, Manufacturing and Construction». Aside from the analysis of the employment status, the perception of the relationship between skills acquired at university and those required by the job market seems to point to the emergence of a socially constructed discourse at the working place, where one can find connections between university and the labor market, within the analytical framework for the «modèle de la compétence» («Competency Model») (Dubar, 2006, Boltanski and Chiapello, 2005). Therefore, we aim to describe the objective situation in the labor market, acknowledging or refuting the comparative advantages of «Engineers» comparing to other graduates groups, and the subjective relation to work, in order to know if there is a connection between the position achieved at the labor market and the importance that work assumes in graduates' lives. Also we aim to know if there is a similarity between skills developed at university and those required by the labor market, according to Engineers perception.

FROM UNIVERSITY TO THE LABOR MARKET: THE «COMPETENCY MODEL»

According to Dubet (1994), the university system includes a suitable skills training for the labour market, for the socialization of students and for the creation of intellectual and critical *intelligentsia*. According to Bergan (2009, p. 118), university shall train graduates so that they can contribute to the economic welfare of the country, according to four purposes: «i) preparation for sustainable employability; ii) preparation for life as active citizens in democratic societies, iii) personal development, iv) development and maintenance of a broad, advanced knowledge base». Therefore, society expects from the higher education institutions to accomplish the «task of producing» professionals provided with the required skills and competencies for their fast integration in a particular activity (Morgado, 2001, p. 83) and desirably taking into account the needs of the labour market.

The fragility of the discourse of stability and stabilization of the acquired knowledge was replaced by the «competency model», a model that reflects the person's adjustment ability to the specificities of multiple work situations that one may face along the transition to work trajectory and during the trajectory of its working life. According to Calisto (2009), the debates on employment and unemployment increase the discussion of concepts such as employability and the relationship between academic learning and labor market needs. Thus, one cannot neglect that «even young university graduates seeking their first job may encounter insurmountable difficulties if their skills do not fit the needs of employers» (Calisto, 2009:17). According to Alves (2010), research on graduates' transition to work trajectories includes the study of the relationship between teaching contents and the working demands.

University graduates constitute a heterogeneous group, because they differ in what transition to work trajectories is concerned, according to the resources that they can mobilize and the academic backgrounds they have. Either the graduates that are included or not in the labour market, either those wishing to access to it, all the graduates are faced with demands for cognitive, theoretical and operational skills, the same being applied to scientific and technical knowledge, the so called «competencies». The concept of competence is not yet consensual and stabilized. However, its meaning has been used as the articulation between knowledge, thought and action. Within this meaning, competence is «an asset added to knowledge: the ability to use it to solve problems, build strategies, make decisions and act in the broadest sense of the term» (Perrenoud, 2003, p. 13). To study the «key qualifications» of university graduates, we have adopted the definition of competence proposed by Suleman (2001, p. 121): «body of knowledge and skills which must be held by any person to enter or remain in the labor market, i. e. for the qualified practice of any profession, to successfully meet a professional situation, to manage career in turbulent, flexible and evolutionary contexts, or for self-employment».

At the moment, one can say that we are witnessing the «passage from the world of having (knowledge, expertise, qualification) to the world of being (we are competent)» (Cornu, 2001, p. 133). The «competence model» (Dubar, 2006, p. 97) was formerly approached in 1955 in France, launching a new perspective on work, which is understood as a problem solving activity, a model present in the work of Alain Touraine, *L'évolution du travail aux ouvriers usines Renault*. From the mid 1980's, in France, the «competence's logic» was developed simultaneously in work organizations and in certain segments of the education system.

In the 1980's, the term «knowledge economy» (knowledge-based economy) emerges in order to draw attention to the fact that the production process is increasingly based on knowledge-intensive activities, featuring «an economy in which the ability to learn is crucial to the economic success of individuals, regions, organizations and nations and to learn is to develop and acquire new skills, in addition to access to information» (Lopes, 1998, p. 15). In the knowledge economy, ideas, information and forms of knowledge to support innovation and economic growth characterize a large part of the workforce, who are not anymore involved in material production or distribution of material goods, but in its design, development, technology, marketing, sales or services (Giddens, 2004).

In the 1990's, there has to trigger the application of the model in French companies, as well as its expansion into the European context, resulting from different factors, such as: i) the emergence of the concept of «employability» (Dubar, 2006, p. 99; Boltanski and Chiapello, 2005, ii) the strengthening of the neo-classical theory of human capital (Dubar and Gadea, 1999), iii) the changes

in the working world (Boltanski and Chiapello, 2005) - increasing rates of structural unemployment, acceleration of the working rhythm, the increase of the temporary work and part-time jobs, the polarization of the academic and education qualifications of the active population structure and the consequent anguish and fear of losing a job (Maurin, 2007), iv) changes in work organizations (Bellier, 2003) - meaning an increased worker's versatility and flexibility.

THE KEY QUALIFICATIONS REQUIRED OF HIGHER EDUCATION GRADUATES IN BOTH EUROPEAN AND PORTUGUESE CONTEXTS

In the European context, we have seen the emergence of the concept of «key qualifications», in order to distinguish achievements in education and training systems from the needs of training and skills required by the labour market. From the Anglo-Saxon perspective, «professional skills» are called «key qualifications», described as transversality. In French literature, they are called «compétences transversales», described as transferability, meaning the use of analogy in solving problems according to different working contexts'. In the Italian context, they are called «saper essere», involving non-specific and transversal competences related to personal, behavioural and social aspects. In the United States of America, these «compétences transversales» are known as «survival skills» because they are considered the basis of the individual's career management (Suleman, 2001). In order to standardize the concept in the European context, the European Union (EU) adopted the term «key qualifications». In this perspective (transverse to different countries), the skills can be of four types: (i) technical, (ii) methodological, (iii) social, (iv) behavioural. Within the following features it must also be said that: (i) they cross different backgrounds and professions, (ii) they are transferable, in order to assure the adaptability and reaction to unforeseen circumstances, (iii) they are acquired via course content, appropriate training methods and models within the qualifying organization, (v) they must be suitable, dynamic and attractive, as far as socio-economic conditions must be taken into account.

According to Pavlin (2009, p. 17), the most required key qualifications that graduates must accomplish are: mastery and a specific field of knowledge; competences related to learning processes; personal proficiency: team work and time management; ability to communicate in foreign languages; information and communication technologies' skills (ICT)».

In the Portuguese context, we find reference to three types of generic skills: (i) instrumental skills: cognitive, methodological, technological and linguistic abilities, (ii) interpersonal skills: individual abilities for social interaction and cooperation, (iii) systemic competencies: skills and abilities related to the combination of understanding, sensitivity and knowledge (Carneiro et al, 2010). So, the academic trajectory should enable individuals to «translating knowledge, skills and abilities in efficient job performance» (Calisto, 2009, p. 25).

In the European context, the concern with the requirement of adapting the academic knowledge to the knowledge society has led to the emergence of projects focusing on skills required for university graduates: «REFLEX - Research Into Employment and Professional Flexibility (The Flexible Professional in the Knowledge Society - New Demands on Higher Education in Europe)», «HEGESCO - Higher Education as a Generator of Strategic Competences» and «CHEERS - Careers After Higher Education: An European Research Study» (Carneiro and such, 2010). Portugal participated in the REFLEX Project, focused on the «demands that the modern knowledge society places on higher education graduates, and the degree to which higher education equips graduates with the competencies to meet these demands» (Allen and Velden, 2007, p. iii). These projects aim to contribute for the analysis of the role of higher education in preparing graduates for the labor market, questioning whether higher education provides a good basis so that university graduates can start working and also have a good professional performance, based on the analysis of the graduates' opinion. Basically it aims to identify which competencies are required for graduates and how institutions of higher education can best contribute to such skills' development.

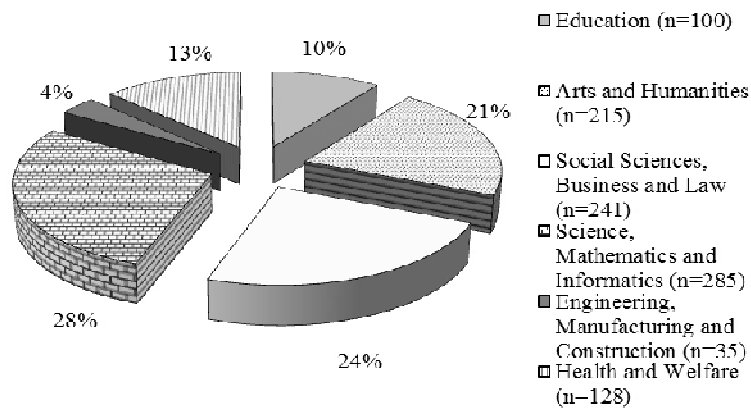
TRANSITION TO WORK TRAJECTORIES OF THE «ENGINEERING, MANUFACTURING AND CONSTRUCTION» GRADUATES' OF UNIVERSIDADE NOVA DE LISBOA

The competency model approach seems to overlook the importance of training university graduates with the necessary conditions so that they can adapt themselves to changes that might occur at work, although the practices and behaviors that individuals adopt are part of a social construct

mediator of aspirations and achievements (Bourdieu, 2001). This new attitude expected from higher education graduates' seems to point to the «new spirit of capitalism» (Boltanski and Chiapello, 2005) where that new attitude is about to become essential at the labor market. Therefore, changes in the working place may affect the skills' requirement perception most valued by employers, as well as it may lead to the graduates' different behavior, focused on the constant and continuous development of new theoretical and technical knowledge.

In the current research, we have attempted to collect data about some of the skills developed at the university: i) team work; ii) negotiation; iii) planning; iv) leadership; v) critical thinking; vi) oral and written communication; vii) decisions making; viii) mastery of both techniques and technologies; ix) oral and written communication in a foreign language. The sample involve 1.004 graduates in 2004/2005 academic year from Universidade de Lisboa and Universidade Nova de Lisboa. As written/shown above, this paper is focused at the graduates on «Engineering, Manufacturing and Construction», comprising a sample of 35 individuals. The overwhelming majority's age (94%) is between 25 and 35, and the remaining between 35 to 45. 75% are male and 25% female individuals:

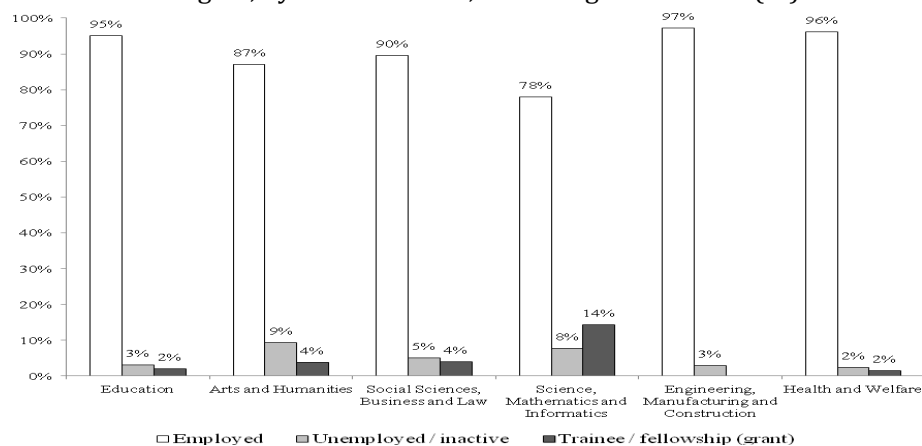
Graph 1 – Sample distribution by fields of education, according to International Standard Classification of Education (ISCED) 1997 (%)



Source: CESNOVA (2011)

The table shows that Engineers is the group comprising fewer individuals, a fact that can influence the situation at the labour market, when it comes to career matters. Keeping a restricted access to some academic courses might be as well a strategy of safeguarding a place when it comes to getting positions, and a higher coordination/ratio between the possibilities of promotion and the number of individuals. The availability of many vacancies in certain courses has been identified as a factor that leads to the increasing number of unemployed or under-employed graduates. In this case, the restriction to the careers' access can be translated as an indicator of more positive trajectories for Engineers.

Graph 2 – Work situation from graduates from UNL and UL respondents 5 years after obtaining the academic degree, by academic field, according ISCED 1997 (%)



Source: CESNOVA (2011)

In opposition to a backdrop of graduates' transition to work, the engineers are a group of the professional elite described as having a more linear and ascendant trajectories.

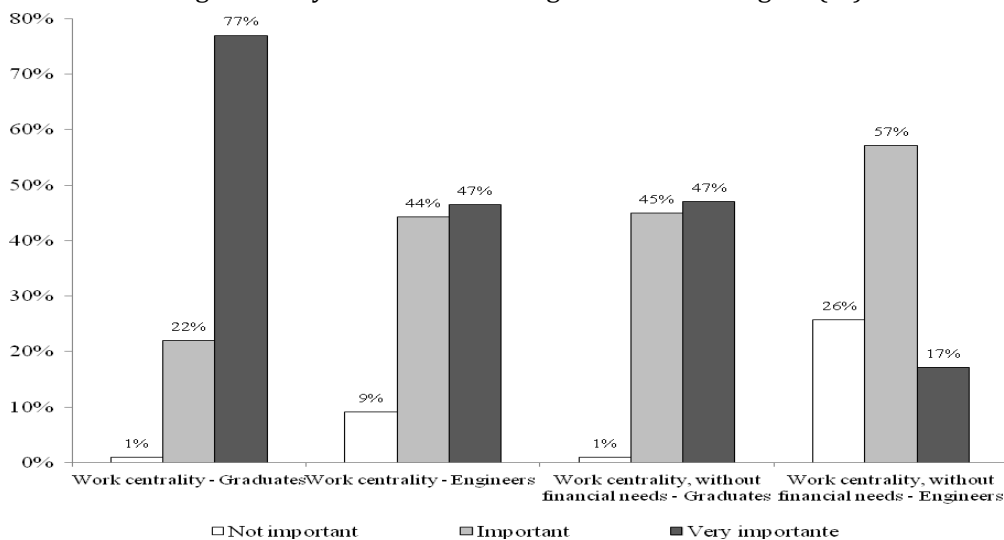
Overall, the big majority of graduates surveyed is strongly embedded in the labour market five years after finishing their training. The «Engineering, Manufacturing and Construction» area shows the highest percentage of employees (97.4%). The engineers took 2 months, average, to get a paid job according to their academic degree and were the group that took less time to find a job. Up to 6 months after obtaining the diploma, 97% were at the labour market, 74% of them working as engineers.

Only graduates of «Health and Welfare» found more jobs in lesser time according to the training area (95%). Both groups are over-represented in relation to the average time for finding a job according to their academic training (59%).

Graduates in «Engineering» have the highest percentage of «Senior Public Administration» (26.5%) positions, strongly over-represented according to the average (7.9%), which shows the connection between this education field and the access to positions of higher responsibility, and probably with salary privileges. Graduates of this area are the ones, by large, having permanent positions (71%), especially when compared to the average (55.1%). They work mainly in private enterprises (61.8%), thus being the most distant group from the average (49.8%). With a structure of a very similar working week schedule to graduates on «Health and Welfare», they are over-represented in weeks with 35-50 hours (64.7%), where the average is 59%. They owe €1.420 average, being surpassed by graduates' in «Health and Welfare» (€1.744) and «Social Sciences Business and Law» (€1.480) when the average salary is €1.300. However, one must keep in mind that the questionnaire was surveyed 5 years after obtaining the diploma, which means that they are/were in the beginning of their professional careers.

Regarding the subjective relationship with work, the majority of «Engineering, Manufacturing and Construction» graduates' consider themselves very satisfied (60%) with the work, 36% satisfied and only a small percentage (4%) declares not being satisfied with their work. Regarding work centrality:

Graph 3 – How important is work on life (*Work centrality*) for UNL and UL graduates comparately to Engineers 5 years after obtaining the academic degree (%)



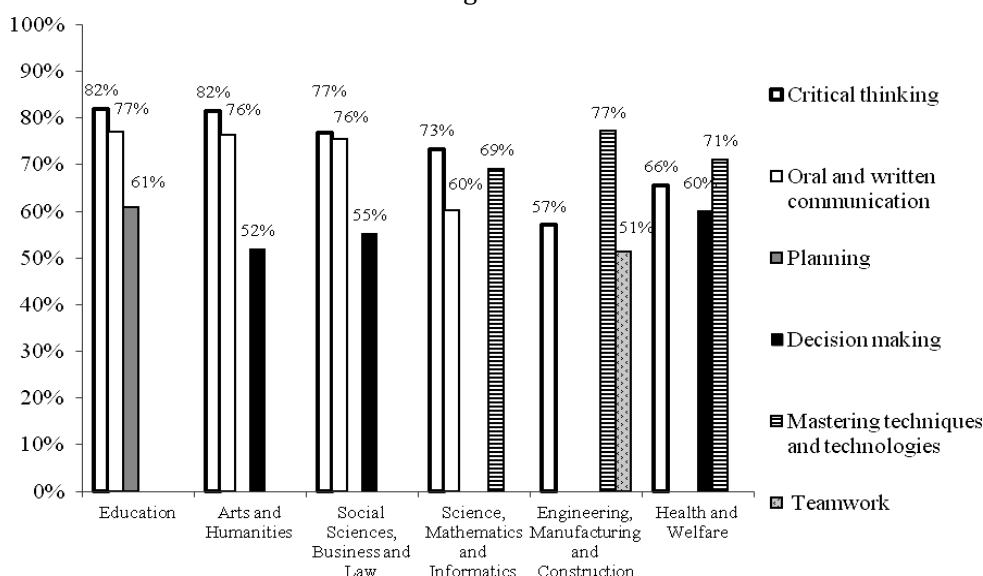
Source: CESNOVA (2011)

For the majority (91%) of graduates in «Engineering» work is an important dimension in life. But if they did not need to work to get some income, the degree of importance attached to work decreases significantly. On the average, 9% of the graduates give little importance to work in life, but among engineers this number rises to 26%. Similarly, if they did not need to work to owe money, the work continues to be very important in life for 47% of the inquired individuals, but only for 17% of engineers. This oscillation seems to point to the work's linkage to a main financial source for economical support.

However, when compared with the other spheres of social life, including family, friends, sport, artistic and cultural activities, politics and religion, work takes the third place for graduates of all areas, including engineers. The work is thus preceded by family and friends spheres, considered one of the most important life spheres for the majority of graduates. It also seems that the social interaction is an important sphere in life for all graduates.

Regardless the working situation, five years after obtaining their academic degree, graduates have compared their academic key qualifications with the demands of the labor market.

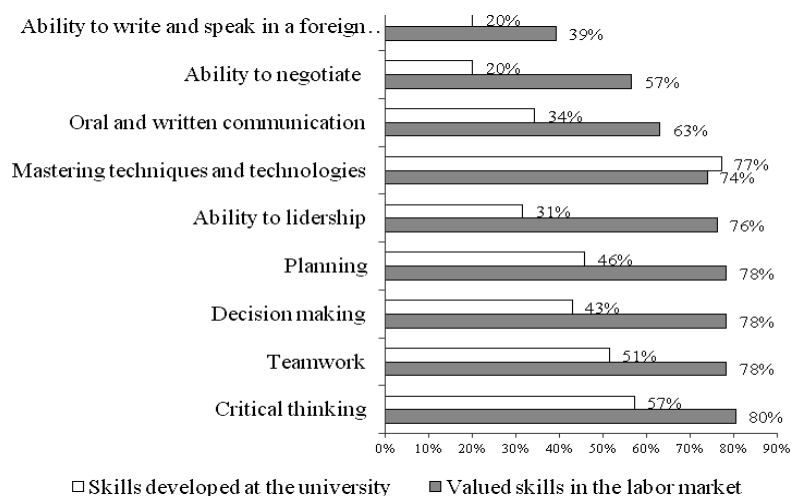
Graph 4 – Skills most developed through the course, by field of education, according to ISCED 1997



Source: CESNOVA (2011)

Overall, graduates feel that the most developed skills at university were «critical thinking», with a significant presence in all areas of their training. Engineers distance themselves from other graduates according to the fulfillment of «Mastering techniques and technologies» (77%), getting closer to «Health and Welfare» graduates (71%) and from those of «Sciences, Mathematics and Informatics» (69%). The engineers are the only group to identify «Teamwork» (51%), something that might be related to the need for collaboration and cooperation to carry out their functions. This area also has a strong practical component that is developed throughout the course, in order to train specialists for professional activities that are based on technical matters:

Graph 5 – Key qualifications developed at university and key qualifications required in the labor market to «Engineering, Manufacturing and Construction» graduates' (%)



Source: CESNOVA (2011)

Five years after contacting with the labor market, the engineers reported that the most valued skills by work institutions are «critical thinking» (80%), followed by «teamwork» (78%), «decision-making» (78%) and ability to «planning» (78%), which appears to demonstrate that these skills act as a graduated network according to specific standards (technical thoughts-team-work). Thus, if they withdraw the critical capacity, keeping only the mastery of techniques and technologies and the team-work ability, engineers could no longer be among the group of graduates that have more privileged career ways until now. Therefore, this group emphasizes that the technical and scientific knowledge seems to be inseparable from social and technical interactions. But such a structure of skills does not seem to deviate much from the skills developed at university, «critical thinking» (57%), followed by «teamwork» (51%) and ability to «plan» (46%). There can be a possibility that courses like «Engineering, Manufacturing and Construction» have a curriculum that intends to develop skills valued by the labor market, taking into account the specificities of the «Engineering» profession. But answering to this question would require further research within this group. The graduates of other training areas do not identify the «teamwork» as a skill developed in higher education, but consider all the «critical thinking» as capital gain obtained at the university. In the one hand, it seems that university aims to enable graduates with soft skills that cross all academic spheres, such as «critical thinking»; on the other hand, the investment on skills that will be most valued in the labor market due to the training area seems to be a feature that universities pay attention to, like the «Oral and written communication» and «Mastering techniques and technologies» skills, according to the specific nature of each course.

FINAL REMARKS

In spite of the discourses about the socio-economic crises scenario, graduates' transition to work trajectories differ due to different aspects, such as the academic learning area, economic, cultural and symbolic capital, gender dimension, available working opportunities at the labor market, key qualifications graduates have when looking for a job. We find reference to the relationship between education and training contents and the skills required in labor market, either on the demand side of a dynamic coherence between supply and demand, either in order to provide candidates workers with the necessary competencies (knowledge, skills and qualifications) for a swift and sustained employability then able to face the changes that have occurred in work organization.

In the present paper we have acknowledged that graduates in «Engineering, Manufacturing and Construction», which obtained their academic degree in 2004/2005 and answered the inquiry 5 years after (2010/2011), keep a very positive transition to work trajectory. Engineers are protagonists of successful career paths: they take less time than the average to get their jobs, they have the highest percentage of employed graduates, and they owe more than the average. The majority holds permanent positions. They also occupy more management positions than the other graduates. However, despite the well successful career paths, and considering the work an important dimension in life, they attach more importance to family and friends, as the other graduates. And if Engineers did not need to work to owe money, they would consider work less important in life (26%) in comparison to other graduates (1%). However, engineers have high levels of satisfaction with work, as 96% refers being satisfied or very satisfied with work.

Engineers consider that there is proximity of the structure of skills valued in the labour market compared with the skills that were developed at university: «critical thinking», «teamwork» and ability to «plan». In this sense, it seems appropriate to bring forward the hypothesis that the courses in the field of «Engineering, Manufacturing and Construction» have a curriculum aimed at developing skills that are valued in the labor market, taking into account the specificities of profession «Engineer».

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