ICT skills gap in Spain: Before and after a decade of harmonizing the European Higher Education Area

Running title:

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ICT skills gap in Spain: Before and after a decade of harmonizing the European higher education area

Abstract

This study examines the impact that the implementation of the European Higher Education Area (EHEA) has had among engineers in the information and communication technologies sector (ICT). Specifically, we focus on the case of Spain, and compare the key professional skills most demanded by the sector in 2008 and in 2018, coinciding with a decade since its implementation. We also investigate if the skills acquired by students at the university are aligned with those demanded in the marketplace. Therefore, with this study we answer the following question: Are ICT students trained adequately? To do so we conduct an empirical study based on a representative sample of Spanish companies working in the ICT sector. Our results reveal the presence of a skill gap between employers' expectations and the abilities that are actually acquired by students. Implications for policy and practice are discussed.

1. Introduction

The information and communication technology (ICT) sector is often described as one of the most important sectors in the current redesign of world business [31] [4], despite the critical voices arguing that the digital revolution is overrated [18]. The training of professionals in ICT has become a key factor [28] and influences the operation of the new economy [26]. Thus, it is worthwhile examining the challenges and opportunities universities face in their task of training the technological leaders of the future.

We address this issue just as we mark the tenth anniversary of the establishment of the European Higher Education Area (EHEA) [6]. Particularly, in this study we scrutinize

the validity of the curricula that was implemented for ICT graduates [13]. We do so by examining the professional – also commonly referred as generic or soft – skills that play an essential role in the hiring of new professional and employability [3], becoming a pillar in the paradigm change known as the Bologna process [17].

One of the leading business development initiatives of the European Commission in 2016 was entitled 'New Skills Agenda for Europe' [9]. The initiative sought to create a shared vision on the strategic importance of skills to generate employment and foster growth and competitiveness. In this context, universities' role was further emphasized as these institutions were – and still are – expected to develop appropriate programs that ensure the achievement and renewal of such skills.

It is worthwhile clarifying the expectations of businesses and employers regarding the main educational parameters that respond to the labor needs of the ICT marketplace, and then reflect on and evaluate whether universities are performing their role effectively. Additionally it is also relevant to compare the current situation with that of a decade ago [23] – before and after the implantation of the EHEA – and identify the differences and similarities in the training of recent ICT graduates.

Rooted in this context, this study focuses on the case of Spain and aims at evaluating the key professional skills of recent graduates in ICT technologies. Specifically, we are interested in evaluating the role of universities in the training of ICT engineers, and compare the skills that students develop during their training, and those skills that their professional activity will require. In this way, we attempt to validate whether universities have filled the gap between the expectations of the ICT sector and the curricular training that graduates receive.

This research has its origin in 2008, prior the application of the EHEA among Spanish universities. The adoption of the EHEA entailed significant changes in university training methods. This article aims at evaluating the results after a decade of their application. In this sense, this study is unique in that it adopts a comparative approach. At the same time, it provides useful insights about the impact of the Bologna process on the profile of newly graduated ICT engineers.

This is an original study in literature, there is no analysis in this line of work, and it allows a direct application to the Spanish ICT University. It also determines the vision of the business world to which it relates a unique and particularly interesting element.

It also makes it possible to assess what the result of the integration in the European Higher Education Area has been, giving a global vision of the performance of the objectives pursued by the so called Bologna process.

This study concludes discussing the educational paradigm shift, not only in Spain but in Europe. As knowledge is increasingly becoming a sustainable competitive advantage in a global economy, so does the sector of information and communication technologies. Ensuing that technological leaders will be capable to solve the challenges of the future is therefore of paramount importance.

The study has been possible thanks to the inestimable support of the main associations and representative groups of the various subsectors that make up the broad ICT sector in Spain. This represents a unique opportunity to obtain a common, yet segmented vision, of the various ICT university degrees.

The remaining of the paper is organized as follows. Section 2 reviews the existing literature and summarizes the importance of professional skills among ICT graduates. Section 3 provides the methodological framework and describes the sample. Results are discussed in Section 4. Conclusions and limitations are put forward in Section 5.

2. Soft skills in the ICT sector

2.1. The ICT sector: A European and a Spanish overview

The DigiWorld Yearbook 2016 [20] published by IDATE (a consortium of the most important European ICT companies) indicates that ICT is one of the most dynamic and safest economic sectors at a global level. The regions (in order of business generated) with the greatest impact in the ICT sector are North America, Asia/Pacific, and Europe. The telecommunications services sector globally grew by 2.9% during 2016. However, forecasts for the period 2016-2020 reflect slower growth expectations and the forecasted compound rate of aggregate growth amounts to 1.2%.

The ICT sector in Europe is growing faster than the average of other sectors. The sector currently produces 5% of the European GDP [8] according to data from 2016. Growth prospects up to 2020 are optimistic [14], yet, they point to a shortage of ICT graduates. Following the OECD [12], Eurostat defines ICT specialists as workers who can develop, operate, and maintain ICT systems, and for whom ICT forms the main part of their job. Following the classification in [11], computer, electronic, multimedia and telecommunication engineers are considered ICT university qualifications.

The Annual Report of the ICT and Content Sector in Spain 2017 [27] elaborated by the National Observatory of Telecommunications and the Information Society confirms a growing trend, with three consecutive years with an increase of the turnover (7.4%), reaching €88,334 million. In global economic terms, and according to the data obtained from the main economic indicators, there is no doubt that the economic recovery is a reality. The most recent (although provisional) data published by Eurostat shows an increase of 3.6% in gross domestic product (GDP) in Spain, ratifying the good performance of the Spanish economy and consolidating the economic growth that began at the end of 2013.

According to the aforementioned report, the ICT sector includes companies whose main activity is the production of ICT goods and services. To understand the nature of the Spanish ICT sector we must analyze the degree of involvement in the manufacturing of components and the provision of services. Only 4% of the ICT sector is involved in the manufacturing of components, while services represent by far the largest part (96%) of this sector. On the one hand, manufacturing includes the production of semiconductors, computers, servers, and peripherals. On the other hand, the ICT service sector embraces computer activities (66.9%), wholesale trade (12.5%) – including hardware and software, and internet providers and telecommunications (15.6%). In Spain 23,427 companies belong to the ICT and content sector in 2016 – up 4% on 2015, and for the fourth year in a row, the number of companies in the sector increased despite they did so at a slightly slower pace than the previous year (when the increase was 4.2%). Sales grew by 7% and reached €88 billion. The regions of Madrid and Catalonia account for 53% of the total number of companies in the ICT sector. Madrid stands out with 32% of ICT companies (from which 23% are from Catalonia).

In 2016, 61.8% of all ICT specialists in the EU-28 had completed university studies, while in Spain the proportion reached almost 80% of ICT professionals [10]. According to a sector report [27], ICT employment in Spain has been growing since 2014. The sector employed 367,906 people in 2016, the highest number in the recent years (3.8% higher than in 2015). Jobs in the ICT sector are mainly concentrated in services (96.1%), with the remaining 3.9% in manufacturing. Within ICT services, the vast majority of jobs are related to computing activities (69.3%) and 19.5% of people work in telecommunications companies – a slight reduction compared to the previous years. Investment increased 8.7% to reach €16.1 billion. The number of firms in the ICT sector increased during 2016 thanks to expanding IT activities and the economy, which experienced a growth of 5.8% in computer activities and 1.9% in whole sale trade. These increases compensate for the loss in manufacturing (-0.2%) and telecommunications (-0.5%) firms in this same year.

2.2. Soft skills and the ITC sector

The concept of soft skills refers to the set of knowledge, skills, and character that each individual possesses in relation to their professional activity [24]. The ICT industry requires professionals who base their employability on their technical knowledge and generic or soft skills [19]. In fact, the concept of employability includes three dimensions – career identity, personal adaptability, and social and human capital [21].

The exhaustive revision of the literature elaborated by K. Pazur Aničić et al. [29] dealing about the professional development of ICT graduates – it includes more than 7,000 research articles published between 1960 and 2014 – indicates that generic skills are an important subject in studies related to ICT education and careers. In their qualitative analysis, the authors identified five main areas of studies: curriculum design and delivery; knowledge; skills of future ICT professionals; teaching methods; collaboration between academia and industry and future employment and career development. A clustering of research topics was conducted for both ICT careers and ICT education papers. Employability and soft skills enhancement formed the smallest cluster, but all the works reviewed highlighted topics that are related to graduate employability, and half of them, linked employability with the importance of enhancing both hard and soft skills.

Generic skills have been the subject of much study and are considered, in addition to technical skills, as a relevant element in recruiting [22]. Various studies that suggest generic skills are crucial for employers, particularly those referring to oral and written communication abilities, teamwork, and problem solving [16]. Leadership skills and the aptitude to establish social relationships are also deemed as relevant [5]. Other authors emphasize the urgency of including entrepreneurship in the ICT university curriculum [2], and recent studies also claim that business knowledge and project management are imperative for handling responsible roles [1]. In a content analysis of papers, Pažur Aničić et al. [29] show that the successful ICT student is the one that develop discipline-specific knowledge and skills, as well as soft skills such as communication, management, and leadership and problem-solving skills.

After carefully analyzing the literature and reviewing the current state of the current art, for the purpose of this study we decided to take into consideration the 20 key generic skills identified in [23] [24], which have been proven to be valid for the Spanish ICT sector.

3. Sample and methodology

3.1. Sample

A survey was designed and completed by 129 companies, 25 with a multidisciplinary scope and 104 from the ICT sector. It is worth noting that because ICT is present in almost every business sector – from automotive supplies to construction – there are some companies that although ICT is not the main focus, they are very active and require ICT professionals. Given that the scope of the survey was broader, for the purpose of this study we only considered the responses from the 104 companies that are in the ICT sector. From a detailed analysis of these firms we can conclude that our sample is illustrative of the ICT sector. Data regarding the ICT sub-sectors in Spain [27] is shown in last column of Table 1. The results from the χ^2 further confirms its representativeness (p-value = 0.136).

Insert Table 1 about here

The relative size of ICT companies surveyed is as follows: large (>250 employees) 40.4%; medium (between 50 and 250 employees) 16.3%; small (10< employees ≤50) 11.6%; and microenterprise (≤10 employees) 31.7%. This distribution clearly differs from the actual distribution in Spain, which is extremely unbalanced with small companies (employing fewer than 50 employees) representing 98%. Despite this difference, we argue that the sample is valid as the size of the firm does not affect the results. This is because an analysis of variance for Q1 answers clearly shows no difference in mean values (of proportions) due to company size: the critical level is very high (0.91).

The critical level is very high (0.91). Companies answering the survey are located in Spain, yet 16.3% of them are also active in Europe and 24% are active beyond Europe (see Table 2).

Insert Table 2 about here

Table 3 shows that profile of the respondents of the survey (for the companies operating in the ICT sector). As it can be inferred, most of the responders were engineers (54%) with a much smaller participation of executives (25%). These profiles are adequate, as respondents are knowledgeable about the skills needed and have a comprehensive view of the sector.

Insert Table 3 about here

3.2. Methodology

The purpose of this study is to investigate whether ICT graduates are aligned with the generic skills demanded by the sector, and thus, explore the effectiveness of the implementation of the EHEA. Given this comparative approach (before and after the enactment of the EHEA), a survey was designed containing similar questions as those posed in [23], so that results in 2018 can be confronted with those obtained before the establishment of the EHEA.

Specifically, we asked respondents (i.e., managers operating in the ICT sector) to indicate which are the most relevant skills ICT graduates should possess and if, based on their experience, graduates have certainly acquired them or not during their years of schooling. To this end, we gave them a list with the 20 most relevant skills identified in [24], and asked them to:

Q1. Select the five soft skills that you consider most important for ICT graduates.

Q2. Select the three soft skills that recent ICT graduates usually possess.

Q3. Select the three soft skills that recent ICT graduates usually lack.

Supporting students in acquiring knowledge, skills and competences that best meet students' self-development goals and social needs is at the centre of the Bologna process, therefore, it is of paramount importance to examine whether the adoption of the EHEA has contributed to this purpose. Aiming at deepening our understanding on the impact that the EHEA has had on students, we were also interested in managers' perceptions about a potential shift in the profile of ICT graduates. As such, we formulated the following question:

Q4. Has the entry into the EHEA significantly changed the profile of ICT graduates?

Three responses were allowed: yes, no, or do not know. The survey was administered by email. Subsequent telephone follow-ups were conducted if some relevant information was incomplete or unclear.

In order to analyze the results we have mainly relied in descriptive statistics and t-tests to investigate potential significant differences between the two periods of time of interest (before and after the implementation of the EHEA). In the next section we summarize the main results.

4. Results

4.1. Generic skills before and after the EHEA

In 2008, a study conducted just before the implementation of the European Higher Education Area [23], the authors found the 20 most important generic skills recent ICT

graduates should possess. Figure 1 shows the importance of these skills ten years after the establishment of the EHEA (question 1). For each skill, the percentage of total answers is shown. It is worth noting that more than the 50% of the respondents believe that *teamwork capacity* is the most relevant skill, while *self-control* is the least important one (5%).

Although we compare our results with those obtained in [23], this comparison is not straightforward as the study performed in 2008 was conceptually different: each skill was evaluated in a scale from 0 (not important) to 5 (extremely important). Thus, to allow the comparison, for each skill we have calculated the average value and ordered the skills according to this indicator. This way, the skill with the highest (lowest) average score is considered the most relevant (irrelevant) one. For the results in 2018, we used the percentages shown in Figure 1.

Table 4 contains this information, reporting the skills that deviate from the mean value: skills that are above (under) are the most valued (least valued). In 2018, *teamwork* was the most valued skill, followed by the capacity to *communicate*, *problem solving* and *planning*. Common agreement is therefore found in the relative importance of *teamwork* and *problem solving* (they both appear in 2008 and 2018). *Empowerment* skills were the least valued in 2008, whereas in 2018 *self-control* and *assertiveness* are the least valued ones.

Insert Figure 1 about here

Insert Table 4 about here

Given that data come from professionals from different subsectors, additional insights can be obtained by analyzing the responses. As shown in Table 5, each subsector has its own requirements in terms of skills; consequently, it is not surprising that although in all instances we are referring to ICT graduates, the "ideal" profile is different due to the specificities of each subsector. Accordingly, we see that, for instance, firms operating in the telecommunication and manufacturing subsectors highly value *teamwork* (70% and

60%, respectively). However, they place little emphasis in *planning*, compared to firms in informatics and the wholesale subsectors (40.7% and 55%, respectively).

Insert Table 5 about here

4.2. Skills that newly ICT graduates acquired (or not) and the role of the university

Questions Q2 and Q3 inquired about the skills that recent graduates have acquired (or not). Extreme data with a deviation from mean values is shown in Table 6. Circa 56% of the respondents indicate that graduates are qualified with the ability to *learn*, 48% of them consider that new ICT graduates are also skillful in *obtaining information*, and 40% believe they are able to *think analytically*. On the other hand, the respondents are critical with the current level of acquisition of skills such as *customer orientation* (43%), *communication* (40%) *negotiation* (38%) and *empowerment* (33%).

Insert Table 6 about here

To further explore these results, Figure 2 confronts, per each skill, two relevant indicators: the importance of the soft skills (responses to Q1) and the level of proficiency that recent ICT graduates possess of that skill (answer to Q2). The first and second quadrants are the most significant ones because they contain the ten skills evaluated as the most valued. The skills in the first quadrant are the most valued ones and also the ones they currently acquired at university. In order of mastery, these are: *learning*, *information*, *analytical thinking*, and *teamwork*. The second quadrant contains the skills evaluated above the mean value (those that recent ICT graduates should have) but that are not fully developed (students score low in showing these skills): *innovativeness*, *planning*, *problem solving*, *customer orientation* and *ability to communicate*.

An evaluation of the skills that graduates do not possess (answers to Q3) vs the skills that are considered to be relevant for the market (answer to Q1) is also performed. The important skills (above the mean values) that graduates lack are *customer orientation* and

communication, while the less important skills that are also not fully developed are *negotiation*, *empowerment*, *leadership*, *loyalty*, and *empathy*.

Insert Figure 2 about here

4.3. Trends before and after the EHEA

In order to shed new light on the trend followed by each of the 20 skills under analysis, Figure 3 graphically shows their evolution (Q2) both in terms of level of acquisition (*x* axis) and relevance (*y* axis) for the two years of interest (2008 in red, and 2018 in blue). To obtain each pair of values we calculated the standardized values with respect to the mean value and reported the change experienced in the form of an arrow. The interpretation of the direction of the arrow is as follows:

− Up-right arrow: Compared to 2008, the skill is most valued for the ICT sector in 2018. Graduates in 2018 are also more proficient in that skill as the level of mastery is greater than the mean value (*creativity, problem solving and innovation*).

− Up-left arrow: Compared to 2018, the skill in 2018 is more valued, yet graduates are less proficient in that skill, therefore, values are below the mean (*teamwork, communication, planning and analytical thought*).

− Down-right arrow: Compared to 2008, in 2018 the skill is less relevant, notwithstanding, graduates are more proficient in that skills (values above the mean value) (*learning and planning*).

− Down-left arrows: Compared to 2008, in 2018 the skill is less relevant by the market, and graduates have acquired it less (values above the mean) (*information*).

Insert Figure 3 about here

A detailed analysis of each skill provides additional insights that are valuable for deepening our understanding about skills acquisition patterns. Figure 4 displays this

information. Specifically, it reports the difference (in absolute numbers, and calculated as a percentage) between 2008 and 2018, showing which skills have been acquired (YES) and those that have not (NO). The positive (negative) values on the right (left) side indicate that the proportion of answers has increased (decreased). For each skill, we have tested for the existence of statistical significant differences of the proportions. When the difference is positive (negative) the alternative hypothesis p2018-p2008>0 (p2018-p2008<0) is assumed, being *p* the proportion of answers from the 104 respondents in 2018 and the 43 respondents in 2008. The p-values obtained reveal that there is no statistical significant difference (p-values>0.13), with the only exception of the skills with the greatest differences (0.014≤p-values ≤0.089) and in both cases we cannot decide). Based on the analysis, we can conclude that:

- Soft skills that are acquired are *communication*, *creativity*, *information*, *objective oriented* and *problem solving*.

- Soft skills that are not acquired are *empowerment*, *leadership* and *self-control*.

Insert Figure 4 about here

4.4. Impact of the EHEA on the profile of ICT graduates

Lastly, we asked respondents (Q4) to indicate whether they believe the Bologna process has significantly modified the profile of ICT graduates. Table 7 reports their responses.

Insert Table 7 about here

5. Discussion and conclusions

The findings of this study have relevant academic and policy implications. First, we have been able to identify the generic skills that, according to ICT professionals, are important for those graduates that want to carve out a professional career in this sector. In order of

importance, these skills are: *teamwork*; ability to *communicate*; being *problem solving* oriented and possessing the ability to *plan*. We argue that these skills should be prioritized to be developed within ICT curricula at universities. Other relevant skills that complete the top-10 list are: commitment to *learning*, *initiative-proactivity*, *analytical thinking*, *customer orientation*, resourceful in obtaining *information*, and *innovative*.

Second, a comparison of the first ten years of the implementation of the EHEA (2008 vs 2018) shows that *customer orientation* and the commitment to *learn* are now less relevant, whereas the ability to effectively *communicate* and *plan* have become critical skills. *Teamwork* and the *problem solving* are still among the most important generic skills for the ICT sector. When segmenting the results by subsector, our results reveal that each subsector has its own requirements. For instance, in telecommunications, the ability to *work in a team* is chosen by 75% of respondents, while in the informatics subsector it is selected by 50% of the respondents.

Third, as for the level of acquisition of the generic skills the results from 2018 indicate that current ICT graduates are committed with their *learning*, are able to seek *information* and possess *analytical thinking* abilities. However, they lack *customer orientation*, are not able to effectively *communicate* or *negotiate*, and do not have the ability to *motivate* others.

Based on the above findings, we posit that universities seem to not take into fully consideration the demands of the sector, as there is a misalignment between the skills that graduates possess and those demanded by the market. Spanish universities do not seem to perform well in three of the skills that the sector considers most important: ability to *communicate*, *problem solving* and *planning*. Therefore, there is a skill gap that universities should address. However, there are some skills in which universities seem to be aligned with the market. This is the case of the capacity to *work in teams*, a skill that is highly valued by the market and is also acquired by graduates.

Another remarkable finding is that Spain's entry into the EHEA has not significantly changed the profile of the ICT graduate in terms of soft skills. We observe this by analyzing the skills that graduates have (and have not) acquired in 2008 and 2018. Statistically, the variations experienced are not significant. This conclusion is consistent with the

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perceptions of managers (Q4). While 38.5% of the respondents believe that the EHEA has changed the profile, a great majority (46.1%) hesitates about the impact of the Bologna process on students, and 15.4% perceived no change. At this point, it is remarkable noticing that despite the great effort for changing the educational landscape (at least in Spain), firms barely perceive an improvement.

If we analyze the first decade of the implementation of the EHEA with respect to skills that are most valued by the market and those acquired by ICT graduates, several conclusions can be drawn. On the one hand, there is evidence of a negative trend in the ability to *communicate*, ability to *work in a team*, and ability to *plan*. These are three of the four most important skills for employers in 2018, and graduates post-Bologna are less proficient in these skills than a decade ago (pre-EHEA). This finding is an alarm that requires an urgent response.

Lastly, we have examined if the training expectations of the Spanish ICT sector are aligned with the theoretical approach regarding strategic decisions and methods for maintaining competitive advantage [7][32]. If two of the potential strategies to maintain competitive advantage in dynamic markets such as the ICT are through innovation and creativity [15] [25] [30], it is reasonable to argue that workers in this sector must possess such abilities. Based on our results, however, we observe that the Spanish ICT sector seems to underestimate (not being listed among the most valued) skills such as *creativity* and *innovation*, yet, they are now more highly valued than 10 years ago.

Indeed, universities are placing greater emphasis on these skills (*creativity* and *innovation*) as well as in the ability to *solve problems*, and our results confirm that these skills are certainly better acquired by students. Notwithstanding, there is still a long way to go and future efforts should be devoted in order to better align the educational curricula with the specific demands of the ICT sector. Hard skills are relevant but soft skills are those that can make a real difference and prepare students to solve the challenges of the future that are still unknown.

As a conclusion, we can affirm that the result of the implementation of the EHEA to the Spanish ICT University has been insufficient. The labour market does not perceive significant changes in the competitive profile of the graduates compared to 10 years ago. In fact, their profile is invariable in terms of soft skills. The university has not reduced the gap between what the market demands and what it is been implemented in the career. Nor have we been able to re-establish its capacity to be coherent with those competitive strategies of the future that will translate into a more competitive Spanish ICT Sector.

Despite following a rigorous method in data collection and analysis, the study has some limitations, which in turn, open up new opportunities for future research. First, this study focuses on a specific sector (ICT) and in a given country (Spain), accordingly, the conclusions should be limited to this scope. Yet, the analysis can be replicated to other settings. Also, in terms of the geographical scope, future studies might consider conducting a cross-country analysis. Second, the study only takes into account the perspective of the marketplace, that is, managers' perceptions. Future research endeavors might consider undertaking a similar analysis, but under the lens of graduates. Third, although we have somewhat examined the role of the university in the provision of soft skills, we invite researchers to further dive into this issue and investigate how these skills are boosted (in terms of teaching methods) at universities.

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Table 1. ICT subsector data from survey with 104 data items from ICT sector

ICT subsectors	frequency survey	% survey	% ICT sector
Informatics	59	56.7%	66.7%
Telecommunications	20	19.2%	16.4%
Wholesale trade	20	19.2%	12.8%
Manufacturing	5	4.8%	4.1%

Table 2. Area of geographic activity among ICT firms.

Geographic scope	% survey
Spain	59.7%
Rest of the world	24.0%
Euro zone	16.3%

Table 3. Profile of the respondents (ICE sector)

Profile	% survey
Engineer	53.8%
Director, manager, owner	14.4%
Others	11.5%
Director of technical department	10.6%
Director of other departments	9.6%

Table 4. Most and less valued skills, in order from top to bottom, comparison between 2018 and 2008.

Most valued skills		Least valued skills	
2018	2008	2018	2008
Teamwork	Teamwork	Self-control	Empowerment
Communication	Learning	Assertiveness	Negotiation
Problem solving	Problem solving	Loyalty	Leadership
Planning	Customer oriented	Empathy	

Table 5. Most valued skills 2018 answers in the subsectors (%).

	Informatics	Telecommunication	Wholesale	Manufacture
Teamwork	47.5%	75%	45%	60%
Communication	42.4%	40%	45%	60%
Problem- solving	45.8%	25%	50%	40%
Planning	40.7%	25%	55%	20%

Table 6. The most valued skills (listed in order) possessed by recent ICT graduates (YES), or not possessed (NO). Table shows the percentage of responses for each skill from the 104 respondents.

Yes	%	No	%
Learning	55.8	Customer oriented	43.0
Information	48.1	Communication	40.0
Analytical thought	40.4	Negotiation	38.0
		Empowerment	33.0

Table 7. Bologna process Impact in ICT profiles.

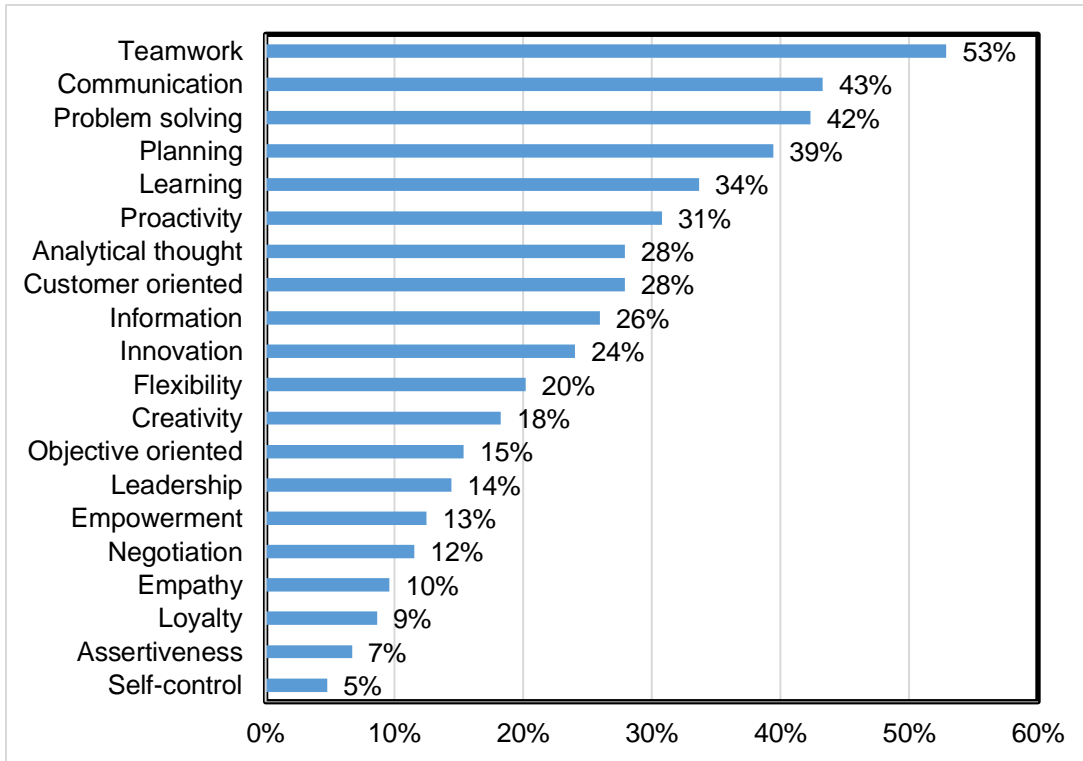| Answer	% survey
Yes	38.5%
No	15.4%
Don't know	46.1%

List of Figures

Figure 2. The role of universities in the acquisition of skills (2018). Scatterplot of the evaluation of skills importance vs proficiency. Standardized mean values are plotted.
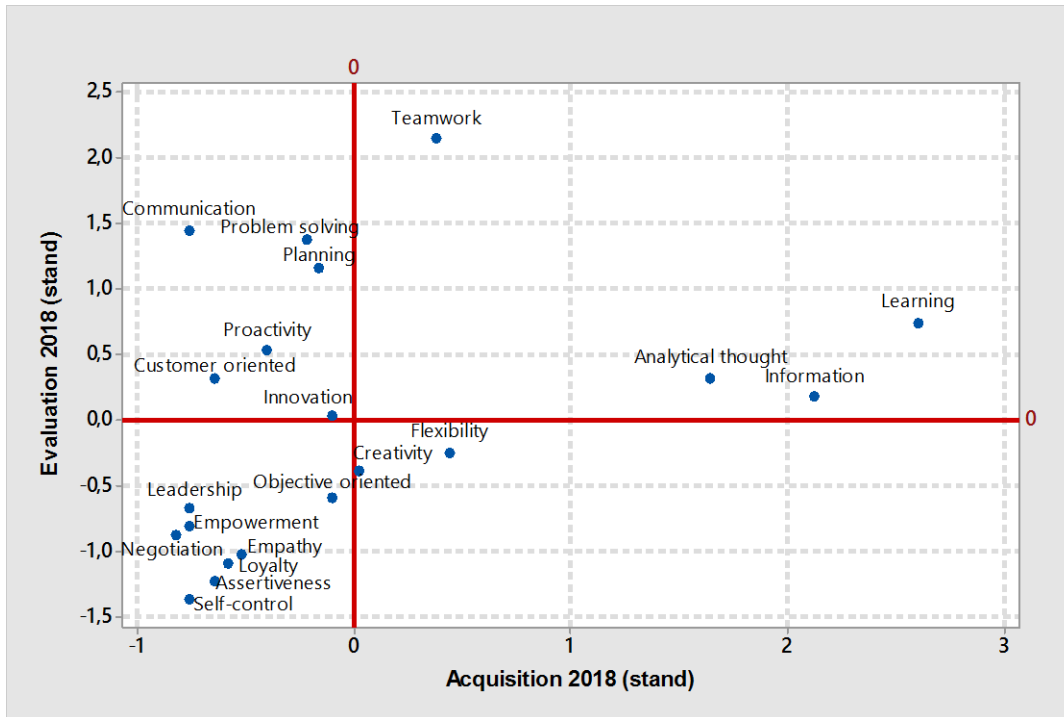

Figure 3. Relevance vs. level of acquisition before (2008, in red) and after (2018, in blue) the implementation of the EHEA.
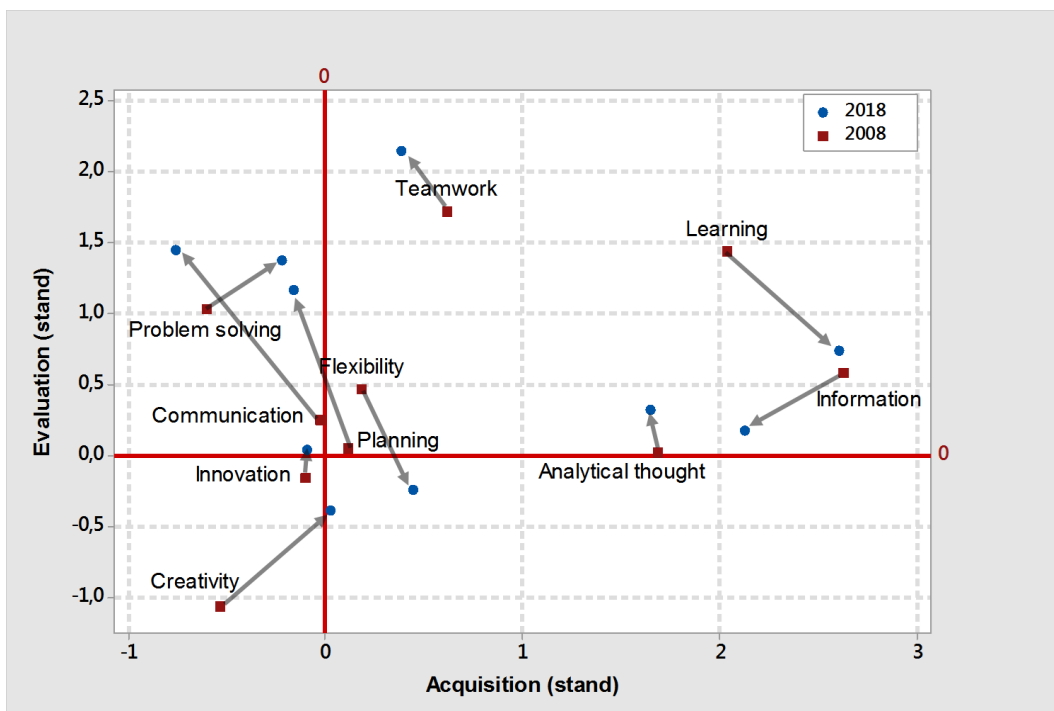
Figure 4. Comparison of differences in the responses between 2018 and 2008 (in percentages) for each soft skill, either acquired and not acquired