Science and technology vocations in Catalonia*

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In recent years, especially in the last five, science and technology students in Catalonia have consistently been diminishing in both secondary school and university. This has led to a yearly average 4% reduction in science and 3% in engineering, amounting to as much as 6% in some specific engineering branches.

Catalonia needs to increase the rate of youngsters graduating at secondary school as well as the overall figure of trainees. At university, the rate of graduations within schedule needs to improve. Overall, the downward trend of candidates for science and technology, especially women, needs to be halted.

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Introduction

For Catalonia to become competitive in the knowledge society in the terms posed by the 2000 Bologna Declaration, different challenges need to be tackled, of which education of new generations in the different fields of knowledge is certainly a basic one. In this respect, different governments and organisations[1] have insisted in recent years in the need to increase substantially the number of people taking up science and technology careers to meet the 2002 Barcelona Declaration targets. This requires an intensive, continuous effort over many years.

Today, our country is part of those European areas where citizens feel most satisfied with their lives (in the 2005 Eurobarometer, Spain, with a 90% satisfaction, only ranged behind the Netherlands, with 97%, and Denmark and Finland, with 93% each), which exposes us to the social trends of such environments, among which are those affecting the level and kind of education.

Reports done in recent years analyse this matter, concluding basically the following:

- At international and particularly European level[2], in many countries like Germany, France, Italy and the Netherlands there was the feeling that scientific vocations among the youth were in a crisis during the 1990s, and the number of students at scientific universities was dropping year after year. There may be a common pattern in feeling that they are difficult careers in which the social reward compared to the effort is perceived to be less interesting for students entering university. However, the exact causes are not always the same in all countries.

For instance, the significant drop in chemistry students that occurred simultaneously in France and Germany might be due to the competition of new technical careers in the first case and to bad signs emitted by the labour market in the second, that is, an academic reason in France and a rather labour-related cause in Germany.

- In Spain[3] the rate of students going for science in the last secondary school year dropped from 56.3% in 1989-1990 to 51.8% in 2000-2001 (from 64.2% to 61.1% in males and from 52.8% to 44.0% in females). Contrarily, the rate of students choosing scientific university careers increased from 35.7% in 1989-1990 to 42.1% in 2000-2001 (from 46.9% to 53.2% in males and from 25.7% to 32.8% in females). A possible explanation of this seeming contradiction is that there are ever less secondary school pupils doing humanities who then enter university compared to those doing science.

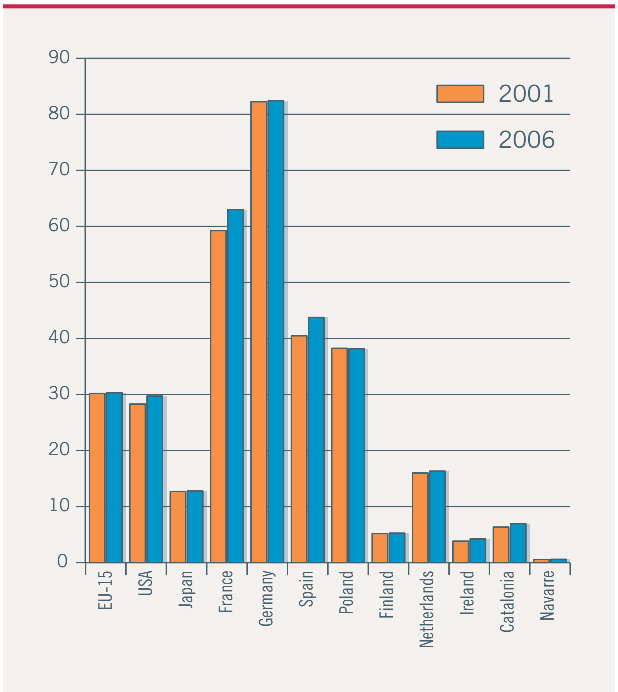
A certain stagnation or drop in the area of science and an increase in engineering was observed in Catalonia and all of Spain in the 1990s.

- An analysis of access to university by field of studies will show that students choosing experimental sciences between 1990-1991 and 2000-2001 dropped from 8.4% to 7.3% (from 8.9% to 6.5% in males and from 8.9% to 8.0% in females), and those going for technical careers increased from 21.0% to 25.8% in the same period (from 32.0% to 41.8% in males and from 9.8% to 12.5% in females). This means a reduction of 0.1 percentage points per year (annual 1.4% decrease) in experimental sciences and an increase of 0.5 percentage points per year (annual 2% increase) in technical careers. As a conclusion, although a certain reduction in experimental sciences is observed, we cannot talk of a deep crisis in Spain during that period.

- In Catalonia, the university population experienced a significant evolution, from 154,799 students in 1989-1990 to 210,000 in 1999-2000. By area of studies, experimental sciences saw an increase from 13,075 in 1992-1993 to 15,124 in 1995-1996 and down to 14,970 in 1999-2000; in engineering the figures were 37,271, 42,282 and 52,000 respectively. Hence an evolution was observed in Catalonia in the 1990s that was in line with all of Spain, with a certain stagnation or drop in the area of science and an increase in engineering. In the following we will analyse what is happening in Catalonia in the first decade after 2000, placing it in the national and international context.

***Chart 1.* Total population in millions**

UE-15, USA and Japan in units of 10 million



Source: Eurostat.[4]

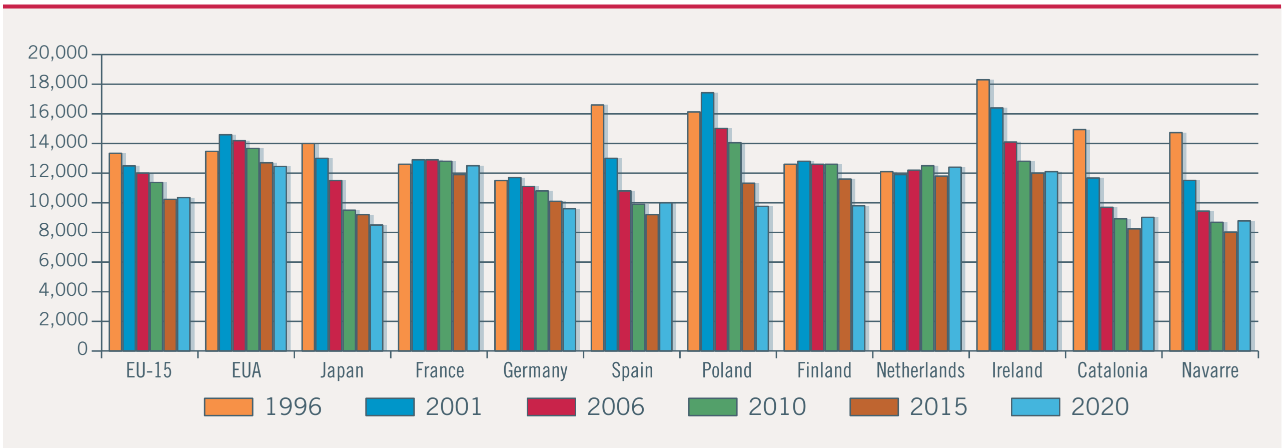
Demographic items

The analysis will focus on the science and engineering studies made up of a wide range of degrees, years of study, associated abilities and knowledge according to each country and level. To have a comparative standard, the data from three international regions – the EU-15, the United States and Japan – have been analysed in parallel, as well as those from a set of large European countries such as France, Germany, Spain and Poland, smaller ones such as Finland, the Netherlands and Ireland, and finally data related to the Spanish region of Navarre, with indicators clearly above the national average.

As the demographic size is very different according to the country, we have decided to represent standardised variables by millions of inhabitants or the 18-year old population (18 year age cohort). On chart 1 the population is represented, while on chart 2 it is the 18 year age cohort and its evolution in the period analysed.

It can be stated that although there are two different development patterns, one for more stabilised countries such as France and the Netherlands, and another with stronger variations like in the case of Spain, Poland, Ireland and Catalonia, they all present, with a view to

***Chart 2.* 18-year old population per million inhabitants**



Source: SCHERBOV, S. et al.[5]

***Table 1.* Development of the 18-year old population in 2001-2007**

in thousands

Area	2001	2002	2003	2004	2005	2006	2007
Spain	543.7	516.1	499.0	485.9	476.5	469.7	469.0
Catalonia	76.4	72.6	70.3	68.5	67.3	67.3	67.4
Navarre	6.4	6.2	6.0	5.7	5.55	5.55	5.5

Source: Spanish National Institute of Statistics (INE).

2015, a decreasing or stagnating trend in the 18-year old population. This means that the need for qualified workforce will basically come from an increase in educational intensity rather than from the increase in size of age cohorts.

With a view to 2015, all countries present a decreasing or stagnating trend in the 18-year old population.

Let us analyse the 2001-2007 period more in detail. To set the context, table 1 shows the population data of the 18-year age cohort in 2001-2007. One same trend is observed for all of Spain, consisting of an annual average 2% decrease during the first half of that period, this decrease then smoothening in the second half. In the EU-15 average, the rate of young people is dropping roughly 1% every year, while the number is far more stable in member states having entered after 2004. Besides, such differences can be significant within one same country. In Spain, for instance, the proportion of young people is slightly higher in Southern regions and the Canary Islands.

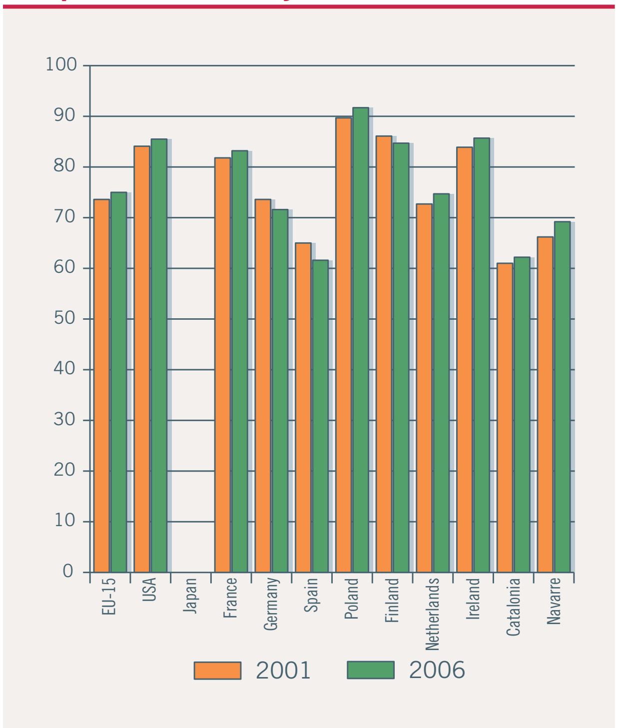
Pre-university

Let us now analyse the evolution of the pre-university population data. Chart 3 shows the rate of youngsters having finished secondary school in 2001 and 2006. We see that although there is a slight improvement in Catalonia (from 61% to 62.2%), the results are 10 or 20 points below those of countries such as France or Ireland. This feature, common throughout Spain, is however slightly better in Navarre, which lies almost 6 points above Catalonia.

In order to contrast indicators that may give information in terms of student preparation, we will take the results of the PISA (Programme for International Student Assessment) study[6] measuring the capacity of 15-year old pupils in science, reading comprehension and mathematics. Over 400,000 pupils representing a rough total of 20 million from 57 countries (30 OECD members and 27 associated countries) took part in the last edition (2006). The assessment is based on a two-hour test with open and closed multiple-response questions. Each test contained up to a hundred questions, covering from the most essential to advanced subjects. Every pupil obtained a score representing the level of difficulty they master. The scale has been made so an average pupil scores 500 and two thirds are between 400 and 600 (100 point standard deviation). The pupils' scores and the difficulty of the questions are divided into six levels. At level 6, pupils are able to identify, explain and apply knowledge related to complex concepts. At level 1, their knowledge is restricted to a few situations they are familiar with.

Chart 4 shows the distribution of the 2006 PISA test across the six capacity levels regarding science, grouped by pairs. In the case of Catalonia, we see that the top range (levels 5 and 6) only includes 4.6% of pupils, whereas the lowest range (levels 1 and 2) takes 44.8%. In Finland, 17.7% are in the top and only 20.9% in the

Chart 3. Percentage of youngsters having completed secondary school



Source: Eurostat and INE

bottom range. This is even worse in mathematics, as there is not only a concentration in the bottom but the evolution has been slightly negative between 2003 and 2006 (cf. chart 5).

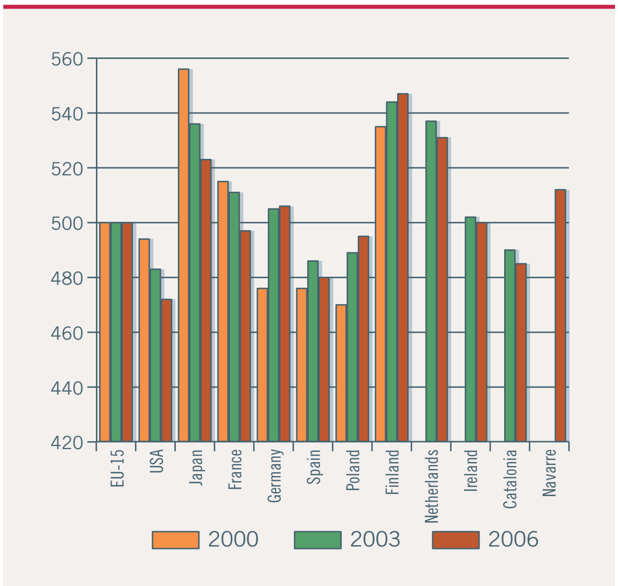
In order to look from close the evolution of preferences of the youth once they finish compulsory secondary school, we can see how the choice of the high school field of study has changed in the last five years. Table 2 shows the evolution of the choice of specialisation, and a downward trend similar to the 1990s can be observed both in Science & Health and Technology. As the reduction is so in relation with the age group within the overall population, the absolute reduction is a combination of both, thus being stronger (cf. chart 6).

The positive part is the high female rate, especially in Science & Health, although even there we find a downward trend. As to technology, this rate is lower, although it keeps stable. We thus see that in technical fields of study there is growth potential regarding the female rate, especially when compared to Science & Health.

Chart 4. Distribution in percent of science knowledge

Source: PISA, 2006

Chart 5. Evolution of knowledge indicators on mathematics in the PISA study



Source: PISA, 2006.[7]

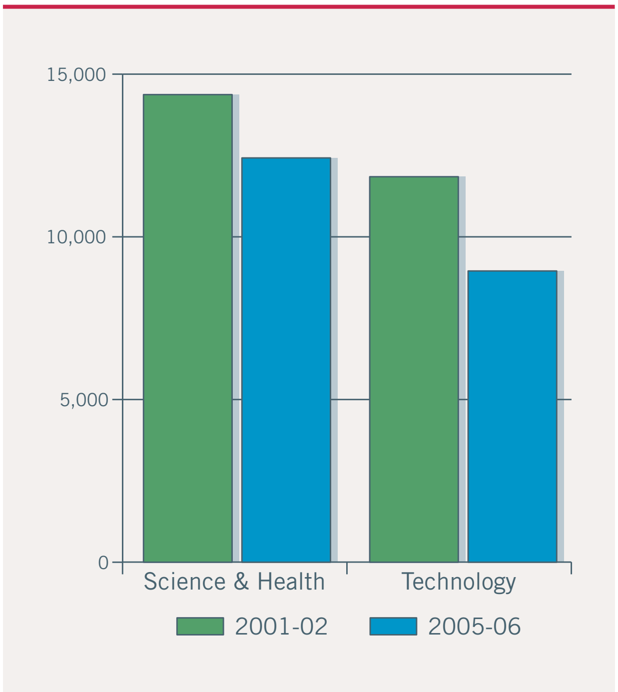
Table 2. 12th class pupils by specialisation

as of total population within that age group

		2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
Spain	Science & Health	26.2	25.67	24.7	24.3	23.9	23.9
	% females	52.6	52.7	52.5	51.37	50.9	50.9
	Technology	7.5	7.0	6.3	5.85	5.4	5.0
	% females	18.2	22.5	22.0	20.7	21.1	21.2
Catalonia	Science & Health	18.9	17.5	16.3	15.8	15.6	15.9
	% females	64.2	64.8	64.4	63.7	62.5	61.8
	Technology	13.3	14.3	14.1	13.8	12.9	12.1
	% females	16.8	18.9	19.6	18.6	19.4	18.6
Navarre	Science & Health	31.2	29.6	29.6	29.9	30.6	31.1
	% females	53.2	53.4	50.3	51.7	52.7	51.4
	Technology	6.6	6.1	4.9	4.4	4.0	3.9
	% females	7.6	12.9	10.1	9.5	9.7	8.9

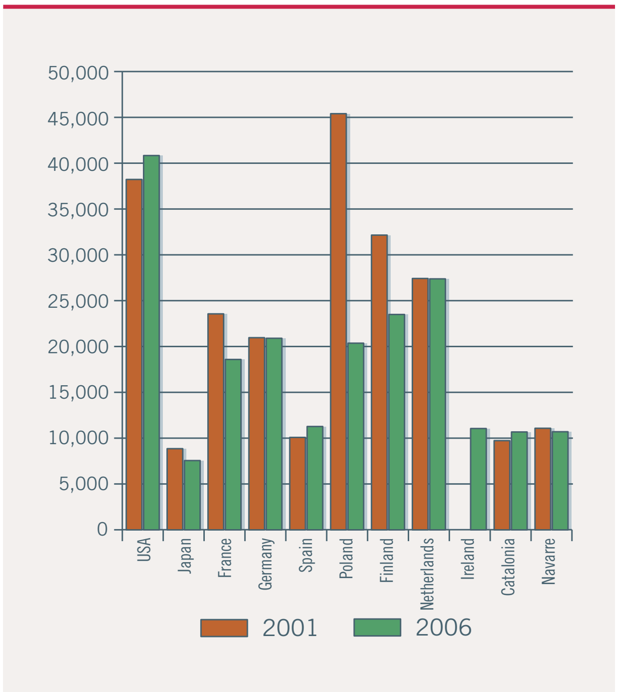
Source: Spanish Ministry of Education[8]

Chart 6. Pupils in the 11th class in Catalonia



Source: Catalan Department of Education.

Chart 7. Students in vocational training per million inhabitants



Source: UNESCO and INE.

Chart 7 analyses the situation of teaching in vocational training. Although there has been a certain increase in Catalonia between 2001 and 2006, figures are very low, namely less than half those of benchmarking countries.

University

The percentage of students entering university and choosing a science career in the last six years has dropped slightly in all of Spain and in Catalonia (between 1 and 2 percentage points in five years) and more in Navarre (5 percentage points in five years), as table 3 shows.

As to technology, the evolution in all of Spain and in Catalonia is similar, while there is a slight increase in Navarre (it seems that there may have been a shift from science to technology). In Catalonia, especially in engineering, the number of students at the Open University of Catalonia as compared to overall figures is noteworthy (17% of new inscriptions in technology careers in 2006-2007).

***Table 3.* New students in university by field of studies**

as of total population within that age group

		2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
Spain	Science % cohort	4.0	3.8	3.9	3.8	3.7	3.6
	Science % year	7.3	6.0	6.0	6.1	6.0	5.7
	Science % females	59.5	59.2	59.5	58.3	57.4	56.5
	Technology % cohort	14.2	16.6	15.6	14.6	13.9	13.7
	Technology % year	25.8	26.1	24.4	23.8	22.6	21.3
	Technology % females	26.5	24.8	29.3	25.2	24.7	24.2
Catalonia	Science % cohort	4.3	4.3	4.6	4.4	4.7	4.7
	Science % year	6.8	6.0	6.1	5.8	5.9	5.7
	Science % females	60.5	63.3	63.5	62.3	61.9	56.7
	Technology % cohort	16.0	18.4	19.9	17.6	18.1	16.6
	Technology % year	25.1	25.6	26.4	23.5	22.6	20.4
	Technology % females	22.8	21.7	21.1	21.7	20.0	20.0
Navarre	Science % cohort	6.5	4.0	4.4	2.9	3.4	3.0
	Science % year	9.9	7.1	7.2	4.9	5.7	4.9
	Science % females	71.7	68.7	71.3	69.5	65.8	66.1
	Technology % cohort	18.1	17.8	19.1	19.0	19.0	18.7
	Technology % year	27.3	31.3	31.6	31.8	32.2	30.8
	Technology % females	31.5	34.1	32.8	33.4	29.6	26.0

Source: Spanish Ministry of Education[9]

In the case of Catalonia there is an annual reduction of 0.2 percentage points (3% annual reduction) in science and one percentage point (2% annual reduction) in technology. Without being a deep crisis, it is a serious situation as it combines a reduction of size in the age cohort (1% every year) and a reduction of the percentage within the year of graduation (3% every year in science and 2% in technology), which causes an aggregate annual reduction of roughly 4% in science and 3% in technology.

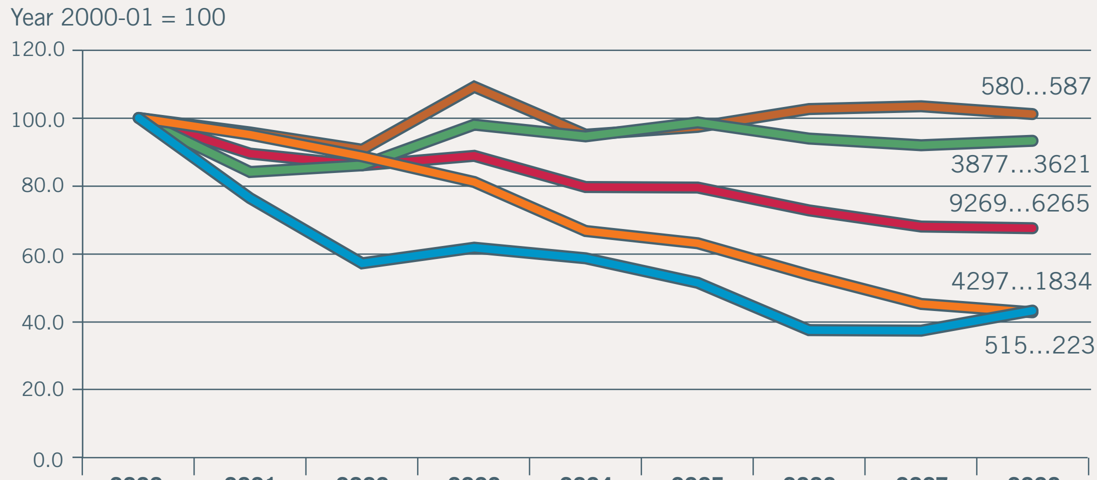
The number of students at the Open University of Catalonia as compared to overall figures is noteworthy.

Chart 8 represents the evolution of demand at university, concentrating on engineering, and shows further a reduction in demand of certain areas of study such as computer science and telecommunications.

If we take a look at the figures of students registered in science and engineering, the data on chart 9 show a gradual reduction in most European countries except for those already having experienced a little crisis in the 1990s. According to this, figures increase slightly in the US, France, Germany, Poland and Finland, while there is a minor reduction in Spain, Ireland, Catalonia and Navarre. Japan and the Netherlands stay stable, but at a low level.

Academic progress of students at university is a key element to improve the performance of the system and the perception they have of their career. To assess this, the cohort having taken up a technical career in Catalonia in the 2000-2001 academic year has been monitored, analysing their progress over seven years. After this period, 3689 students (42% of the cohort) had graduated, 1561 (18%) had changed that career for another one, 1796 (20%) left university completely and 1733 (20%) were still studying (cf. chart 10).

Chart 8. **Evolution of demand for careers, academic year 2000-2001**

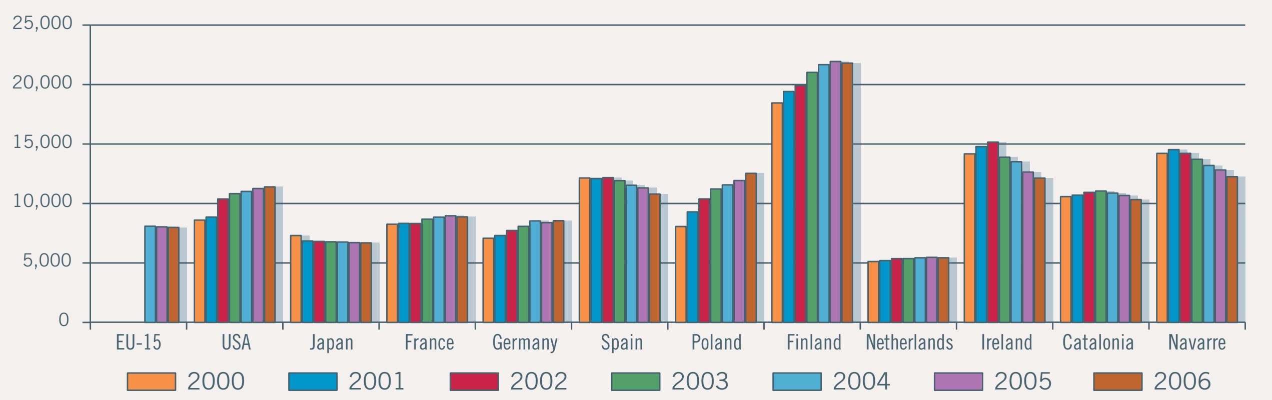


	2000	2001	2002	2003	2004	2005	2006	2007	2008
Agricult & forestry	100	76.5	57.3	61.7	58.6	51.5	37.5	37.3	43.3
Civil engin.	100	95.9	90.7	109.3	95.2	97.4	102.8	103.4	101.2
Industrial engin.	100	84.2	86.2	98.1	94.6	98.8	93.9	92.1	93.4
Telecom. & IT	100	95.1	88.7	81.2	66.8	63.2	53.8	45.3	42.7
Total	100	89.6	86.0	89.0	79.8	79.6	72.7	68.0	67.6

Source: University Pre-Registration Office

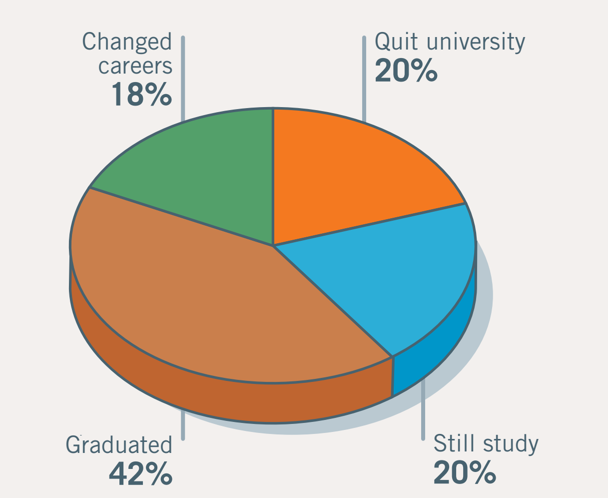
Chart 9. Students registered in science and engineering careers (ISCED 5-6, university students)

per million inhabitants



Source: Eurostat and Spanish Ministry of Education and Science (UNESCO)[10]

Chart 10. Academic progress up to 2006-2007 of the 2000-2001 cohort of students of technical degrees in Catalonia



In terms of academic progress, six in ten students eventually graduate, but four go different ways.

The final outcome of the educational process are graduates, and it is from this perspective that the existence or absence of a crisis in science and technology vocations needs to be stated. Table 4 shows the data of university graduates in Catalonia compared to the whole of Spain and Navarre. A progressive reduction in science graduates can be observed, although it is less dramatic in Catalonia. In technology, figures have been stable up to 2005, after which a downward trend started. Once again, we see that a reduction of graduates is starting to take place in the last two or three years, a period in which demand has grown, which could lead to a feeling of shortage.

When comparing to data of benchmarking countries (cf. chart 11), we see that the aggregate number of graduates in science and technology in Catalonia is relatively high but there is a clear reduction, while a slight increase is occurring in most countries. The gender breakdown shows a slight increase of the female graduate rate in Catalonia, which may suggest a better efficiency of female graduation (cf. chart 12).

When analysing the breakdown by specific fields within science and engineering (cf. chart 13), we see that there is a balance between science and engineering graduates in Catalonia, and the relevance of other areas could be in line with benchmarking countries, though at a lower level, especially in mathematics. The PhD graduate figures in

Table 4. **Number of science and technology graduates (ISCED 5-6) per year**

		2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
Spain	Science 1st	899	940	859	929	1,134	1,085
	Science 2nd	14,408	14,006	13,504	12,607	11,888	10,391
	Total 1st+2nd	15,307	15,346	14,363	13,536	13,022	11,476
	% year	7.4	7.1	7.0	6.8	6.8	6.4
	Technology 1st	24,462	24,421	24,867	24,260	23,573	23,031
	Technology 2nd	17,694	18,962	18,728	19,041	18,247	17,999
	Total 1st+2nd	42,156	43,383	43,595	43,301	41,820	41,030
	% year	20.3	20.7	21.3	21.8	21.8	22.7
Catalonia	Science 1st	191	243	216	195	278	259
	Science 2nd	1,967	2,015	2,019	1,850	1,924	1,715
	Total 1st+2nd	2,158	2,258	2,235	2,045	2,201	1,974
	% year	6.9	7.0	7.0	6.5	7.0	6.6
	Technology 1st	4,419	4,201	3,792	4,152	4,063	3,850
	Technology 2nd	3,185	3,408	2,901	2,960	3,232	3,071
	Total 1st+2nd	7,604	7,609	6,693	7,112	7,295	6,921
	% year	24.1	23.5	20.9	22.6	23.1	23.0
Navarre	Science 1st	88	98	106	87	66	35
	Science 2nd	253	255	218	187	189	232
	Total 1st+2nd	341	353	324	274	255	267
	% year	9.0	9.4	9.2	8.2	8.3	9.8
	Technology 1st	353	289	364	434	335	315
	Technology 2nd	630	528	552	622	566	502
	Total 1st+2nd	983	817	916	1,056	901	817
	% year	26.0	21.8	25.9	31.7	29.4	30.0

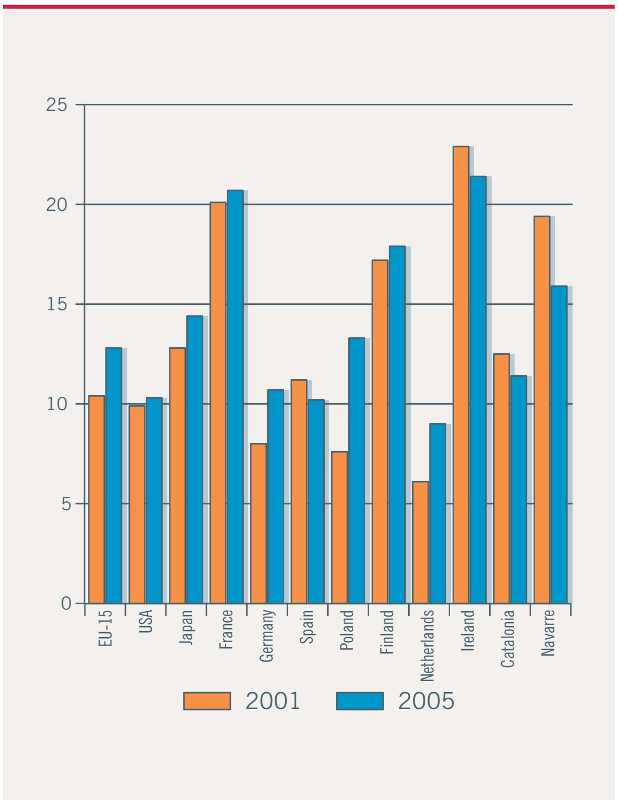
Source: INE.[11]

science and engineering are stable and relatively high in Catalonia compared to the European average and overall Spain (cf. chart 14).

Chart 15 analyses the data on how graduates are distributed across the three university cycles. To do so, the following comparison has been made: diplomas and technical engineering degrees in Catalonia have been equalled to bachelors, licences and higher engineering degrees to masters, and doctors to PhD. To have a more precise view, we have separated science from engineering careers. Data show quite a settled pattern at international level, with a decreasing proportion of graduates from the first (BA) to the second cycle (MA), which in Catalonia and all of Spain is clearly the opposite in science.

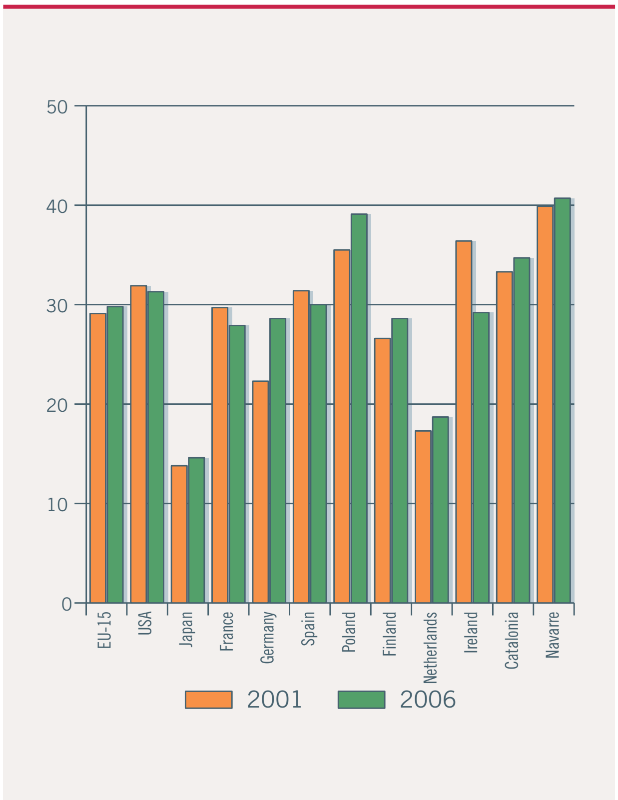
An item directly linked to the pace of progress in university is dedication to studying, and support

Chart 11. Number of graduates (ISCED 5-6) per year in mathematics, science and technology per 1000 inhabitants aged 20-29



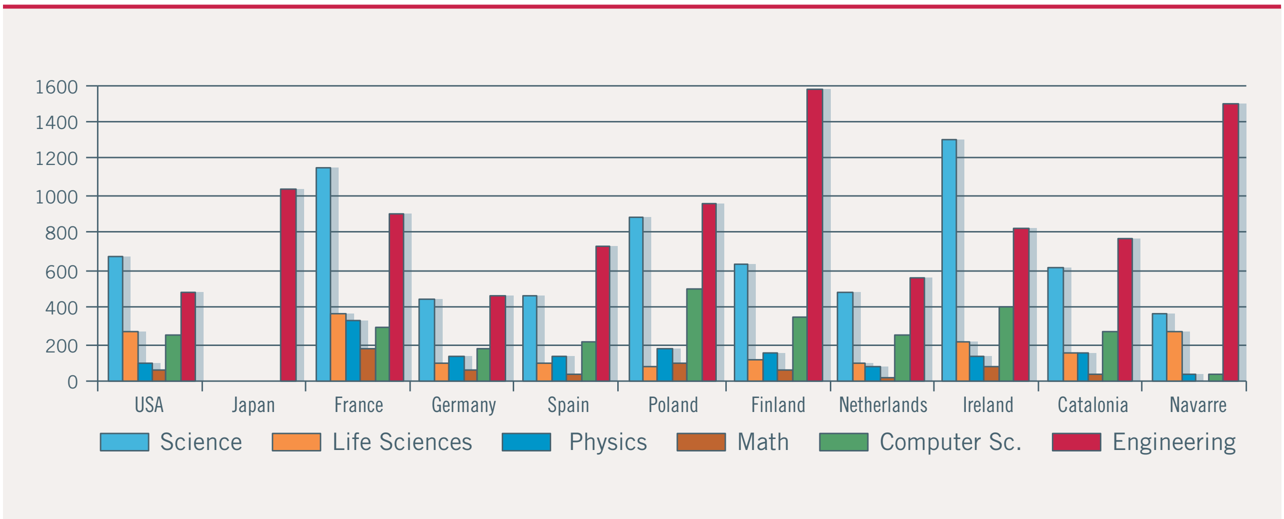
Source: Eurostat and INE

Chart 12. Number of female graduates (ISCED 5-6) in mathematics, science and technology as of total female and male graduates



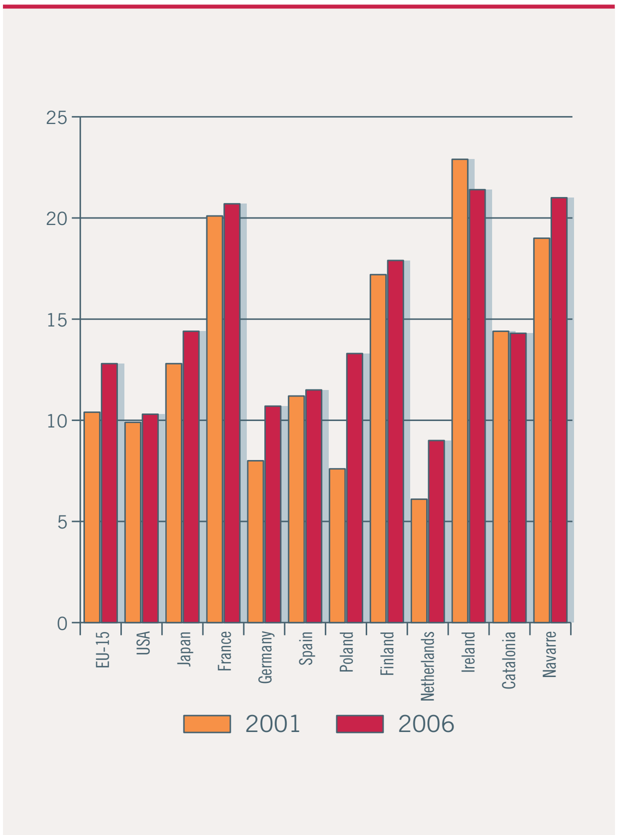
Source: Eurostat and INE

Chart 13. Number of graduates per year (2005) per million inhabitants



Source: OECD[12] and INE

Chart 14. **Number of science and technology PhD per 1000 inhabitants aged 25-34**



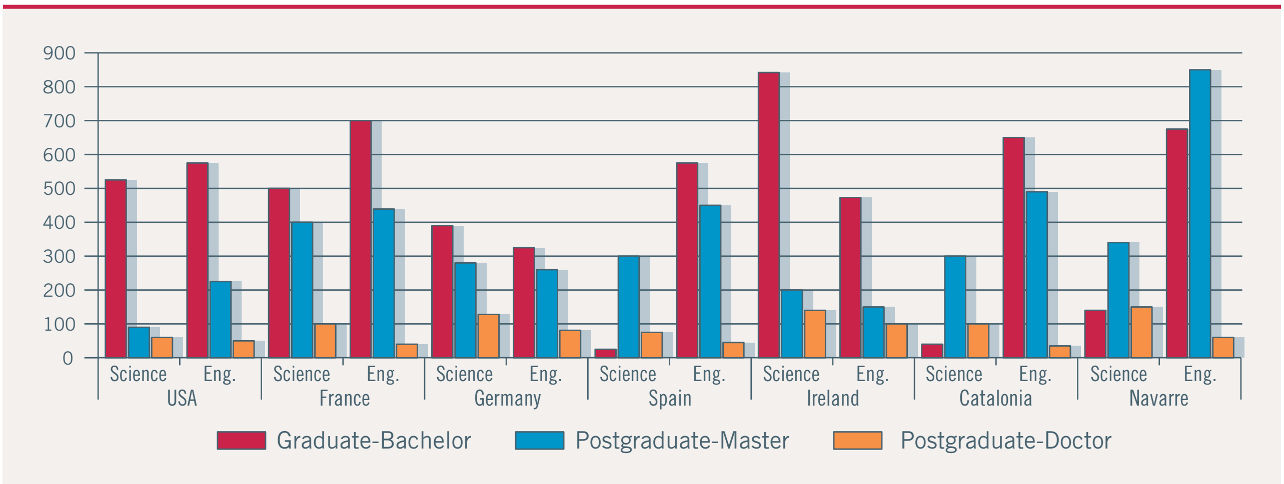
Source: Eurostat and INE

in the shape of grants and loans (cf. chart 16) can have a significant influence here. Grants in Spain are clearly below the European level, and the use of loans is scarcely developed. In Catalonia, these data are even poorer. However, it has to be said that Catalonia stands out[14] as to the number of international grants awarded.

Perception of science and engineering careers

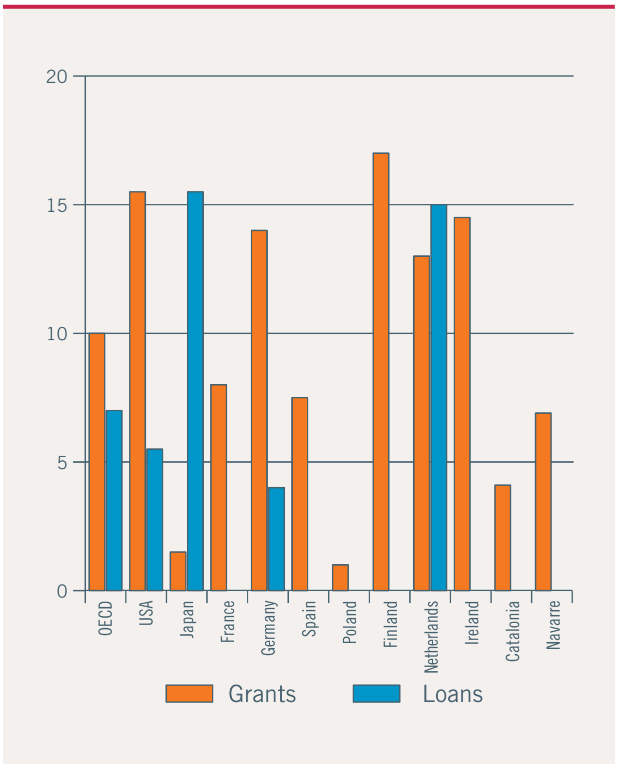
The educational level contributes quantitatively to the employment rate (cf. chart 17) and qualitatively to remuneration. Studies carried out in the United States[16] reveal salary structures depending on the education level that result in proportions of 20, 30, 40, 50 or 60 according to whether they correspond to primary, secondary or university education, the latter being divided into BA, MA and PhD. In this respect, university studies in general have a positive perception with students and their families. However, this opinion does not affect in the same way the different areas of study. Let us now analyse some aspects that may have an influence on the choice of science and technology careers:

Chart 15. **Number of graduates a year in mathematics, science and technology by level of study per million inhabitants in 2005**



Source: Research and Development Statistics in Ireland[13]

Chart16. Funds allocated to subsidise university studies (grants and loans) as of overall OECD university education budget



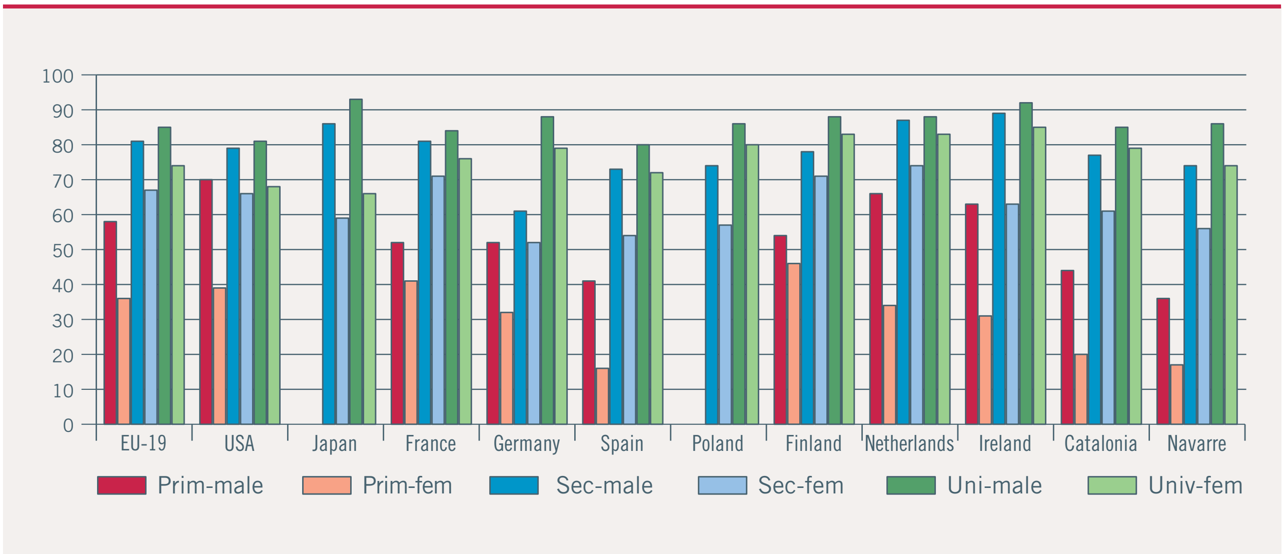
Source: OECD.[15]

Although science and technology have in general a good audience[18] according to the science and technology Eurobarometer[19] (the very interested, with 35%, and relatively interested, with 49%, amount to a total 84%), and medicine and environmental studies raise considerable interest, the interest in areas such as sports, communication and culture is even bigger.

Scarce interest in science is because school lessons are not attractive enough, scientific subjects too difficult, salaries and professional careers unappealing and the youth less interested in science.

When analysing the social perception of the different professions, it can be observed20 that in the EU-15, doctors (71%), scientists (45 %), engineers (29 %), judges (28 %), athletes (23 %) and artists (23 %) are above 20%. While this high consideration of scientists and engineers is apparent in countries such as Germany, France and Finland, engineers are less considered than athletes in Spain, coming very close to the perception of

Chart 17. Employment rate by gender and educational level (primary, secondary and university)



Source: OECD[17]

artists and journalists, while doctors, architects and lawyers are still highly considered.

- When asking the youth for the reason of their lack of interest in science, their answers are that lessons at school are not attractive enough (25%), scientific subjects are too difficult (20%), salaries and professional careers are not appealing (15%) and they have no interest in science (15%).

- The attitude of the public in general in the 2005 European enquiry on the lack of interest by the youth in science and technology was: more needs to be done to encourage girls to enter these careers (71%), Europe needs to open up more to graduates from abroad (63%), authorities need to take measures (60%), companies will find the people they need (55%), nothing must be done as individual freedom of choice has to prevail (45%), it is a serious threat for future socioeconomic development (42%).

- All in all, there is quite a widespread perception that science and technology careers are not attractive for young people, which includes issues related to remuneration, career structure, work environment, social status and image. These perceptions can vary slightly depending on the professional area. While remuneration and career structure could have a bigger impact in civil service and university, the image of the profession could be determining in the industry.

Initiatives in Catalonia

Being aware of this situation in Catalonia in recent times, especially in the last year, different initiatives have been set up to foster a more favourable environment to encourage new vocations that may contribute to halt this downward trend in science and technology graduates. We would like to point out specifically the following:

- The Department of Education is observing with attention the initiatives of the European Science, Technology and Society pedagogic movement, working in updating secondary school curricula and contents to bring them closer to pupils. They also collaborate with programmes to promote science vocations in secondary school, such as the Prat de la Riba programme.

- Universities have developed several alternatives to smoothen the change from secondary school to university, regarding both information and orientation as well as contents. The Estudia show, for instance, offers exposure for universities to explain the careers to prospective students. The Barcelona Science Park hosts workshops to disseminate science in connection with international meetings. There are also efforts to update the contents and denomination of technological careers and facilitate the effort and dedication they require.

- Professional organisations identify an increasing difficulty in covering a significant proportion of the demand by companies and are developing initiatives to bring the concept of their profession closer to the youth. Different teacher and professional associations promote activities to disseminate science and technology in parallel to what is done at European level.[21]

- The Institute of Catalan Studies hosts scientific meetings, and the Catalan Research and Innovation Foundation promotes initiatives such as the Science Week. Further, noteworthy activities are that by CosmoCaixa, the Math Olympics organised by the Catalan Society of Mathematics, activities by the Caixa Penedès Foundation to promote technology as well as the E2C3 (Science Summer Stages of Caixa Catalunya), in which 53 10th year pupils take part for two weeks in different research programmes coached by international leading scientists.

- Different analyses such as the detailed study of the ICT industry by FOBSIC[22] predict an imbalance in demand of 15,000 technicians, which may increase job rotation, tasks ordered outside the company and outside Catalonia, recruitment of foreign professionals or ICT training of those working already here. A significant feature is that while the academic system is producing vocational trainees, bachelors and masters in quite comparable numbers, the labour system will require progressively more bachelors and vocational trainees, according to what is already occurring in technologically more consolidated countries, with a rough proportion of 40% vocational trainees and related degrees, 40% university undergraduates and 20% graduates. Another study also warns about the specific difficulties in computer science and telecommunications, predicting a significant reduction of graduates in the medium term[23] (more than 20% by 2010).

- In Catalonia, business representatives state an increasing difficulty in finding qualified professionals and the job rotation this creates on the market. Among other measures, they propose a faster implementation of the European blue card to attract skilled workforce.[24]

Chart 18. Basic action lines of the EnginyCAT programme

LINE 1. What does an engineer do?

ACTION 1: VÍDEOS

Edition of multimedia files
Active distribution and dissemination (web, e-mail)

ACTION 2: MATERIALS FOR GUIDANCE

Elaboration of materials
Women and science
Active distribution and dissemination

LINE 2. Explore!

ACTION 3: ROBOTICS WORKSHOPS

Stage 1: Girona area
Stage 2: Lleida area
Stage 3: Tarragona area
Stage 4a: Northern Barcelona area
Stage 4b: Southern Barcelona area
Stage 4c: Barcelona city

Each stage: two months, 2400 pupils

ACTION 4: TECHNOLOGY CAMPS

Layout and preparation of contents
Implementation: 2009

LINE 3. Test yourself!

ACTION 5: ANNUAL PUBLIC RECOGNITION EVENT

Search of awards and prizes
Promotion of the initiative and preparation
Event to be held in 2008-2009

LINE 4. Get ready!

ACTION 6: PUSH FOR CURRICULAR UPDATE

Strategic projects of curricular renewal 2008-2009

ACTION 7: INTERNATIONAL MEETING ON BEST PRACTICES

International meeting on best practices 2009

LINE 5. Get involved!

ACTION 8: STUDENT-MENTOR GRANT PROGRAMME

Call for grants
Execution of grants 2008-2009

LINE 6. Your future: innovation!

ACTION 9: PROFESSIONAL OFFER-DEMAND ADJUSTMENT

ICT training of assimilated professionals
Practice at companies (400 placements)
International programmes

- The will of different associations, institutes, professional organisations and universities as well as the Catalan Department of Labour to increase the presence of women in technical careers and their access to managing positions is also worth mentioning.

The EnginyCAT programme

Given the imbalance between the reduction of science and technology graduates and the demand by companies and research institutions to cover their needs with skilled employees, the EnginyCAT programme has been created under the leadership of the Department of Innovation, Universities and Enterprise through the Commission of Universities and Research (CUR-DIUE), in collaboration with different involved institutions to tackle this situation.

The EnginyCAT programme is led by the Department of Innovation, Universities and Enterprise through the Commission of Universities and Research (CUR-DIUE), in collaboration with different involved institutions.

The programme has set out six action lines (cf. chart 18) acting directly on the different stages (pre-university education, university and labour market) and on the previously identified bottlenecks. This action translates into nine urgent measures to be deployed in 2008-2009 in order to meet the following goals:

- **Increase the amount of vocations** in science and technology careers, especially engineering, devoting special attention to women.
- **Improve science and technology education** of pupils in pre-university education.
- **Contribute to improving the academic record** of engineering students.
- **Fostering a better adjustment between offer and demand of professionals** in technology.
- **Coordinating existing actions by the different stakeholders**, looking for synergies and avoiding duplications.

Actions geared to a specific audience are completed by horizontal actions for promoting, marketing and communicating the initiative. The programme also plans to set up the EnginyCAT Observatory to monitor the evolution of the different indicators while providing the rest of the programme with information and data.

Conclusions

To summarise, we could say that Catalonia needs to increase substantially the rate of youngsters graduating from secondary school (between 10 and 20 percentage points). With a higher overall rate of secondary school graduates, the absolute number of vocational trainees could increase and graduation rates within schedule improve. Generally speaking, the downward trend of prospective science and technology students, especially women, needs to be halted.

Catalonia needs to increase substantially the rate of youngsters graduating from secondary school.

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