



In depth



Why is it important to encourage scientific vocation?

Teachers play a key role in stimulating curiosity about science from a young age. In Catalonia, there is an ever-growing number of organizations and researchers promoting initiatives geared towards students and teachers at primary and secondary schools.

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Fostering scientific vocation can be compared to planting a seed to harvest the fruit from the tree in the future. It is a long-term investment with clear, positive repercussions on society. As researcher Roderic Guigó wrote in an article in the book *Ciència i Universitat a Catalunya: projecció de futur* (*Science and University in Catalonia: A vision of the future*, University of Barcelona, 2012), scientific development is vital not only for economic reasons but also because "societies in which science plays an important role have achieved a **higher level of wellbeing, democratic culture and social development.**"

So, how can we foster scientific vocation? There are various factors that impact the chances of a person developing a curiosity for science from a young age: visiting a museum, a book, relatives working in the field, etc. The study [Does the public communication of science influence scientific vocation?](http://pus.sagepub.com/content/19/5/625.abstract) (<http://pus.sagepub.com/content/19/5/625.abstract>) (*The Public Understanding of Science*, 2010) says **teachers exerted the greatest influence** on development of scientific vocation.

Therefore, educational tools for teachers to transmit science are of particular importance. According to scientist and entrepreneur David de Lorenzo, also in the book *Ciència i Universitat a Catalunya*, "Human beings have an innate curiosity about science but this curiosity can be educated and fostered through the scientific knowledge that children and teenagers take in from their surroundings."

The way **science is taught in the classroom** has a **direct impact** on future vocations. The educational model has changed in recent years and classes are no longer unidirectional, they are now more **dynamic, open** and geared towards **practical learning**. A good example of this new outlook is expressed by primary-school teachers Núria López and Pilar Melcón in their article [Quan suquem una galeta a la llet](http://dialnet.uninjoa.es/servlet/articulo?codigo=3335755) ([When we dunk a cookie in milk](http://dialnet.uninjoa.es/servlet/articulo?codigo=3335755)). In this study on meaningful learning, López and Melcón turn an every-day event into the foundation for discovery: dunking a cookie in milk serves to stimulate critical thinking in students and introduce the scientific method.

Another disruptive focus has been defined by educator [Sir Ken Robinson](http://sirkenrobinson.com/) (<http://sirkenrobinson.com/>), who wrote the revolutionary Robinson Report while leading a national commission on creativity, education and the economy for the British government. The report, officially entitled [All Our Futures: Creativity, Culture and Education](http://sirkenrobinson.com/pdf/allourfutures.pdf) (<http://sirkenrobinson.com/pdf/allourfutures.pdf>), reveals the importance of creativity on the future of education. Robinson believes that good teaching must be based on three pillars—diversity, curiosity and creativity— and that education must be seen as an organic, not mechanical, system.

Science, increasingly valued by society

However acting is just as important as evaluating. With this in mind, the Spanish Foundation for Science and Technology (FECYT) compiles a survey every two years on social perception of science. The results published in 2012 show that general interest in topics of science and technology has increased 19% from 2010, and among 15- to 24-year-olds the rise is even more noteworthy, up 40%.

Moreover, the FECYT study also highlights that nearly 90% of the population associates science and technology with improved quality of life and economic development.

When did you decide to become a scientist?



Pere Puigdomènech, CSIC research professor: "After I finished my degree in Physics, I had the opportunity to work in a laboratory in France. I discovered that delving into learning about the world around us is one of the most gratifying and beneficial experiences in life. And I still believe this."



Fàtima Bosch, director of the CBATEG-UAB: "I was interested in biomedicine but ended up choosing pharmacy. Thanks to the good professors I had, I decided to study a PhD. In the 1980s, I saw the beginnings of gene therapy and ever since have devoted my life to searching for new treatments for human diseases."



Pere-Joan Cardona, co-inventor of the Ruti vaccine and CEO of Manremyc: "I discovered A.Fleming when I was 14. The simplicity of the resources he used and the clarity of his hypotheses

Greater interest in science, and particularly in the **life and health sciences**, is closely tied to an increase in the number of university degrees on offer in these fields and the growing number of students enrolled in them. With the launch of the European Higher Education Area (EHEA), in the 2009-2010 school year, universities began offering more undergraduate and masters degrees. Today, 11 of the 12 universities in Catalonia offer studies associated with the life sciences.

In addition to the most popular degrees in biology, biotechnology and biochemistry, there are also new undergraduate degrees in microbiology (UAB), biomedical engineering (UB, UPC, UPF), genetics (UAB), nanoscience and nanotechnology (UAB), biomedical science (UAB, UB, UdL) and biological systems engineering (UPC). Furthermore, there are 90 masters degrees focusing on the sector. For the 2011-2012 academic year, a total of 9,595 students chose to pursue a degree in the life sciences, 17,377 in the health sciences and 3,163 enrolled in a master focusing on this arena. Together these students make up 12.3% of all those enrolled in Catalan universities. That same academic year, 495 dissertations were presented in science and 462 in health sciences, for a total of nearly one thousand new PhD graduates.

Research of excellence in Catalonia

Although science knows no borders, young people need to be aware that Catalonia is world renowned for its scientific excellence and bioscience is one of the most prosperous areas. To sum up this positioning we can say that the country has large-scale facilities like the ALBA-CELLS synchrotron light laboratory, the *Mare Nostrum* supercomputer at the Barcelona Supercomputing Center, and the National Genome Analysis Center (CNAG), more than 500 biotechnology, pharmaceutical and medical technology companies, 440 research groups and 54 centers that carry out research in the life sciences.

Catalonia also stands out for its top-notch researchers. Between 2007 and 2012, the European Research Council (ERC) awarded 102 grants to Catalan scientists, which accounts for 52% of all those awarded in Spain over this period and puts Catalonia tenth on the ranking of European countries led by the United Kingdom, Germany and France. These grants are the most prestigious currently awarded in Europe and have recognized top-notch researchers like [Jordi Sunyer](http://www.biocat.cat/en/news/seven-catalan-scientists-awarded-europes-prestigious-advanced-grants) (<http://www.biocat.cat/en/news/seven-catalan-scientists-awarded-europes-prestigious-advanced-grants>), [Manel Esteller](http://www.biocat.cat/en/news/seven-catalan-scientists-awarded-europes-prestigious-advanced-grants) (<http://www.biocat.cat/en/news/seven-catalan-scientists-awarded-europes-prestigious-advanced-grants>) and [Eduard Batlle](http://www.biocat.cat/en/news/six-scientists-working-catalonia-receive-prestigious-erc-advanced-grants) (<http://www.biocat.cat/en/news/six-scientists-working-catalonia-receive-prestigious-erc-advanced-grants>).

Looking to the future, the promotion of scientific vocation will have to tackle challenges like encouraging scientific interest in all social classes, working to strike a gender balance in the classroom in scientific degrees, strengthening the role of teachers and fostering transversal learning from an early age. Some studies, like that by Evers [Factors influents en l'elecció d'estudis científics, tecnològics i matemàtics](http://www.evers.com/catalonia/WCLibraryRepository/Factors%20influentis%20eleccio%20estudis%20CTM.PDF) (<http://www.evers.com/catalonia/WCLibraryRepository/Factors%20influentis%20eleccio%20estudis%20CTM.PDF>) (*Factors Influencing the Choice of Studies in Science, Technology, and Mathematics*), show that mathematics, technology, physics and chemistry need to be made more attractive during obligatory secondary education in order to avoid the Pygmalion effect.

Resources for the educational community in Catalonia

Over the past five years, Catalonia has increased the resources available for the training and retraining of primary and secondary science teachers, as well as that to encourage scientific vocation among the youngest students. Various programs, workshops, courses and practical laboratory sessions tied to the life sciences among other disciplines, mostly free of charge, are offered through foundations run by financial institutions, public research centers and private companies.

A summary of the resources available can be found on this table (<http://www.biocat.cat/en/life-sciences-resources-educational-community-catalonia>)

Research fairs and events for the general public

Furthermore, there are many research fairs, guided visits and open houses for families, schools and the general public, as listed below (life sciences arena):

- [Science Week](http://setmanaciencia.fundaciorecerca.cat/) (<http://setmanaciencia.fundaciorecerca.cat/>)
- [Researchers' Night](http://spin.udg.edu/m13/?lang=en) (<http://spin.udg.edu/m13/?lang=en>)
- [Live Research Fair at the Barcelona Science Park and Fundació Catalunya-La Pedrera](http://www.pcb.ub.edu/homepcb/live/en/p1826.asp) (<http://www.pcb.ub.edu/homepcb/live/en/p1826.asp>)
- [Science on the Street in Lleida](http://mielleida.cat/wp-content/uploads/2013/06/PDF-CI%20C3%88NCIA-AL-CARRER-2013.pdf) (<http://mielleida.cat/wp-content/uploads/2013/06/PDF-CI%20C3%88NCIA-AL-CARRER-2013.pdf>)
- [Barcelona Biomedical Research Park Open Day](http://www.prbb.org/openday) (<http://www.prbb.org/openday>)
- [Open House at the Barcelona Supercomputing Center](http://www.bsc.es/about-bsc/press/b-sc-in-the-media/jornada-de-puertas-abiertas) (<http://www.bsc.es/about-bsc/press/b-sc-in-the-media/jornada-de-puertas-abiertas>)
- [Visits to the ALBA-CELLS synchrotron](http://www.cells.es/visitALBA) (<http://www.cells.es/visitALBA>)

Even [Google](https://www.google.com/sciencefair/en/2013/) (<https://www.google.com/sciencefair/en/2013/>) has launched a yearly Science Fair.

Photo above and cover of E-News (N. 43): open day at PRBB - © 2013 PRBB / Jordi Casañas

pushed me towards working in science and setting up my first microbiology laboratory in the attic of my house!"



David Bueno, *professor of Genetics at the UB*: "When I was 8, my parents gave me a book on the cosmos. As soon as I read it I knew I wanted to study science. I chose biology after having excellent teachers at school. What drives me to continue working in science is the feeling, the conviction, that it makes me grow every day."



Judit Tulla, *researcher at IRB Barcelona*: "I was doing a routine job and decided to make a change and go into research. After 14 years researching I can say that every project is an exciting challenge and that you never stop learning."



Ben Lehner, *researcher at CRG*: "When I was at school, history, geography and art were much more interesting, and those teachers were more inspiring to students. But as time went on, I realized that there's an incredible creativity in science, as well as the excitement of being the first to discover something."



Alba Olivares, *vice-president of ASBTEC*: "I was always curious about the life sciences. I was fascinated by what we learned about DNA and genes in secondary school. Finding a job that allows me to discover new things every day seemed like a challenge I couldn't pass up."

