The pipeline

The number 700,000 is often cited in articles and editorials about science politics and economic development as an estimate of the number of scientists, technicians and engineers that the European Union will need by 2010 to keep up its current rate of growth. There might be some questions about how the figure is reached, but the message is clear: the European economies face a huge deficit of the trained people needed to sustain modern knowledge-based economies.

The problem of the availability of skilled personnel worries policy-makers worldwide, who solve it in different ways. Scientific research in the USA depends massively on young scientists from abroad who are attracted by the excellent reputation of US university education and research, and by the chance of finding a well-paid job. China and India are training a large number of scientists and engineers, and expect that there will be enough jobs for them once they graduate. There are similar plans in South American countries—notably Brazil and Mexico—that, in time, will also be able to retain their researchers. Smaller countries, such as Singapore, are also investing in high-tech industries and are becoming increasingly successful at attracting talented researchers from other countries. Clearly the demand for trained scientists and engineers is increasing worldwide.

This is good news for all students in science and engineering, and yet these subjects are not the first choice for most students now working towards their high-school graduation. It is therefore worthwhile to reflect on this lack of interest in science, because the projected deficit in manpower will ultimately strangle economic development and delay the process of discovery and invention.

Some of the problem might originate from the fact that science is often presented in an unattractive way, akin to focusing on grammar when learning a foreign language. It is therefore necessary to develop a more

attractive mix of 'edutainment' and solid science to engage school children.

Subsequently, the negative image of science as a career choice is, in my view, a problem of both structure and perception. Structurally, it is not at all clear to high-school students whether 'being a scientist' is actually a well-defined career path. At a career-counselling event, a mother once asked me, "If my son gets a degree in science, what will he be?" The answer 'a scientist' would obviously have been inadequate, yet outlining the many job possibilities open to 'a scientist' is also rather confusing. The reality is that a primary degree in science is akin to a degree in the arts: it is only a starting-point. However, many university students embarking on degrees in science would probably prefer a more predictable career structure; one comparable with that of their colleagues who attend business, law or medical school.

A related structural problem is the fact that 'a scientist' is not a bonafide profession. Consequently, there are no standard rules or qualifications that define a scientist, and only a few, very select guidelines and regulations. Scientists follow no strong and binding codes about behaviour, nor are there any clear definitions of the values and duties of a scientist. This lack of a formal structure might explain why the number of young people applying to study science remains irrationally low.

Another fact that discourages students from science is the widespread perception that the salaries of scientists are very low compared with those of medical doctors, lawyers or bankers, for example. Although this is true at the PhD and postdoctoral level, in advanced economies, scientists at the top professional level are well paid. Once students have finished their PhD training—which admittedly takes longer than the training for some other professions—they find a welcoming international marketplace

that offers competitive salaries; but nobody seems to know that. Worse still, the salaries of experienced researchers who reach the level of group leader or professor are rarely reported. The potential student is therefore left with the image of an impoverished career in science driven solely by the quest for knowledge. It is easy to see how this cannot hold up against the widely reported salaries of sports-car-owning investment bankers, surgeons or lawyers.

Another aspect of science that is not sufficiently stressed, but that could attract students, is the prospect of job satisfaction. There are many scientists who relish the thrill of discovery, the satisfaction of solving a problem or the pride of finding solutions to society's needs. Indeed, the possibility of developing a new cure or diagnostic test, improving the way we generate energy or simply being the first to understand something, should all be utilized as good recruiting tools. Scientists need to learn to promote these aspects of their careers more effectively and to stress the culture of altruism in scientific research. As a community, we have to emphasize the fact that science is a passport to a global arena in which to pursue fascinating and diverse career options. We need to support and encourage young students and help teachers to communicate science in an exciting and inspiring manner, even as early as primary school. In fact, the scientific community has a lot to do and it needs to start soon if we are to avoid the deficit of skilled scientists and engineers predicted for the coming decade.

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This Editorial represents the personal views of Frank Gannon and not those of Science Foundation Ireland or the European Molecular Biology Organization.

doi:10.1038/sj.embor.7401156