SCIENCE

European Universities in Transition

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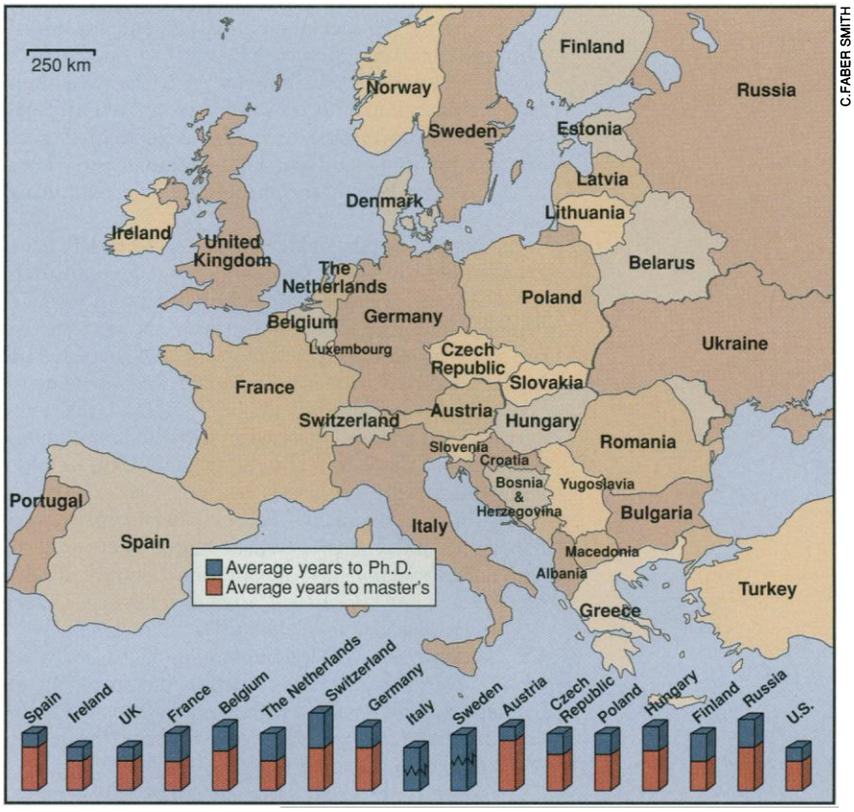


European diversity. The disparity in European education is indicated by the differences in the average number of years students take to get an M.Sc. or Ph.D.

From the Atlantic seaboard to the Urals, the education of Europe's next generation of scientists is in a state of flux. There is no single trend—indeed, in some cases, neighboring countries are moving in opposite directions as they overhaul their university systems. But across the continent, political, economic, and social forces are transforming higher education.

In this special report, *Science*'s network of European correspondents focuses on changes taking place in eight countries across western, central, and eastern Europe. They sought out the views of students, teachers, department heads, and rectors at several dozen educational institutions, as well as those of researchers, politicians, and policy-makers. Although this survey does not claim to be comprehensive—key countries in Scandinavia and southern Europe could not be included, for example—the countries chosen reflect the different faces of this transition.

While the U.S. higher education system may see itself as the "Great American Doctorate Factory," European universities are, to use the American vernacular, no slouches. While some of the universities featured in this report may be half a millennium old—even older in the cases of Cambridge, Toulouse, Heidelberg, and Prague's Charles University—they are not havens of sleepy academia and quaint customs. Most such institutions are vibrant centers of research that also use modern teaching methods to churn out skilled graduates by the score.

In the past 30 years, most European countries have added a new generation of universities to these venerable institutions, broadening higher education from a pursuit for the elite to a mass-production process. And training scientists and engineers has been a key part of that growth: Figures published by the Paris-based Organization for Economic Cooperation and Development (see p. 682) indicate

Photo research: Anne Alvarez

that, compared to the United States, a greater proportion of students leave European universities clutching degrees in science, engineering, and medicine.

These decades of expansion have resulted in university systems that share some of the problems encountered by higher education across the Atlantic, as institutions struggle to accommodate record numbers of students on tight budgets. (See special reports in the 4 November 1994 and 6 October 1995 issues of *Science*; full text of the '95 special report is available on-line at <http://sci.aaas.org/nextwave/careers95/>.) But Europe's mostly public universities have far less control over their own destinies. Education is either free or costs students very little, so universities are highly dependent on government funding—and like the state university systems in the United States, they are vulnerable to shifting political winds.

Is bigger better? Nowhere are these trends more evident than in the two powerhouses of European science—France and Germany. Both countries share a common problem: Their universities are straining at the seams as reforms instituted in the 1960s opened up higher education to more people and student numbers boomed. Government funding has not kept pace, however—and the strain is showing with student demonstrations in France and chronic overcrowding in Germany (see p. 683).

As Paris correspondent Michael Balter reports on page 686, France still retains a system designed to train an elite, with numerous exams and diplomas and fast tracks for the brighter students. "When one brings the mass [of students] to a structure made for an elite, there are problems," says Claude Gutierrez, who teaches biology at Paul Sabatier University in Toulouse. The consensus in France seems to be that a shift back toward higher requirements for those entering university will be needed to maintain the quality of science graduates and Ph.D.s.

In contrast, the German system is based on equality, reports Heidelberg correspondent Patricia Kahn on page 684. But while all students get equal treatment, they also receive little guidance or encouragement along the way—German students take the longest of any in Europe to graduate, and many of those interviewed by *Science* described their college days as lonely and dispiriting. With the government showing little sign of tackling the problem, some universities are taking the initiative—improving teaching quality, putting more structure into courses, and counseling students.

Survival of the fittest. While France and Germany brace themselves for change, U.K. universities are already in the throes of a revolution, says London correspondent Nigel Williams on page 688. Britain's university system was among the most selective in Europe until 4 years ago, when polytechnic colleges were promoted to university status. Higher education is now a competitive marketplace where institutions must fight for students and their government funding depends on assessments of research and teaching quality. This has forced universities to move from a democratic to a managerial style of operation, says Diana Green, pro vice chancellor of the University of Central England: "And it has happened because it has been linked clearly to funding."

Dutch universities are feeling similar pressures, reports Amsterdam science writer Alexander Hellemans on page 693. Higher education in the Netherlands expanded greatly in the 1970s, and, as in Germany, students studied at a relatively leisurely pace. Now economic pressures are forcing the government to streamline the system, and it is winning some support from university authorities. "We want a more compact and more selective university," says Jan Veldhuis, president of Utrecht University.

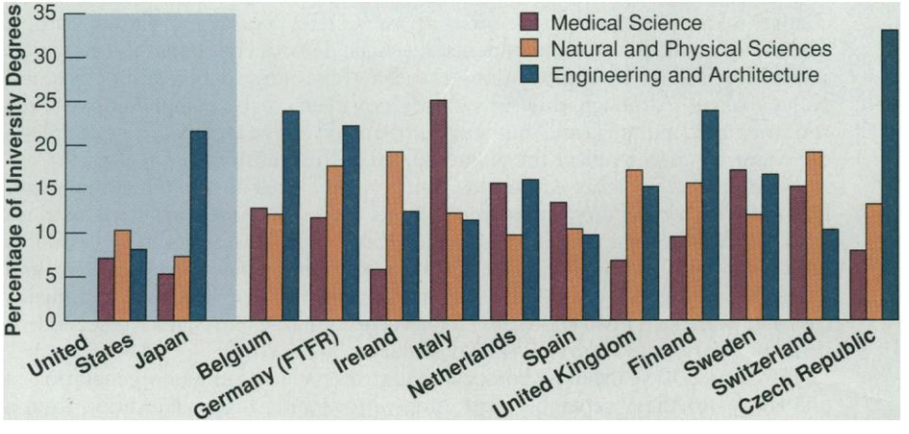
Joining research and teaching. The financial hardships of the Netherlands are nothing, however, compared to those endured in the countries of the former Soviet bloc, where economic turmoil is causing governments to cut deeply into once-generous education funding.

In Poland, says Berlin reporter Robert Koenig on page 695, universities are finding it hard to shed the authoritarian yoke of the communist system. Courses are dated and inflexible, and professors are forced to use some of their meager research grants to pay for lab classes. As government funding declines, Hungarian universities are beginning to look to the country's burgeoning industry for support—and for guidance—reports Budapest writer Susan Milligan on page 696. Meanwhile, in the Czech Republic, writes Patricia Kahn on page 697, researchers at Prague's Charles University are attempting to cut across old divisions by setting up an American-style graduate school—a model for Eastern Europe.

Russian universities are also attempting to throw off the shackles of their communist past, says Rostov correspondent Richard Stone on page 699, but it is proving difficult. "Russian education and science are going through deeply traumatic experiences," says Loren Graham, a specialist in Russian science at the Massachusetts Institute of Technology. Shortage of funds is an ever-present problem here too, but the legacy of separate institutions for education and research is making reform slow.

The picture of European education that emerges from this set of snapshots is a patchwork of different problems and different solutions. And governments seem content for it to stay that way: They have excluded the European Union (EU) from trying to impose Europe-wide educational reform, reports Nigel Williams on page 694. The EU is trying to foster a European spirit, however, through programs of student exchanges and assessments of teaching quality. But for the foreseeable future, higher education in Europe will remain one of the last major areas to be Europeanized.

–Daniel Clery



Focus on science. Compared to their U.S. and Japanese counterparts, a higher percentage of European students, on average, graduate in science and engineering.