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French Strategy for Science Education

Claude Allègre

As we enter the 21st century, defining a clear strategy for education and research has become essential, at a time when the economic competitiveness of any country depends not only on scientific and technical knowledge, but also on culture. France has always placed great emphasis on its educational system, but with little appreciation for experimental disciplines. Mathematics has played a central role in scientific education and, more importantly, in the process by which our elites are selected. French scientific research ranks among the best, and our technological research successes include Ariane, the nuclear industry, fast trains, and "intelligent" banking cards. But we have not satisfactorily transferred our scientific results to create new high-tech ventures. Therefore, we are committed to a drastic program for renovation of education, research, and technology.

In primary education, we will focus on key abilities (foremost, speaking, and reading, writing, and counting), teach at least one foreign language, emphasize a "hands-on" approach to the experimental sciences, and introduce new information technologies (all schools will be connected to the Internet by the year 2000). The challenge for secondary schools is to update the curriculum without extending the school week. Programs and contents are far too heavy and not always up to date. Our students know a lot about details, yet often fail to master the essentials. To remodel programs, we have organized a vast, national consultation to formulate and start answering the right questions: what kind of mathematics should be taught, given the expansion of calculators and PCs? Should biology begin with the cell, DNA, and genetics? Shouldn't we stress experiment and observation in physics rather than mathematical concepts?

Our priorities—the life, environmental, and material sciences and the new information technologies.

Higher education has evolved in the right direction in the last ten years; however, we are introducing two new concepts. The first is internationalization: as we are building Europe, our respective systems must adapt to an open world. So we have undertaken, at first with the United Kingdom, Germany, and Italy, to harmonize the architecture of our diplomas at the European scale: an undergraduate degree, a shorter master's, and a longer Ph.D. This will allow us to drop many obsolete diplomas, which were part of a system incomprehensible both from inside and outside. The Grandes Ecoles will also conform, with the "engineering diploma" at the master's level. These changes will allow for true mobility of students throughout Europe and the world. The second major reform will be continuing education that allows everyone to return to academic studies, to obtain new diplomas, or to update competencies throughout life. For the first time this year, 13 universities will remain open year-round to experiment with continuing education leading to diplomas.

In research, our main goal will be restructuring our institutions and priorities. Research spending, about 2.3% of our GNP (an outlay similar to Germany's, a bit below U.S. funding), is not the issue. Rather, we need to bring in younger researchers and to improve institutional connections. French research organizations, most of which were founded after World War II, have their own permanent research personnel, whose mean age (above 46 years) is too high. Links with universities must be reinforced. Researchers cannot easily transfer into industry. To redress the age imbalance, we have offered jobs to thousands of young Ph.Ds. We are preparing measures to encourage autonomy and mobility and to grant responsibilities to young scientists. We are devising a new law to facilitate new start-ups, to provide fiscal encouragement to those who invest in innovative firms, and to promote risk capital within each research organization.

At the same time, we want to boost funding for basic research and to let it thrive in a free and creative environment. Proposals from scientists will be encouraged, rather than state-controlled programs, which tend to be too numerous and not innovative enough. Remaining programs will be better coordinated and more rigorously evaluated. We will make bold scientific choices and not sprinkle funds or maintain obsolete directions. Foremost in our priorities will be the life, environmental, and material sciences and the new information technologies.

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