



Switzerland's Scientific Strengths

1. Switzerland's security for the future

Stability in education and research means that researchers, teachers and students in Switzerland can count on continuity in their work over the long term.

Another source of stability in this context is the fact that the infrastructure for research and education is varied and well developed throughout the country: Switzerland has ten cantonal universities, two Federal Institutes of Technology, seven universities of applied science and numerous additional research and vocational training centres; thus it enjoys a dense network of educational and research institutions. Such diversity creates healthy competition and is one of the reasons for the high quality of higher education in Switzerland. According to the Swiss federal system, the cantons and the federal government share responsibility for education, and, depending on the situation, the cantons may cooperate among themselves or join forces with Bern – all in a spirit of pragmatism and efficiency.

The Swiss National Science Foundation (SNF), the central agency of state-financed funding in particular for basic research, is an international rarity in the field of research due to its great flexibility, lack of red tape, and unusually low level of administration.¹

In the field of education, meanwhile, the customary efficiency with which the Bologna curriculum-reform process has been implemented at universities, institutes of technology and universities of applied science, already well ahead of the European average, is a further example of the advantages of education in Switzerland, where in autumn 2006, seven years after curriculum reform was launched in 29 European countries, all freshmen and women at Swiss universities are following the Bologna system.²

Another feature of Switzerland as a hub for education and research is its well developed system of protection for intellectual property, which ensures that researchers can reap just rewards for their inventions. In the IMD World Competitiveness Yearbook Switzerland enjoys first place with the remark "intellectual property rights are adequately enforced in your economy"³.

A further aspect is the funding available for education and research. By international comparison, Switzerland is one of the countries that invest the most in their education systems, the greatest sums

¹ Evaluation of the Swiss National Science Foundation and The Innovation Promotion Agency (2002): Report of the Swiss Science and Technology Council to the Federal Council, May.

² Swiss University Conference (2006): Annual Report 2005. Interim Report 2005/06 by CRUS on the Status of Teaching Reform at Universities in Switzerland as part of the Bologna Process, August.

³ IMD (2008): World Competitiveness Yearbook. The future importance of issues concerning intellectual property can be seen in the fact that the Californian Institute for the Future has included intellectual property matters in its list of megatrends for the coming decade. Institute for the Future (2005). Ten Year Forecast Perspectives. Online at http://www.iff.org/docs/SR-891_2005_TYF_Exec_Sum.pdf.

per head naturally being deployed in higher education⁴: according to OECD calculations dating from 2004, Switzerland spends a total of 6.4% of its gross domestic product on education, which is above average for OECD countries. Only the USA, Sweden and Norway have a larger budget for education.⁵

Moreover, with a budget for research and development representing 2.94% of gross domestic product, Switzerland has more or less achieved the aims set out in the Lisbon strategy drawn up by the European Union; only Sweden, Finland and Japan spend a larger percentage of their GDP in this area.

2. Self-determination in Switzerland

The stable conditions and great structural and organisational efficiency of the Swiss education and research environment are not mere ends in themselves, but rather provide the groundwork for the academic freedom and self-determination enjoyed by researchers and instructors alike. Indeed, these are the central principles of Swiss research.

These values are reflected in the fact that public research funding is largely the preserve of the Swiss National Science Foundation, an institution administered by the specialists themselves. This means in turn that 83% of grants, the so-called free funding available to promote innovative ideas and high-level research in new fields, are made on the basis of researcher submissions by the academic community itself, which thus determines the areas and issues worthy of investment. A comparison with the majority of similar organisations abroad, such as the German Research Foundation (DFG), shows that the SNF is exemplary for its application of the bottom-up administrative model.

Here in Switzerland, the political establishment simply accepts the circumscription of its control over scientific development, and recognises that academia must be allowed to find its own way in many regards. It can rest assured that its specialists are conscious of their weighty responsibility to society and that they are constantly aware of the source of funding for their work.⁶

Another interesting aspect of the Swiss model is the important role played by private industry in financing research and development: taken as a percentage of GDP the amount spent by private industry in Switzerland is one of the highest in the whole of Europe (Switzerland: 2.2%; European average: 1.26%), exceeded only by Sweden (2.9%) and Finland (2.5%). Moreover, in no other country does private industry use such a high proportion of its turnover for developing new ideas (3.5%).⁷ In addition, Switzerland lies in sixth place for “business expenditure on R&D per capita”⁸ and features sixth on the scale of countries worldwide for business expenditure on R&D in absolute terms. This is largely thanks to the pharmaceutical and medical industries, which increased their expenditure on research last year by an above average rate of 10%.⁹

Owing to Switzerland’s topography and lack of natural resources, adding value has only been possible through skilled craftsmanship or “brainwork”. For this reason, education and research have always been of great importance; the country’s prosperity is based on the generally recognised high level of

⁴ Swiss Federal Statistical Office (2005): An international comparison of the Swiss education system. Selected indicators, 25.

⁵ State Secretariat for Education and Research. After OECD and SFSO surveys.

⁶ www.snf.ch

⁷ SFSO (2006): Science and Technology in Switzerland.

⁸ IMD (2007): World Competitiveness Yearbook.

⁹ Department of Trade and Industry (2005): The 2005 R&D Scoreboard.



research within the Swiss economy (see: “Switzerland’s Economic Strengths” and “Switzerland’s Cultural Strengths”).¹⁰

In view of this close relationship between science and the economy, it is hardly surprising that Switzerland comes second in the IMD World Competitiveness Yearbook 2007 for the “extent to which basic, technological, scientific and human resources meet the needs of business, i.e. basic infrastructure, technological infrastructure, scientific infrastructure, health and environment and education”, and first in “basic research does enhance long-term economic development”.¹¹

3. Swiss education and research: an international affair

Such ideal conditions make Switzerland a popular destination for foreign researchers (see: “The strengths of Switzerland and its people”).

“You can develop here, because you are surrounded by first-rate people at every level.”

Heinrich Rohrer, Swiss Nobel Prize winner¹²

With a foreign contingent of 63 percent in 2007 the teaching staff of the ETH Zurich is one place where Swiss nationals are in the minority; among doctoral students, meanwhile, they are just slightly outnumbered by foreigners (57%).¹³ At the University of Zurich, meanwhile, the numbers of Swiss and foreign teachers are roughly equal, although the proportion of professors from Germany alone stood at 32 percent at the end of 2005.¹⁴ The international character of Swiss higher education is reflected both in the student body in general and in the rising generation of scholars: with a 43% share of foreigners at post-graduate and doctorate levels, Switzerland leads the OECD’s comparison.¹⁵ At the same time it should be noted that young Swiss people show an above-average willingness to pursue their studies at a foreign institution, particularly one located in an EU country. All in all, therefore, Switzerland is doing its part for the construction of a European academic community.¹⁶

International research labs like that of IBM in Rüschlikon, the CERN in Geneva, the Paul Scherrer Institute in Villingen, Neuchâtel’s CSEM and the International Space Science Institute in Bern both recruit the world’s top researchers and collaborate closely with Swiss universities. And Swiss specialists are avid participants in European research programmes.

The EU is aware of the excellent connections enjoyed by Swiss academics, something we appreciate enormously.

Maryline Maillard, Director of SwissCore, Brussels

¹⁰ OECD (2006): OECD Reviews on Innovation Policy. Switzerland.

¹¹ IMD (2007): World Competitiveness Yearbook

¹² Quoted at <http://www.swissworld.org>

¹³ ETH Zurich: Facts and Figures. Online at <http://www.fc.ethz.ch/facts> (German only)

¹⁴ “Universität Zürich holt Professoren immer öfter aus dem Ausland” (The University of Zurich recruiting foreign professors ever more frequently), NZZ 10.02.2006, p. 51.

¹⁵ OECD (2008): Education at a glance – Key results, Contribution of international students to university graduate output.

¹⁶ Not absolutely, to be sure, but rather in relative terms. Swiss Federal Statistical Office (2005): The Swiss Education System in European Comparison. Selected Indicators, p. 34.

4. The quality of Swiss education and research

The high quality of Swiss research and education, a consequence of the curiosity and perseverance of the researchers and instructors at work in Switzerland, is further attested to by the country's excellent ratings on the relevant official benchmarks.

By percentage of population, Switzerland comes in just after Iceland and Sweden as the country with the highest density of Nobel Prize winners, and registers more patents than any other country except for Luxembourg. As for scientific publications and triadic patents per million inhabitants, the Swiss lead the pack.¹⁷

Switzerland's trump cards in study and research come especially from the life sciences, including biomedicine, systems biology and medicine, as well as from the fields of nanotechnology, material processing, information science, space exploration and process technology.

Swiss training and research institutions figure in the major international leagues, with the ETHZ und EPFL institutes of technology, the University of Geneva and private education and research institutes in particular acknowledged worldwide for their cutting-edge performance.

What the MIT is to the United States, the Swiss Federal Institutes of Technology are to Europe.

Monika Henzinger, until 2005 Director of Research at Google, today Head of the Laboratory of Theory and Application of Algorithms at the EPFL¹⁸

In the University of Shanghai's Academic Ranking of World Universities, which is otherwise dominated by US institutions, the ETH comes in 27th, the University of Zurich 58th and the University of Basel 82nd.¹⁹ All of Switzerland's universities and Federal Institutes of Technology figure on the list of the world's 500 best universities. IMD in Lausanne, among the best-known schools of management, comes in at first place in the 2008 Financial Times (executive education) and the Economist (MBA programme) rankings.²⁰

As far as regards professional training, too, Switzerland is a premium choice. As early as the end of the 16th century there were apprentice watchmakers in Geneva, where the Protestant movement played a major role in local affairs. The first training centres of qualified tradesmen were founded in the late 18th century, and today Switzerland is unique in the world for the quality of its apprenticeship programmes. The main advantage of the dual system of professional education (practical/academic) is its close ties to the labour market, the high degree of cooperation between apprenticeship programmes, universities of applied science and universities, and their mutual openness towards and accessibility for students in all systems. It is also a key reason for Switzerland's low level of youth unemployment.

¹⁷ Triadic patents are those which are simultaneously registered with the European Patent Office, the US Patent & Trademark Office, and in Japan. State Secretariat for Education and Research and the Federal Office for Professional Education and Technology in cooperation with Presence Switzerland and the Swiss University Conference, eds. (2006), Die Hochschullandschaft Schweiz (Swiss higher education landscape), Bern, pp. 39-40.

¹⁸ Quoted in Why Switzerland (2006), ed. Presence Switzerland, p. 52.

¹⁹ Institute of Higher Education, Shanghai Jiao Tong University (2006), Academic Ranking of World Universities. Online at <http://ed.sjtu.edu.cn/rank/2007/ranking2007.htm>

²⁰ <http://news.ft.com/cms/3b554180-918b-11da-bab9-0000779e2340.pdf>
http://www.businessweek.com/pdfs/2005/0543_emb.pdf



It also explains the relatively small proportion of students graduating with purely academic qualifications from high (grammar) schools and universities on an OECD international comparison: the OECD takes into account only graduates of institutes of higher learning and ignores successful graduates of apprenticeship programmes, which in Switzerland make up a large measure of those preparing to enter (or who have already entered) tertiary education.

When these graduates are included in calculations, the Swiss finishers' quota stands at 89%, and thus above the OECD average. Furthermore, if one considers the statistics for successful completion of continuing research programmes (i.e. doctorates), Switzerland posts the highest quota among the countries taken into consideration.²¹

This picture also includes the large numbers of Swiss who take part in training and continuing education programmes: some 29% between the ages of 25 and 64, making Switzerland home to the oldest students after Sweden.²²

This high-performance research and education system constitutes the foundation of an extraordinarily innovative national economy, as shown by the Global Competitiveness Report 2008-09, in which Switzerland comes in second place after the USA as the most competitive country in the world (see: "Switzerland's Economic Strengths").²³

²¹ OECD (2006): Education at a glance, p. 48.

²² BFS (2006): Switzerland's Innovation System on International Comparison: A Selection of Indicators from the European Innovation Bulletin 2005, Neuchâtel.

²³ Competitiveness is defined as that collection of factors, policies and institutions which determines the level of productivity of a country, and thus the level of prosperity that can be attained by its economy.