

Science and Competitiveness: A World Concern

Tom Price



American scientists who are concerned about their nation's long-term prospects in science and economic competitiveness can take comfort from this fact: There is equal concern from the world science community.

The United Kingdom's leading business association, for instance, warned last year that Britain's "world-class science base is being eroded at a time when new international competitors are emerging and traditional rivals are getting stronger."

"The U.K. risks being knocked off its perch as a world leader in science, engineering and technology," said Richard Lambert, director-general of the Confederation of British Industry. "There's a very real risk that our traditional international competitors—and rapidly expanding countries like India and China—will overtake us."

Sound familiar? So will the reasons for the concern.

While the demand for scientists and other high-tech workers is soaring, the confederation reported, the best British students are choosing other fields. The number of top British secondary school students studying physics has dropped 56 percent in the last two decades, according to the confederation. The

number studying A-level chemistry has fallen 37 percent. The proportion of university graduates whose degrees are in physics, engineering or other technological fields is down a third.

The business association blames the slide on "stripped-down" science classes in secondary schools, too few fully qualified secondary school science teachers, and a lack of encouragement for students to pursue scientific careers.

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A quarter of Britain's secondary schools don't have a fully qualified physics teacher, the organization said. Just one in four chemistry teachers is fully qualified in the subject. The vacancy rate for math and science teachers is 50 percent higher than for any other subject.

"We must smash the stereotypes that surround science and re-brand it as desirable and exciting—a gateway to some fantastic career opportunities," Lambert said. "We need more specialized teachers to share their enthusiasm for science and fire the imaginations of pupils, and to persuade them to study the core individual disciplines to high levels."

The businesses' concerns were echoed by a study at the University of Buckingham, which said British physics is in "terminal decline."

Another warning came from the British Computer Society (BCS) early this year. Because British universities aren't educating enough computer scientists, said BCS Chief Executive David Clarke, Britain's information technology industry faces a 25 percent shortfall of computer science graduates as early as 2009. British schools need to introduce children to "the excitement of computing and information technology" at an early age, BCS President Nigel Shadbolt said.

George Osborne, the Conservative Party's shadow chancellor of the exchequer, recently charged that the United Kingdom is losing business to Ireland because of the U.K.'s inferior education system. At the same time, however, former University of Limerick President Edward Walsh lamented the "low research standing" of Ireland's universities, which he blamed on "80 years of neglect."

“Unless a number of our universities make good progress towards the top-100 international rankings,” Walsh warned, “Ireland’s long-term wealth- and job-creation prospects are at some risk.”

Walsh painted all Europe with the same broad brush, saying the continent’s universities rank low in international ratings. “Talent has drifted away, and many of Europe’s once-great universities have been humbled,” he wrote in *The Irish Times*. “Now the U.S. wins most of the Nobel prizes in science. Eight of the world’s top 10 universities are in the U.S.”

Browse *The Australian*, a national newspaper, and you’ll discover things aren’t going so well down under, either. The World Economic Forum recently rated the quality of Australia’s math and science education below India’s. A University of New South Wales study found that Australian school children can’t spell English words as well as children in Singapore, even though half of the Singapore children speak English as a second language.

The number of Australian secondary students studying science dropped by a third between 2000 and 2005. Sixty percent of those who do obtain college degrees in science or technology plan to take their skills overseas. Science and business leaders blame this on a lack of qualified science teachers and low prestige associated with studying science.

According to Microsoft founder Bill Gates, the entire Western world is failing to produce enough information technology graduates, so companies like his must scour developing countries such as India for the talent they need.

But the Indians are feeling inadequate as well. Only a small percentage of the country’s best college students study science because they will be better compensated in other fields, the Indian National Science Academy reported. Indian colleges will graduate a half-million engineers this academic year—a 70-percent increase in just three years, according to the Indian National Association of Software and Service Companies.

However, association president Kiran Karnik lamented, only about a quarter of them will be employable in India’s booming IT and IT-related industries. Most colleges’ curricula are outdated and their equipment obsolete, he said. In addition, “our education system has tended to dampen rather than encourage creativity and innovation.” To increase the number of employable science and technology graduates, Indian companies have begun offering training to faculty members and subsidizing college laboratories and libraries.

India’s problems stem largely from its rapid transition from one of the world’s most impoverished nations to a high-tech powerhouse with enormous gaps between

the educated and uneducated, and between the affluent and the many who remain horrendously poor. Fewer than 10 percent of college-age Indians attend college. Nearly 40 percent of Indians older than 15 are illiterate. The software association projects a shortfall of 500,000 technology workers in four years.

For scientists and high-tech workers, all this hand-wringing contains good news. Good jobs with rising salaries await those who possess these skills. And they can go to work just about any place in the world that they want to. ▲

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OSA/AIP Panel to Focus on Training Scientists and Engineers

At this year’s Conference on Lasers and Electro-optics (CLEO), OSA and the American Institute of Physics (AIP) will host a panel discussion devoted to cultivating the next generation of scientists and engineers. The program, which will take place May 10 at the Baltimore Convention Center, will focus on private-sector solutions to the decreasing technical labor pool expected in the years ahead. The event is open to all employees of OSA Corporate Associates and AIP Industrial Affiliates.

Part of the decline is due to demographic changes. For example, a large number of current scientists are slated to retire over the next decade—and there do not appear to be enough well-trained younger professionals to fill their shoes. Although some individuals entered scientific disciplines during the tech boom of the late 1990s, many exited those fields during the downturn years that followed.

The “success stories” presented in this forum will start a dialogue for business leaders in the scientific community, so they can develop their employees and secure bottom-line results. Solutions that will be explored include community outreach programs, partnerships with local universities, internships, fellowships and corporate universities.

“We have found educator internships to be a very effective strategy in building partnerships between schools (high schools and colleges) and industry because it is a win-win situation,” said Fenna Hanes, principal investigator for several National Science Foundation-funded Advanced Technological Education projects at the New England Board of Higher Education. By hosting an educator, professionals can affect school curricula and cultivate interns and future employees, she said. At the same time, the internship allows educators to see how theories are applied. “Our educator internships have led to numerous longer-term relationships that ultimately build a skilled workforce,” Hanes said.

Larry Schwartz of Schlumberger-Doll Research, Charles Becker from General Electric Global Research and Judith Goldberg from Zygo Corp. will participate in the panel. For more information, visit www.osa.org/breakfastbriefing.

— Allison Reznick