British Mathematicians Count Their Numbers

The international trade in top mathematicians is endangering the survival of the species in Britain

London—MATHEMATICS RESEARCHERS IN Britain are worried that their discipline is doomed to a rapid extinction, according to a report released this week by a review panel of the UK Science and Engineering Research Council (SERC). Threatening its survival are all the same social and economic problems encountered by U.S. mathematicians—poor standards of teaching in high schools, low public appreciation of the power of mathematics, lack of research funds, and a shortage of jobs—plus one extra. In Britain, U.S. head hunters are on the prowl, "creaming off the very best people," as one of the report's authors put it.

While brain drains are nothing new to Britain, the report shows that, as you might expect, mathematicians are particularly good at calculating just how scary their future might be. Thus the report goes beyond offering a demographic study of the British situation to presenting an analysis of the supply and demand for mathematicians in the United States. The conclusion: U.S. demand for mathematicians is now building fast and could spell the end for Britain's less well-funded efforts.

Concern over what American wealth might do to British brains was one reason why the SERC group invited Edward David, presidential science adviser to Richard Nixon and a former Exxon research president, to be a member of their study group. Viewed as a spokesman for U.S. thinking on future trends, David was chief author of both the recent U.S. National Research Council report "Renewing U.S. mathematics: A plan for the 1990s" and an earlier study on the same subject. By taking part in the British study, David earns the unusual honor of having advised both sides in a possible transatlantic mathematics trade war.

Both sides start with a similar handicap: In the UK as in the United States, mathematics education in primary and secondary schools is languishing, says the report. Potential mathematicians are put off by poorly qualified teachers—and that translates into a shortage of mathematics students at universities. In Britain, though, two more bottlenecks exacerbate the problem: There aren't enough research studentships for everyone who wants to continue study to the doctoral level, nor are there enough research funds and advanced fellowships to sustain them afterward.

Contrast that with prospects in the United States. U.S. funding for mathematics research has been tight, but statistics provided by the American Mathematical Society show that better days are coming soon. "The clear conclusion," says the SERC report, "is that from about 1994 there will be a substantial growth in attractive opportunities [in the United States] for non-U.S. mathematicians." Indeed, says Adrian Smith, professor of mathematics at Imperial College in London and one of the report's authors, the analysis shows that the indigenous supply of mathematicians will be able to fill fewer than half the jobs available in 1995. Relief won't come from Asia, as it did when the United States ran out of engineering students. The report notes that there are too few trained people coming from the Middle and Far East to fill the breach.

Instead, U.S. institutions will end up raiding Europe. That's certainly nothing new. "If you talk to any vice chancellor of a British university," says panel chairman Sir John Kingman, a noted statistician, "he will tell you of staff who have been offered twice their salaries by American universities." Sir John should know: He is vice chancellor of Bristol University, which lost David Aldous—whom he calls "the best probability theorist in Britain"—to the University of California at Berkeley.

But such examples are just a taste of what's to come, according to the report. Without the job opportunities or the research funds to keep British mathematicians in Britain (and the panel did conduct a study showing that when jobs are available "top quality people are recruited and retained"), mathematics research in Britain will suffer an "irreversible collapse."

But the lure of foreign employment is not the whole story of what is wrong in British mathematics. The nature of mathematics has also changed, unnoticed by the public and by funding bodies. Mathematics is "no longer a pen and pencil subject," says Sir John. Mathematicians tackling the chaotic behavior of nonlinear systems or trying to model such vast systems as Earth's atmosphere rely more and more on the processing power and graphics capabilities of powerful computer workstations, he says.

The advent of this new, computer-intensive mathematics has made the discipline far more expensive to fund. In the latest round of research awards, for example, only three British mathematicians put in requests for workstations that, had they been approved, would have gobbled up £700,000 ($1.2 million)—almost 25% of the total available basic mathematics research budget of £3 million ($5.2 million). "We have to get across to the other bodies supporting mathematics, like the University Funding Council, that mathematics is a laboratory subject now," Sir John says.

Edward David. *Multinational math maven.*

Mathematics has changed in another significant way, too. It has become much more specialized, according to Sir John, meaning that a country has to maintain an active research presence in many major branches at once to stay competitive. "You can't just buy into mathematics," says Sir John. "You have to be a member of the global club within which news travels very fast." And the study group says Britain is now only just hanging on to full membership in the club. "The size of the UK community is dangerously small," says the report. "Any decline below the current level of research activity could set in train a dangerous spiral of contraction."

To keep Britain in business, the report recommends that the number of long-term postdoctoral fellowships in mathematics be tripled, research studentships increased by 50%, and core research funding doubled from £2 million to £4 million ($7 million). And that's saying nothing of the need for the Department of Education to re-examine mathematics teaching in high schools and to recognize, says Smith, that "innumeracy has replaced illiteracy as our principal education problem."

Sir Mark Richmond, head of SERC, can so far promise only that within his own tight budget, SERC will be "taking account" of the report. If improvements do not prove possible, budding mathematicians who haven't yet been recruited by American institutions at least now know what to do—wait until the odds change in '94 and then go West. ■ ALUN ANDERSON