

The Internationalization of Science at Michigan State University
Sample case: The Department of Physics and Astronomy
by Walter Benenson

Abstract: Foreign born and foreign trained scientists have played a large and growing part in the makeup of the Michigan State University teaching and research effort during the last 50 years. Is this a problem or an asset? Is this in any way unique to M.S.U. or is it just part of what can be seen as a nationwide trend? The Department of Physics and Astronomy is examined as a test case.

Statement of the Problem:

Science has already been an international effort for some time, and because of this Michigan State University must compete on a global market for its scientists at the graduate, postgraduate, staff, and faculty level. The following questions need to be considered before Michigan State University embarks on another decade:

- *If the number of foreign graduate students available is declining, who is going to staff our teaching and research efforts in the future?*
- *If U.S. science is no longer pre-eminent, how will M.S.U. attract first-rate foreign faculty in the future decade?*
- *Can M.S.U. play a special role in attracting bright U.S. students into science?*

In the following physics will be used as an example of the internationalization of science, but the same trends exist for the other sciences.

Background:

The history of physics is very similar to that of the other sciences in that the effort has traditionally been international in scope. Except in times of war and preparation for war, science has served as a neutral meeting ground between nations. Of course these relations were not always peaceful e.g., the feuds of Newton, an Englishman, with Leibniz, a German, for the credit for the invention of calculus, and with Huygens, a Dutchman over the nature of light. Note that Newton's great work, the *Principia* was written in Latin, even though he was very reluctant to publish it for many years and kept it secret. Worldwide recognition has always been important to scientists, and therefore they need to be able to communicate internationally. This has led to the existence of a common language for science, which was Latin, then French and German, now is English.

Before World War II, physicists generally had careers in the country of their birth, and in fact the majority of physicists remained in the town of their birth all the way through their education, training, and professional lives. This pattern was not usual in the United States since scientists were encouraged to leave their original educational institutions and move elsewhere for their careers. During this period scientists in the U.S. were required to learn French or German to be able to communicate with the rest of the world. Travel was an important part of physics communication. Photos of scientific meeting in the 1930's show researchers from every country in Europe and a sprinkling of Americans in many locations.

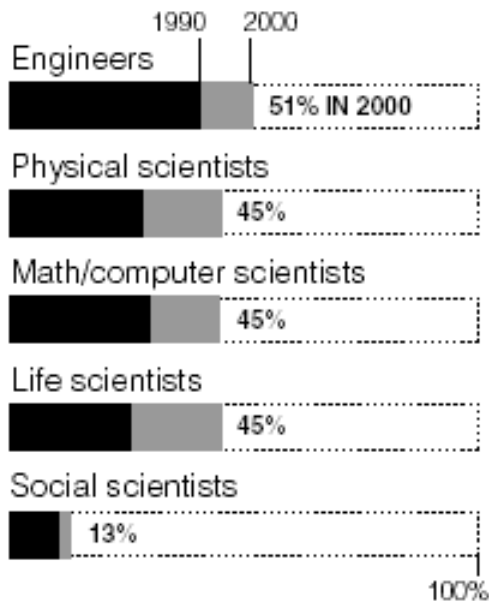
The effect of World War II on the internationalization of physics was enormous. Many physicists had come as refugees to the U.S. before the war. They were crucial to the war effort and became a very strong component of university physics faculty all over the U.S. One outcome of the war was the realization of the importance of science for the defense and prosperity of a nation. The U.S. government put unprecedented resources into physics after the war, partly as a response to the threat of the communistic block. Up until recently, a period of research in the U.S. was considered to be a requirement for a successful career in physics in Europe. At the same time the expansion and upgrade of U.S. universities created a great need for physicists with doctoral degrees to staff the teaching and research efforts of the universities. During this period many foreign born physicists extended their stays indefinitely. Graduate students were, however, almost entirely U.S. born during the postwar period. A U.S. advanced degree was not considered a good stepping-stone to a professorship in Europe. In fact it still isn't, and most foreign graduate students now come from non-European countries.

Nationwide trends in physics:

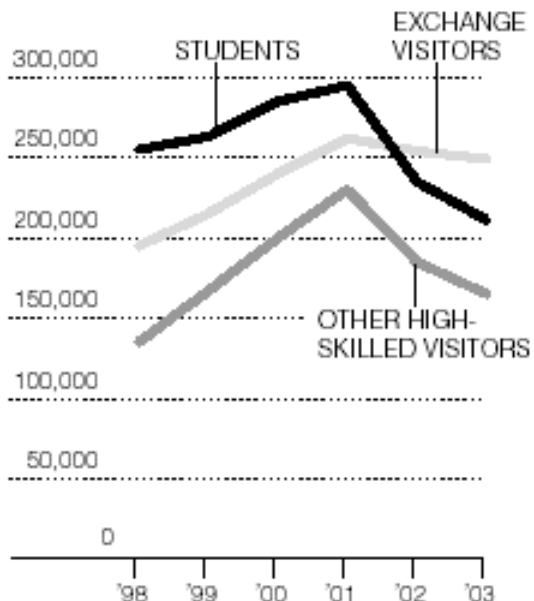
There has been a number of studies of the internationalization of U.S. science. Recent articles in the New York Timesⁱ and many other sitesⁱⁱ seem to indicate that the leadership role that has been held by the U.S. is evaporating.

Relying on Foreign Scientists

Percentage of people with Ph.D.'s in the U.S. who were born elsewhere:



Temporary U.S. visas issued to foreigners:



Source: U.S. Bureau of the Census, U.S. Department of State

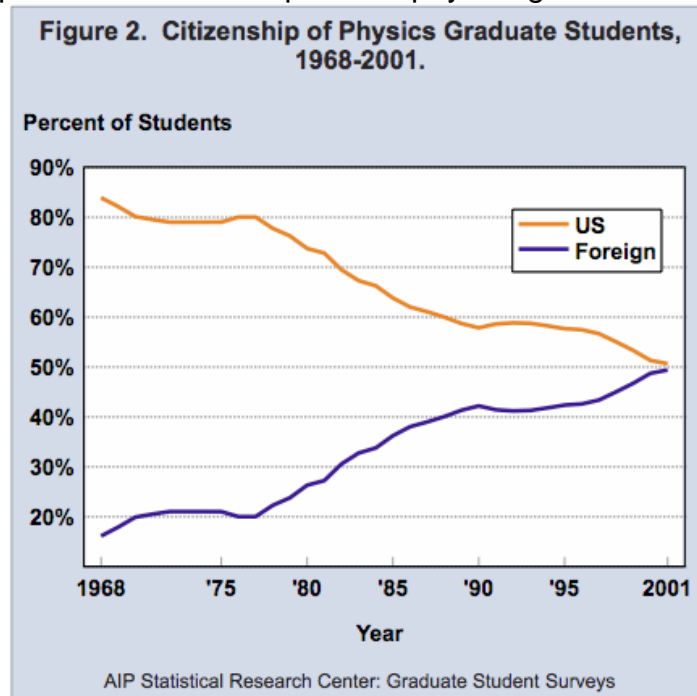
Note that the trend was generally upward during the 1990's and has only reversed in the last few years. Quoting the NYT: "Shirley Ann Jackson, president of the American Association for the Advancement of Science, told the recent forum audience that the drop in foreign students, the apparently declining interest of young Americans in science

careers and the aging of the technical work force were, taken together, a perilous combination of developments.” The 9/11 events and their aftermath may play a role in suddenness of the change in trend. Some see this trend as an evidence for the decline of U.S. science, but others view it as propaganda for the continual budget battles in congress.

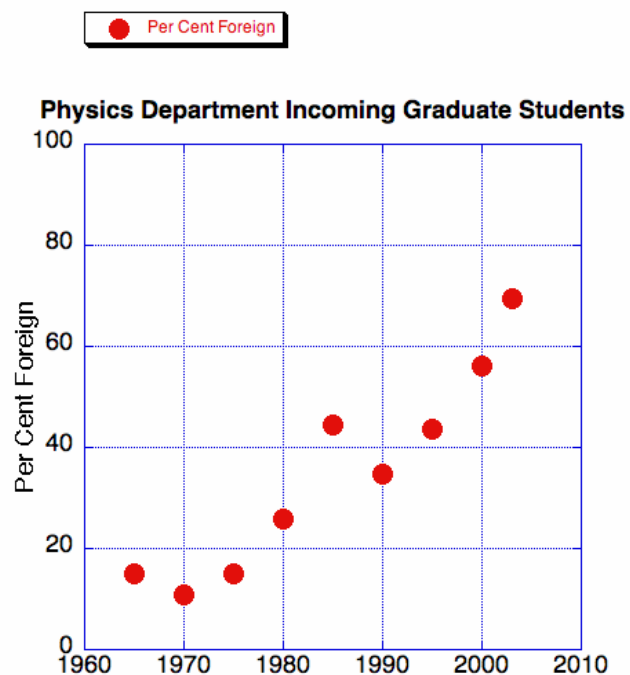
Some scientists have begun to question the value of the reliance on foreign graduate students. Here is a recent quote from a chemistry journalⁱⁱⁱ, “If a school cannot recruit domestic students, there has to be a question about the purpose of the doctoral education at that institution.” The question of future competition with Asian countries comes up often. These are important questions, but before examining them we can take a look at data from the M.S.U. Department of Physics and Astronomy. Does it mirror the U.S. trend in internationalization or is it unique?

M.S.U. Department of Physics as a microcosm:

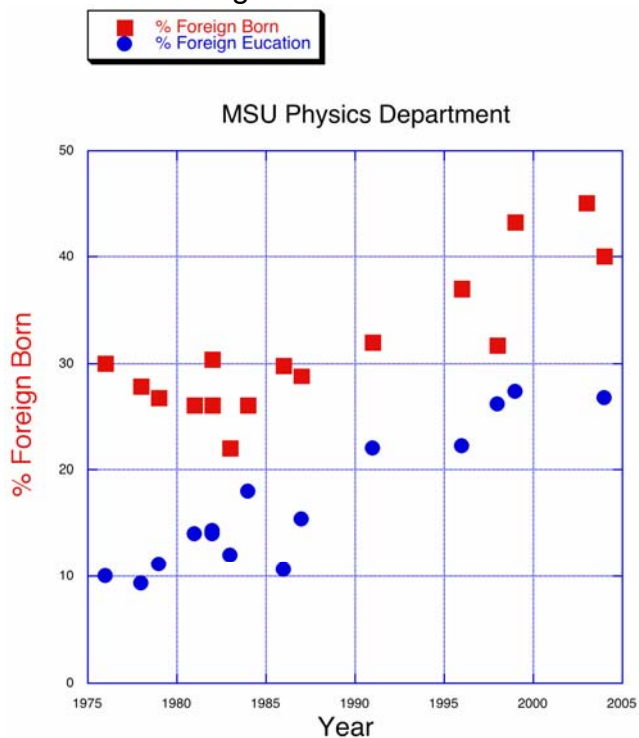
There is a data source for information on faculty and graduate students in U.S. physics. Here is a plot from a recent report^{iv} on physics graduate students in the U.S.



If the internationalization of our graduate schools is a problem, M.S.U may have a serious case of it. Does M.S.U. follow this trend? The data^v come from departmental files.



Within statistical fluctuations we are right on the national trend. What about faculty?



The parallel to U.S. data is striking. There are huge variations within the department. For example, the entire nuclear theory section is foreign born and educated whereas an equal-size specialty, astronomy, is entirely U.S. born and educated.

Conclusions for the NCA self-study:

The results above seem to indicate that the internationalization of M.S.U. science mirrors that of the U.S. This is a bit of a leap since only one field has been studied in detail. However, the fears and dire predictions expressed in the various published reports are definitely relevant to M.S.U. On the other hand, the internationalization of science has positive aspects for the overall educational mission of M.S.U. Students come in contact with foreign born scientists, and without any effort broaden their vision and knowledge of the world outside of Michigan and the United States. The tradition at M.S.U. of seeking out the best people to staff their classes and laboratories has paid off in the past and will continue to do so.

It is clear that the internationalization of science presents both a problem and an opportunity for Michigan State University.

ⁱ New York Times, William A. Broad, *U.S. Is Losing Its Dominance in the Sciences*, May 3, 2004
National Science Panel Warns of Far Too Few New Scientists, May 5, 2004

ⁱⁱ WHAT'S NEW, A.I.P., Robert L. Park, Friday, 7 May 04, Washington, DC
CNN.com Report: *U.S. losing ground in science education*, May 6, 2004

ⁱⁱⁱ Chemical & Engineering News, October 28, 1996, *Graduate students from abroad face tough decision on where to go after graduation, have a rough road to jobs in the U.S.*, Linda R. Raber

^{iv} AIP report R-207.33, April 2004, Mark McFarling, Michael Neuschatz, and Patrick J. Mulvey

^v Thanks to J. Kovacs, Professor Emeritus