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Foreign Students Are One-Fifth of Total Science/Engineering Graduate Enrollment in U.S. Doctorate-Granting Institution

• Since the mid-1940s, the United States has provided graduate training, especially in the sciences and engineering, to an increasing number of students from overseas. Developing nations face severe problems requiring scientific and technical personnel in far greater numbers than their own higher education systems can produce. Because foreign governments have increased their support of students studying abroad, the number of foreigners enrolled in U.S. institutions of higher education has grown significantly.

• The growth in the number of foreign students was concentrated in the science/engineering fields and at the graduate level.[1] While the number of science/engineering graduate students with U.S. citizenship enrolled at doctorate-granting institutions grew by less than 3 percent over the 1975-80 period, the comparable number of foreign students grew by 47 percent.

• Over the 1975-80 period, the proportion of full-time foreign graduate students in science/engineering increased from 16 percent to 21 percent. The 1980 share was substantially greater in engineering than in the sciences—42 percent compared to 17 percent. The ratio was highest in petroleum engineering (57 percent). Of the full-time graduate students in metallurgical/materials engineering and agricultural engineering, nearly half were foreign. This reflects the high priority assigned to the development and exploitation of natural resources.

• In general, foreign graduate students made up smaller proportions in science than in engineering; there were significant exceptions, however. In statistics, 42 percent of the graduate students were foreign and in economics 38 percent. In psychology, by contrast, foreign students were only 5 percent of the total.

• Although foreign enrollment in graduate science/engineering programs at doctorate-granting institutions continued to grow through the late 1970s, the number of doctorate degrees awarded to foreign students declined, as did the number going to United States citizens.

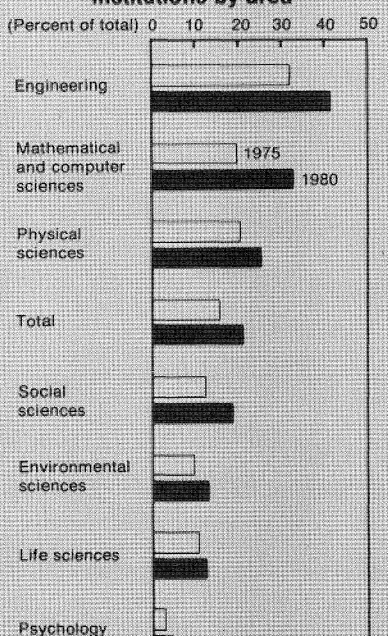
• In most fields, the proportion of all degrees awarded to foreign students declined. But in engineering, they increased; foreign students received 46 percent of the doctorates in 1980, up from 41 percent in 1975. This is largely a reflection of the declining number of United States citizens staying on to complete their doctorates in the face of the high starting salaries offered by industrial firms to baccalaureat and master's-degree holders. The only other area i which foreign students received a larger share of th doctorates awarded in 1980 than in 1975 was mathe matical/computer sciences, in which industrial de mand for personnel was also high.

• Foreign participation in American higher educa tion ultimately affects the employment situation bot in the United States and in the students' home coun tries. One measure of the relative strength of thes two influences is the proportion of doctorates awarde to foreign students in the United States on permaner visas (immigrants) compared to those on temporar visas (nonimmigrants). In 1975, about one in thre doctorates awarded to foreign students went to student on a permanent visa. By 1980, the ratio ha fallen to one in four. The relative decline betwee 1975 and 1980 occurred in all fields except the soci sciences (including psychology) and the mathematica computer sciences.

• Although nonimmigrants comprise the bulk o foreign students receiving science/engineering doc torates in the United States, they have little effect o the United States labor market in general. Studen from foreign countries may have a substantial effe on the curriculum, however, especially in those fiel where they make up a significant part of the tot enrollment. There is no positive indication yet of an substantial modification of curricula to meet specif needs of foreign students. However, there have bee occasional complaints that some course material inappropriate in terms of third-world concerns.[2]

• Those foreign Ph.D.-holders who plan to remai in this country have a direct effect on the Unite States labor market, though the small numbers i volved tend to minimize this effect in most field Foreigners in the United States on permanent visa received only 4 percent of the Ph.D.'s awarded science fields in 1980. In engineering the proportio was 12 percent—down slightly from the 14 perce reported in 1975 but still a significant share of th total. In view of the shortage of doctorate-level eng neers in all sectors of the economy—especially faculty in academic institutions—recruitment fro abroad of engineers trained in the United States ma fill a growing number of vacancies on engineerin faculties.[3] By 1990, foreign students could make u as much as one-sixth of the doctoral engineerin labor force, in the absence of a substantial growt in the number of United States citizens staying graduate school to complete their doctorates.[4]

Foreign as a percent of total full-time graduate science/engineering enrollment in doctorate-granting institutions by area



SOURCE: National Science Foundation

Full-time graduate enrollment in doctorate-granting institutions and number of Ph.D.'s awarded by citizenship and science/engineering field: 1975 and 1980

	Total	Engineering	Physical[1]	Mathematical[2]	Life[3]	Social[4]
Full-time S/E graduate enrollment:						
Fall 1975	210,307	37,105	30,236	14,152	43,408	69,179
Fall 1980	230,601	42,451	32,286	15,279	44,924	72,884
Foreign:						
Fall 1975	33,128	11,883	5,256	2,818	5,161	6,689
Fall 1980	48,748	17,636	6,901	5,024	6,397	10,687
Ph.D.'s awarded:						
June 1975	18,488	2,961	3,631	1,147	4,540	6,209
June 1980	17,195	2,479	3,151	963	4,710	8,990
Foreign:						
June 1975	4,015	1,223	813	272	868	839
June 1980	3,576	1,149	682	258	777	831
Nonimmigrants:						
June 1975	2,758	810	544	197	596	611
June 1980	2,642	850	506	182	591	584
Immigrants:						
June 1975	1,257	413	269	75	272	228
June 1980	934	299	176	76	186	247

SOURCE: National Science Foundation and National Research Council

[1] Includes environmental sciences.
[2] Includes computer science.
[3] Excludes medicine.
[4] Includes psychology.

[1] National Science Foundation, *Foreign Participation in U.S. Scien and Engineering Higher Education and Labor Markets* (NSF 81-3 (Washington, D.C.: Government Printing Office, 1981), p. 1.

[2] See Association of American Colleges (AAC), *International Educ tion Trends 2000*, "Educational Policies in the Middle East," Vol. No. 4 (Washington, D.C., 1979), p. 105.

[3] A recent Higher Education Panel report indicates that about percent of all full-time engineering faculty positions were vacant in 1980. See Frank J. Atelsek and Irene L. Gomberg, American Council Education, Higher Education Panel Report No. 52, *Recruitment a Retention of Full-Time Engineering Faculty, Fall 1980* (Washingt D.C., October 1981), table 1.

[4] National Science Foundation, *Foreign Participation*, p. 17.