

Chapter 6: Impacts on Recruitment

The IGERT program is intended to facilitate “diversity in student participation and preparation,” and contribute to the “development of a diverse, globally-engaged, science and engineering workforce.” Diversity is a multi-faceted concept, and includes (but is not limited to) diversity in academic ability, professional preparation, career goals, disciplinary or interdisciplinary background, ethnicity, race, or gender. By design, only United States citizens or permanent residents may receive IGERT funding, as part of NSF’s efforts to attract more American students to science, technology, engineering, and mathematics (STEM) Ph.D. programs. Recruiting and enrolling students from diverse backgrounds and groups traditionally underrepresented in STEM fields has also been an emphasized priority of the IGERT program since its inception, in response to the underrepresentation of such individuals in American STEM Ph.D. programs. In support of the NSF’s commitment to these goals, in 2002 NSF funded the IGERT National Recruitment Office (INRP), a stand-alone program dedicated to helping IGERT projects enhance recruitment of these targeted groups. In evaluating the IGERT program’s success in recruiting diverse students to participate, all of these facets of diversity are examined.

As of spring 2005, IGERT projects have successfully supported over 2900 American citizens, and IGERT Principal Investigators (PIs) and faculty report that IGERT students are talented and diverse. IGERT faculty assert that IGERT students bring new ideas and energy to their university. The IGERT program has been successful in maintaining diverse recruitment of underrepresented groups on par with national averages of the disciplinary fields represented in IGERT. In this chapter we explore the IGERT program’s impact on the involved doctoral programs’ capacity to recruit a diverse pool of applicants, and examine the characteristics of enrolled IGERT trainees as compared to non-IGERT students. This chapter addresses the following research questions:

- What is the added recruitment value of the IGERT project?
- What are the characteristics of students being recruited into IGERT programs, and how do they differ from traditional graduate students?

Increasing Access in Higher Education

Increasing Participation of United States Citizens

United States citizens received 62 percent of all science and engineering Ph.D. degrees awarded in 2003, a figure that has been slightly declining over the last ten years.⁵³ To encourage enrollment in STEM doctoral education by American students, the NSF requires that all IGERT trainees must be United States citizens or permanent residents. Thus the IGERT program has the long-term potential to influence the proportion of Ph.D. degrees being earned by United States citizens. Given that many IGERT students have yet to graduate, it is relatively early to determine how much impact the IGERT program will have on the number of United States citizens earning degrees. Approximately 20 percent of IGERT students surveyed indicated that they might not have attended graduate school had the IGERT graduate program not been in existence. It is anticipated that by 2007-08 IGERT

⁵³ 2004 Science and Engineering Doctorate Awards. Division of Science Resources Statistics, National Science Foundation.

programs will be graduating approximately 500 individuals per year⁵⁴, meaning that if 20 percent continue to be individuals who otherwise might not have pursued a doctoral degree, IGERT could be responsible for about 100 new American STEM graduates per year.⁵⁵

Increasing Participation of Underrepresented Groups (Women and Minorities)

A further goal of the IGERT program is to increase participation in STEM doctoral education by groups underrepresented in STEM fields, including women and minorities. In spite of the challenges associated with developing new doctoral degree programs, the IGERT program has been successful in maintaining recruitment of women and minority students on par with national averages of the disciplinary fields represented in IGERT. Nationwide, women received 38 percent of all science and engineering Ph.D. degrees awarded in 2003, while underrepresented⁵⁶ minorities received 12 percent.⁵⁷ Some IGERT projects have effectively recruited higher numbers of students from these groups, while others have not. Overall, of the active trainees, 35 percent are women and 9 percent come from minority groups underrepresented in STEM disciplines: Black, Native American, or Hispanic. An analysis of data from the web monitoring survey reveals that in 2003, 32 percent of projects with trainees report having no students from underrepresented minority groups, 39 percent report between one and 13 percent, and 30 percent report greater than 13 percent underrepresented minorities.⁵⁸ One-third (36 percent) of the IGERT department chairs⁵⁹ report that the IGERT has enabled them to attract more underrepresented minority students than before.⁶⁰

PIs responding to the 2003 Monitoring Web Survey identified multiple approaches to recruiting students from underrepresented groups. Almost all projects use faculty contacts, non-electronic media, competitive stipends, and visits to campus as tools in recruiting students. The most successful recruitment of students to IGERT projects comes through personal connections faculty or other students have with prospective applicants. Across the five cohorts funded through 2002, 80 percent of the PIs reported ensuring that entry requirements do not unnecessarily exclude prospective students. Other strategies include recruiting through minority science organizations (73 percent), offering research experiences for undergraduates (68 percent), and making informational visits to minority serving colleges (47 percent).

During site visit interviews, some PIs pointed out that statistics on the involvement of underrepresented minorities in IGERT may underestimate actual involvement, because students from underrepresented minority groups participating in IGERT projects do not always receive IGERT funding due to the availability of other sources of funding specifically earmarked for

⁵⁴ IGERT Distance Monitoring Web System 2004.

⁵⁵ Projections based on data from IGERT Distance Monitoring Web System 2004.

⁵⁶ American Indian/Alaskan Native, Black, Hispanic, Puerto Rican, Mexican American, and Other Hispanic.

⁵⁷ 2004 Science and Engineering Doctorate Awards. Division of Science Resources Statistics, National Science Foundation.

⁵⁸ Percents do not equal 100 due to rounding.

⁵⁹ Initial Impacts Survey of Department Chairs 2004. Question: "Has the presence of the IGERT grant had an impact on your departmental admissions in any of the following ways?"

⁶⁰ All data from "IGERT Annual Report." Prepared by Abt Associates Inc. for the National Science Foundation. Cambridge MA: Abt Associates, Spring 2005.

underrepresented minorities. In other words, students with minority scholarships or fellowships do not also need the IGERT support, but may still participate in the IGERT program.

Increasing Interest in Doctoral Education Among Undergraduates

IGERT projects have had some perceived impact on stimulating interest in STEM graduate education among undergraduates, with 49 percent of PIs reporting that their IGERT grant has led to increased interest among undergraduates in pursuing STEM graduate degrees.⁶¹ In an attempt to diversify the student body and to increase the number of undergraduates interested in science and engineering programs who enter the graduate education pipeline, some projects have also begun long-term collaborations with minority serving colleges (47 percent) and offer research experiences for undergraduates at IGERT institutions (68 percent).⁶²

Student Characteristics

Not surprisingly given the increased funding available for student support, IGERT grants have enabled participating departments to recruit **more** students to their programs. Nearly all PIs (94 percent), and 72 percent of IGERT department chairs, report they can recruit more students because of IGERT. This is confirmed by findings that more IGERT department chairs than non-IGERT department chairs report an increase in the number of applications to their departmental doctoral programs in the last five years (75 percent and 69 percent, respectively). Department chairs also report that IGERT has attracted students with more diverse career goals (59 percent) and disciplinary backgrounds (67 percent). In addition, IGERT department chairs report that more students inquire into their programs because of IGERT (64 percent).

IGERT grants have also enabled participating programs to recruit more highly qualified students, as reported by 85 percent of PIs, and 72 percent of IGERT department chairs. Similarly, three quarters of the IGERT faculty believe that the students in the IGERT program are better qualified than the usual department students in terms of their academic and research potential. When asked to compare their IGERT students' academic and research potential with graduate students they normally see, IGERT faculty rated their IGERT students as "Far superior" (16 percent), "Somewhat better" (59 percent), "About the same" (21 percent), or "Somewhat less promising" (4 percent).

Non-IGERT students reported significantly higher average GRE scores than the IGERT students, as shown in Exhibit 6.1. Given the faculty perception that IGERT students are better qualified, it is possible that IGERT projects attract a different type of student, whose academic talent is not reflected in measures like the GRE score.

⁶¹ Initial Impacts Survey of PIs 2004. Question: "To what extent do you agree with the following statements about the impact of the IGERT grant at your institution? The IGERT grant has led to increased interest among undergraduates in pursuing STEM graduate degrees."

⁶² *IGERT Annual Report 2005*.

Exhibit 6.1**GRE Scores for IGERT Students and U.S. Citizen Non-IGERT Students**

		N	Mean	Min	Max
Verbal	IGERT	227	576 **	320	790
	Non-IGERT	178	619	330	800
Quantitative	IGERT	227	713 **	340	800
	Non-IGERT	182	738	430	800
Analytic	IGERT	226	692 ***	280	800
	Non-IGERT	179	737	420	800

Significance denoted as: *(p<.01) **(p<.001) ***(p<.0001)

Note: Foreign non-IGERT students were excluded from this analysis.

Source: *Initial Impacts Survey of Students 2004.*

Question: *What were your GRE scores?*

We also examined differences in professional productivity, such as publications and presentations. There are no significant differences between IGERT and non-IGERT students (Exhibit 6.2). Half of both groups have authored or co-authored a journal article in the last two years.

Exhibit 6.2**Professional Productivity of IGERT and Non-IGERT Students**

	Percent reporting accomplishments in last two years		Of those, average number of each	
	IGERT	Non-IGERT	IGERT	Non-IGERT
	(N=306)	(N=566)		
Journal articles in refereed journals	55%	53%	2	2
All other publications	41	38	3	3
Book chapters	13	10	1	1
Patent applications	8	7	1	1
Approved patents	3	1	1	1
Books	2	1	1	1

Source: *Initial Impacts Survey of Students 2004.*

Question: *“Please provide counts of any professional publications you have authored, or patents you have applied for or won, during the past two years. Count all publications and/or patents that include your name as an author.”*

While equal numbers of IGERT and domestic non-IGERT students have attended conferences at their home institutions or within the United States (Exhibit 6.3), IGERT students are significantly more likely to have presented a poster at these events (p<.01). IGERT students are also more likely than domestic non-IGERT students to have attended a conference outside the United States (p<.05).

Exhibit 6.3

Conference Attendance of IGERT and U.S. Citizen Non-IGERT Students

	Number responding		Attended Conference		Presented a Poster		Presented a Paper	
	IGERT	Non-IGERT (U.S.)	IGERT	Non-IGERT (U.S.)	IGERT	Non-IGERT (U.S.)	IGERT	Non-IGERT (U.S.)
At home institution	299	336	67%	62%	41%**	29%	20%*	15%
Within the US (outside the home institution)	306	341	85	79	55%**	44	47	41
Outside the US	286	325	37*	28	17	13	18	14

Significance denoted as: * (p<. 05) ** (p<. 01)

Note: Foreign non-IGERT students were excluded from this analysis.

Source: *Initial Impacts Survey of Students 2004.*

Question: "Please provide the following information for conferences you have attended inside and outside your home institution: (a) Counts of conferences you have attended; (b) Counts of conference poster sessions in which you have participated; (c) Counts of conference presentations you have made."

Expanding Interdisciplinary Graduate Education Opportunities

As a result of the IGERT program, new interdisciplinary graduate programs or experiences are available to students who otherwise might not have such opportunities. IGERT projects have expanded educational opportunities and in doing so, have the potential to attract new students to graduate education. Both IGERT and non-IGERT graduate students report having applied to a mixture of single and inter/multidisciplinary programs, indicating an awareness of and interest in inter/multidisciplinary education (Exhibit 6.4). Close to half (46 percent) of the current IGERT students report having applied to other inter/multidisciplinary programs; only one third (34 percent) applied only to other single disciplinary programs. Conversely, only a third of non-IGERT students applied to an inter/multidisciplinary program, while the majority applied only to single disciplinary programs. These responses suggest a greater tendency among IGERT students to have sought out interdisciplinary experiences when applying to graduate school.

Exhibit 6.4**Programs to which IGERT and Non-IGERT Students also Applied when Applying to Their Current Program**

	IGERT (N=306)	Non-IGERT U.S. Citizens (N=343)	Non-IGERT Foreign (N=223)
I applied to (other) single discipline programs	34%	50%	25%
I applied to a mix of other single discipline and inter/multidisciplinary programs	28	19	20
I applied only to this program	21	20	43
I applied to (other) inter/multidisciplinary programs	18	11	13
Total who applied to at least one inter/multidisciplinary program (including IGERT)	100	30	33
Total who applied to at least one other inter/multidisciplinary program (excluding IGERT)	46	--	--

Note: The Non-IGERT students have been split out into U.S. Citizens, and non-U.S. Citizens/Foreign, due to the high proportion of foreign students who only applied to one program.

Source: *Initial Impacts Survey of Students 2004.*

Question: "When you applied to this graduate program, to what other types of graduate programs did you apply?"

Summary

IGERT projects have had a clear impact on the ability of participating programs to recruit, in the perception of faculty, **more and better academically qualified** individuals, and have the potential to increase the number of United States citizens currently enrolled in STEM doctoral programs. IGERT PIs and faculty members report successfully recruiting high quality students, including those students for whom the availability of an IGERT program was a factor in choosing to attend graduate school. IGERT projects provide an interdisciplinary alternative to what might otherwise be available to students, and IGERT students are more likely to pursue interdisciplinary education than their non-IGERT counterparts. The IGERT program has recruited minorities and women in science and engineering programs at rates equal to national averages. While IGERT projects have shown success in their recruitment efforts, the goal of the IGERT program is to be a leader in increasing diversity, and this challenge will continue to be a major focus of the program. The continued recruitment efforts of individual IGERT projects may in the future further increase the diversity of students enrolling in IGERT projects in these areas. The next chapter summarizes evaluation findings and suggests areas for future study.