

Chapter 5: Impacts on Institutions

The IGERT program is intended to catalyze a cultural change in graduate education for students, faculty, and institutions, by establishing innovative models for graduate education and training in a fertile environment for collaborative research that transcends traditional disciplinary boundaries. We have discussed in previous chapters the ways in which IGERT has impacted participating students and faculty. In this chapter, we explore the ways in which IGERT projects have impacted the larger institutional context in which they operate, influencing institutional culture, policies, and structures. We address the following research questions:

- How have IGERT projects influenced institutional culture and support for interdisciplinary graduate education?
- How have IGERT projects impacted institutional policies and procedures?
- How have IGERT projects impacted institutional structures?
- What elements of IGERT projects have been institutionalized or adopted by other institutional programs?

Impacts on Institutional Culture

During interviews, university administrators identified several elements as key to establishing, maintaining, and expanding institutional support for interdisciplinary education, including support for interdisciplinary education in the institutional mission; leadership that values interdisciplinary education; and acceptance of interdisciplinary work by the institutional culture. While there is little evidence that IGERT projects have impacted institutional missions or leadership values, they have played a role in broadening acceptance of interdisciplinary work within their institutional cultures.

Administrators indicated that support for interdisciplinary graduate education at research universities is substantial and growing, and in general IGERT projects are situated at universities that support interdisciplinary graduate education in a variety of ways. Most IGERT department chairs report that their university supports inter/multidisciplinary graduate education (81 percent)⁵⁰ and that over the last five years their university's support for inter/multidisciplinary graduate education has increased (75 percent).

In general, university support for interdisciplinary *research* is stronger than that for interdisciplinary *education* at IGERT institutions. For example, twice as many IGERT department chairs report that their department supports cross-departmental faculty research collaboration (78 percent) compared to cross-departmental faculty team teaching (44 percent). IGERT faculty members also perceive much higher support for interdisciplinary research activities: 72 percent report their department chair values and rewards inter/multidisciplinary research and collaboration, while only 32 percent believe that interdisciplinary teaching is rewarded in the tenure/promotion process at their university.

⁵⁰ Reporting the percentage selecting '4' or '5' on a scale of 1 ("Not Supportive") to 5 ("Very Supportive") when asked "How would you describe your university's support for inter/multidisciplinary graduate education?"

IGERT PIs were asked to describe concrete ways in which their central university administration supports inter/multidisciplinary graduate education. Exhibit 5.1 illustrates the various supports from the central administration as reported by PIs.

Exhibit 5.1

Percent of IGERT PIs Reporting Various Central University Administrative Support for Inter/Multidisciplinary Graduate Education

	Percent of PIs
Financial support for inter/multidisciplinary programs	81%
Provide policy support and encouragement for inter/multidisciplinary degree programs	79
Provide policy support and encouragement for cross-disciplinary courses	79
Allowing joint faculty appointments (faculty appointed in multiple departments)	77
Provide policy support and encouragement for cross-disciplinary team teaching	49
Allowing inter/multidisciplinary certificates	45

N=47 (missing =2).

Source: *Initial Impacts Survey of PIs 2004.*

Question: "In which of the following ways does your central university administration support inter/multidisciplinary graduate education?"

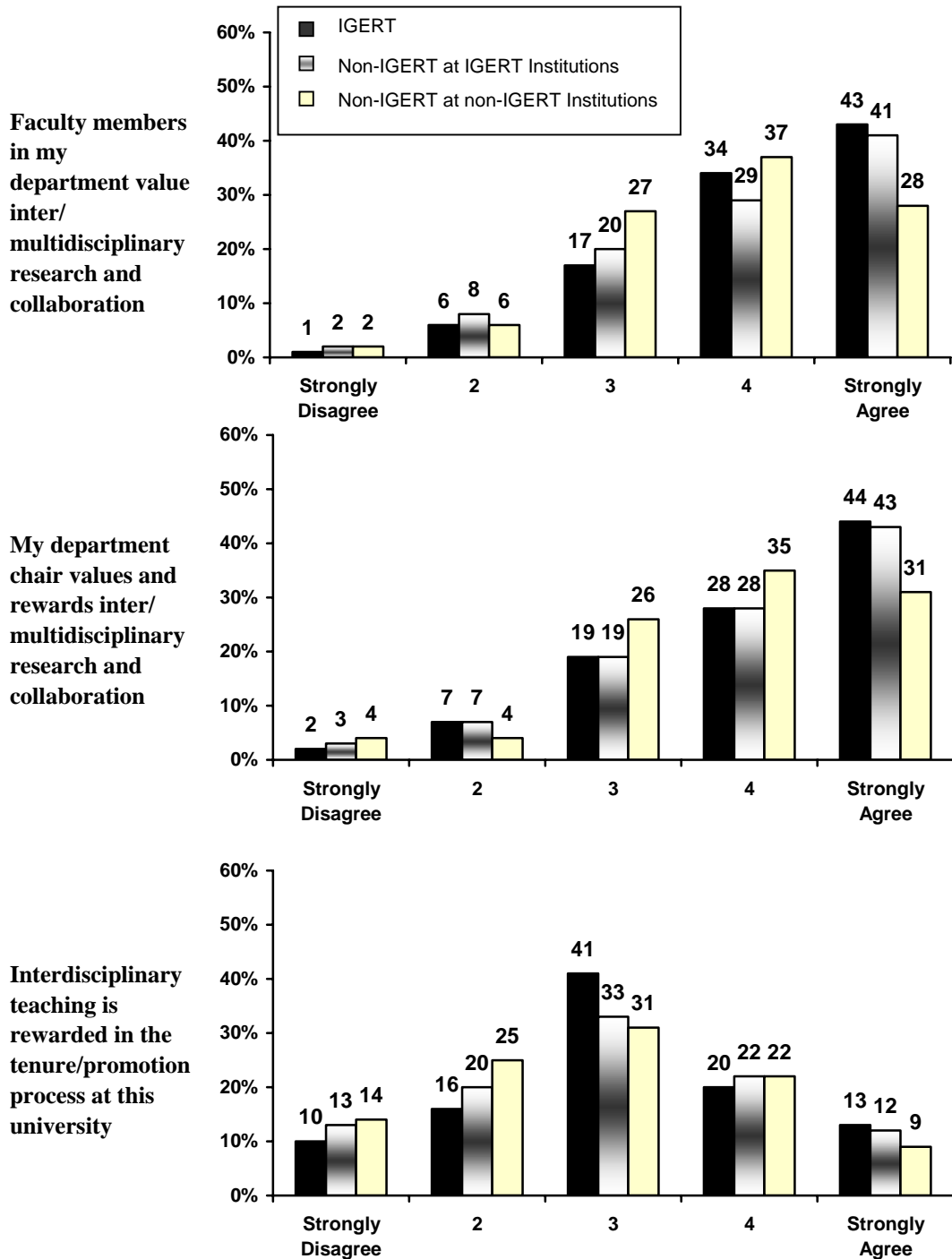
Faculty Perceptions of Institutional Support

Similar to department chairs and PIs, more faculty members report institutional support for interdisciplinary research than report that interdisciplinary teaching is rewarded in the tenure process at their institution. When the non-IGERT and IGERT groups are compared, there are not significant differences between the two in reporting on institutional support for interdisciplinary activities. However, when non-IGERT faculty are divided based on whether their home institution houses an IGERT grant, non-IGERT faculty members at IGERT institutions are more like IGERT faculty in their responses than those at non-IGERT institutions. This suggests that the culture of institutions that have been awarded IGERT grants is overall more supportive of interdisciplinary efforts than other institutions (Exhibit 5.2).

Exhibit 5.2 illustrates a correlation between the presence of an IGERT grant, and perceptions of faculty that interdisciplinary collaboration is valued at their institution. What we cannot determine is whether the presence of IGERT grants at an institution *causes* increased institutional support for interdisciplinary work, since data from these institutions was not collected prior to the IGERT awards. This question can be examined to some extent through the perceptions of IGERT participants.

Exhibit 5.2

Faculty Agreement with Statements about Support for Interdisciplinary Activities at Their Institution



IGERT N = 343. Non-IGERT/IGERT institution N = 357. Non-IGERT/non-IGERT institution N ranges between 198 and 199 due to missing responses. Percentages may not sum to 100 percent due to rounding.

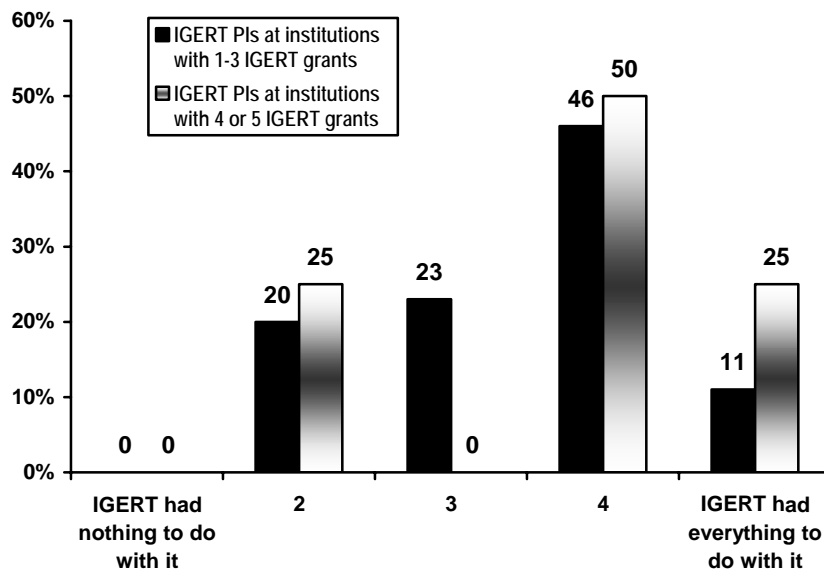
Source: *Initial Impacts Survey of Faculty 2004.*

Question: "To what extent do you agree or disagree with the following statements about inter/multidisciplinary research and teaching at your university?"

IGERT participants do believe that their IGERT grants have had an impact on institutional support of interdisciplinary graduate education. Of the 83 percent of PIs who report that their university's support for inter/multidisciplinary graduate education has increased since they won the IGERT grant, three fifths attribute this change in large part to the presence of the IGERT grant(s) on campus (58 percent). PIs at institutions with four or more IGERT grants are also more likely than their counterparts at institutions with three or fewer grants to attribute increased institutional support to the IGERT grant, suggesting a cumulative effect of multiple IGERT grants (Exhibit 5.3).

Exhibit 5.3

To What Extent are Recent Increases in Your University's Support for Inter/Multidisciplinary Graduate Education the Result of the IGERT Grant? (Percent of PIs)



N (1-3 IGERTS)=35. N (4-5 IGERTS)=4.

Note: Reported only for PIs who indicated that their university's support for inter/multidisciplinary graduate education has increased since they won the IGERT grant.

Source: *Initial Impacts of Survey of IGERT PIs 2004.*

Question: "To what extent do you attribute this change [increase in support] to the presence of the IGERT grant(s) on campus."

Given that IGERT PIs perceive that IGERT grants are effecting institutional change, how might IGERT projects be increasing institutional support for interdisciplinary graduate education? The data suggest several ways, including:

- broadening campus awareness of interdisciplinary graduate education through increased involvement of faculty members in IGERT activities, and
- broadening the research foci of participating faculty and departments to include interdisciplinary topics.

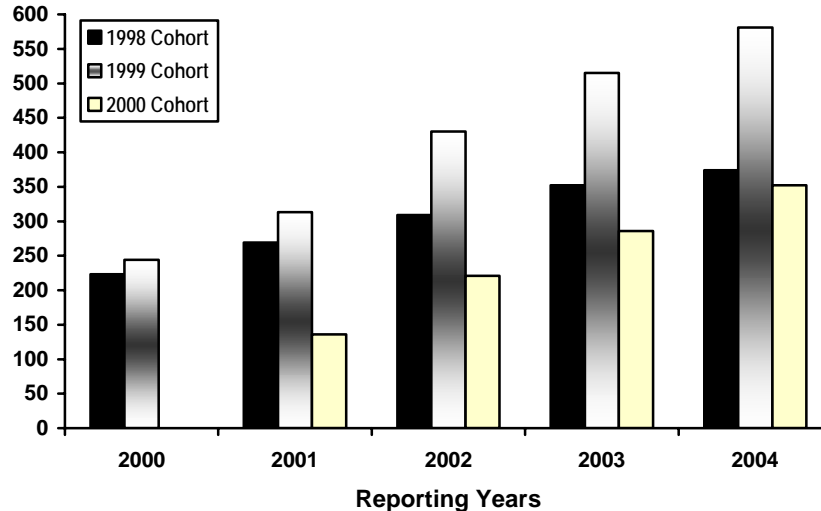
Broadening campus awareness of interdisciplinary graduate education

IGERT projects involve faculty members from between 1 and 24 departments / academic units, with an average of 7 to 8 departments involved in any one IGERT project. It is rare for more than half of a department's faculty members to be involved with the IGERT grant; department chairs report it more likely that one quarter or less (68 percent) or between 26 and 50 percent (23 percent) of their department's faculty members are involved with the IGERT grant.

Thus IGERT faculty members tend to be situated within departments containing non-IGERT faculty members. One sign of IGERT projects' increasing presence on campuses is that 89 percent of project PIs report an increase in participating faculty members since funding began. Exhibit 5.4 illustrates the growth in numbers of IGERT faculty members involved in projects in the first three cohorts. As more faculty members become involved with each IGERT project, word of the IGERT model of education likely spreads throughout the campus. This possibility is supported by data from non-IGERT faculty members: non-IGERT faculty members at institutions with IGERT grants were more likely to know about the IGERT program (62 percent) than non-IGERT faculty members at institutions without IGERT grants (54 percent) ($p=.0587$). Non-IGERT faculty at institutions with an IGERT grant who have heard of IGERT reported most commonly hearing about IGERT from NSF grant announcements (73 percent); colleagues at their own institution (72 percent); or information about the IGERT grant at their university (45 percent).

Exhibit 5.4

Number of Faculty Members Involved in IGERT Projects Over Time, by Cohort



Note: Reporting the number of faculty members listed in the IGERT monitoring system as serving as Co-PIs or Advisors to trainees. Does not include PIs. Number of projects in each cohort: 1998 (17); 1999 (21); 2000 (19).

Source: IGERT Distance Monitoring Web System, reporting years 2000, 2001, 2002, 2003, and 2004.

Broadening faculty research foci

IGERT projects have also increased support for interdisciplinary work by broadening the research foci of involved faculty members, which has an impact on participating departments. Department chairs report, for example, that the IGERT grant has expanded the department's research focus (60

percent). And as reported in Chapter 4, IGERT faculty likewise report that participating in IGERT has made them more likely to conduct research with colleagues in disciplines outside their own. Thus as IGERT projects involve more faculty, and those faculty who become involved experience broadened research activities and collaborative possibilities, IGERT grants have the potential to impact the culture of support for interdisciplinary research and education on their campuses.

Impact on Institutional Policies and Procedures

Although institutional cultures are becoming more accepting of interdisciplinary work, institutional policies may be slow to change. One IGERT Vice Provost for Graduate Studies & Dean of the Graduate School commented that existing policies that get in the way of interdisciplinarity are not usually mechanisms of active resistance but just inertia. Institutional policies impacting the ability of IGERT projects to implement interdisciplinary graduate education center around tenure promotion, and balancing disciplinary versus interdisciplinary educational activities.

Impact of IGERT on Tenure Review Policies

Most administrators we interviewed cited tenure review policies as a common barrier to support for interdisciplinary research and graduate education. Administrators report that conversations about how to incorporate interdisciplinary activities into the tenure process have been happening for decades. A few administrators are starting to see some changes, though they acknowledge that institutional change takes a long time. Some institutions have begun to require input from interdisciplinary institutes and centers, if applicable, when reviewing a faculty member in their home department. Issues still to be worked out include how to systematically incorporate this feedback, and exactly how it should count; since the very nature of interdisciplinary work is that it is unique and varies greatly across topics and projects. Another issue is how to weigh publications and research grants: traditional requirements for up-and-coming faculty members to have published in peer-reviewed journals (ideally as first author) and to have acquired funding to do discipline-based research have deep historical roots.

A few administrators mentioned conversations at their institutions about having tenure review teams that are themselves multidisciplinary, rather than a single disciplinary review team getting input from an interdisciplinary source. While this idea is being considered, it poses a fundamental question on how to establish criterion for evaluating work that has no established standards while maintaining the highest expectation of quality. As one IGERT administrator explains,

It works like this: many traditional scientific disciplines, when looking at promotion/tenure, are looking for evidence that [faculty members] have initiated creative work. When [work has a] single author, it's easy to see. When there are ten authors [on a paper], on a subject that crosses disciplinary boundaries, it's harder to see.

Perhaps as a result of these challenges, as was illustrated in Exhibit 5.1, only a third of IGERT and non-IGERT faculty believe that interdisciplinary teaching is rewarded in the tenure/promotion process at their university. It does not appear that IGERT grants have had much impact on these policies: 81 percent of IGERT PIs said the IGERT grant did *not* result in changes in criteria for faculty promotion, tenure, or merit awards at their university or other universities participating in their project.

Tenure status of Faculty Engaging in Interdisciplinary Work

A related issue raised by many administrators concerns the interplay between the protection offered by tenure to faculty members interested in engaging in interdisciplinary work, and the likelihood that junior (untenured) faculty are more often interested in conducting interdisciplinary work than senior (tenured) faculty. Newer faculty members have often had exposure to interdisciplinary work in their doctoral programs. However, it is more established faculty members who already have tenure and therefore the security to work across disciplinary boundaries. According to administrators, conversations about how to protect younger faculty and leverage their interdisciplinary involvement are common.

While administrators reported that tenured faculty have more freedom to engage in interdisciplinary work, the proportion of IGERT faculty who are tenured is not significantly different that of our non-IGERT sample (78 versus 73 percent).⁵¹ This contradicts the expectation that we would see fewer non-tenured faculty members in the IGERT sample than in the non-IGERT sample, suggesting that non-tenured faculty members feel secure in participating in the IGERT program.

Tenured faculty in both samples are more likely to have engaged in various interdisciplinary research activities in the last two years (Exhibit 5.5). However, *non-tenured IGERT faculty* are more likely to engage in these activities than *tenured non-IGERT faculty*; also suggesting that IGERT projects may provide support and encouragement to untenured faculty desiring to engage in these activities. Overall, the responses shown in Exhibit 5.5 indicate that interdisciplinary research activities are common among all faculty respondents.

⁵¹ Reporting only tenured or tenure-track faculty – non-tenure-track faculty comprise 4 percent of the IGERT sample, and 6 percent of the Comparison sample, and were excluded for this analysis.

Exhibit 5.5**Tenured vs. Non-Tenured⁵² Faculty Engagement in Interdisciplinary Research Activities**

	IGERT		Non-IGERT	
	Tenured (N=255)	Non-tenured (N=87)	Tenured (N=383)	Non-tenured (N=173)
Worked on research projects jointly with individuals outside your home discipline	90%	90%	80%	75%
Co-authored proposals with individuals outside your home discipline	87	83	67	57
Co-authored research articles or books with individuals outside your home discipline	79	67	64	50
Published research findings in a journal outside your home discipline	65	56	53	35
Presented research findings at a conference outside your home discipline	64	48	44	45
Mentored any graduate student(s) outside your home discipline	67	66	49	44
Been awarded new research grants, either singly or as part of a team	81	76	66	65

Source: *Initial Impacts Survey of Faculty 2004*.

Question: "Have you engaged in any of the following research activities in the last two years?"

Policies Governing Interdisciplinary Teaching

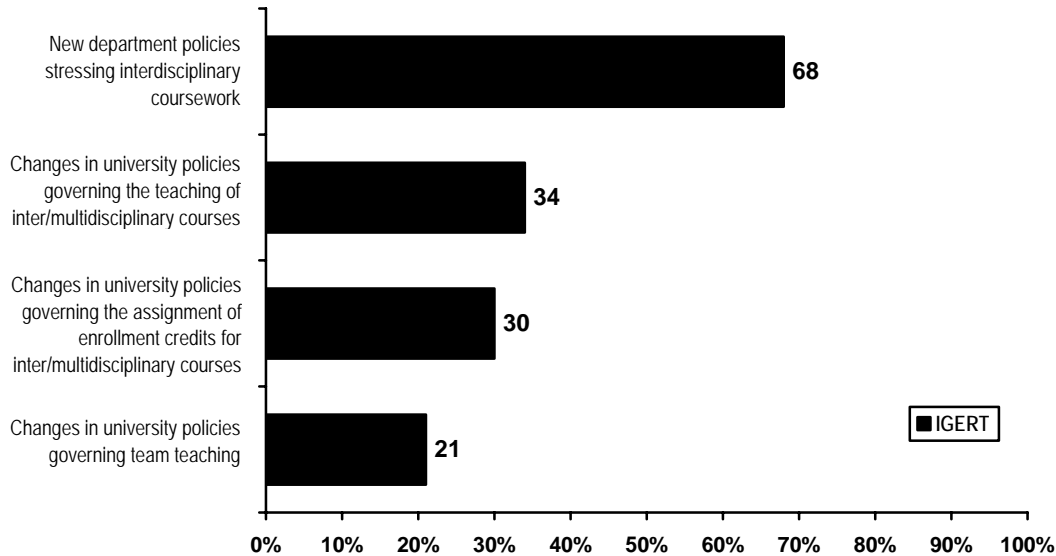
Many administrators we interviewed commented that an institution's support for, or barriers against, interdisciplinary courses and team-teaching impacts how willing faculty are to engage in these activities. Forty-nine percent of PIs report that their central university administration provides policy support for cross-disciplinary team-teaching. While teaching policies are not as high a priority as research policies at doctoral granting institutions, IGERT institutions are nonetheless more supportive towards interdisciplinary teaching. Sixty-three percent of IGERT department chairs compared to 39 percent of non-IGERT department chairs report that teaching inter/multidisciplinary courses is both supported by department policy and informally encouraged. Seventy-eight percent of PIs report at least some change in university policies due to IGERT, including new departmental policies stressing interdisciplinary coursework, changes in university policies governing team teaching, assignment of enrollment credit for inter/multidisciplinary courses, the teaching of inter/multidisciplinary courses, and changes in criteria for faculty promotion, tenure, or merit awards. These findings suggest that IGERT is contributing to changes in institutional policies supporting interdisciplinary graduate education.

⁵² Non-tenured is defined as either non-tenure-track or tenure-track, not tenured.

Exhibit 5.6

Percent of IGERT PIs Reporting Changes in University Policies Resulting from the IGERT Grant

“Our IGERT grant has resulted in the following changes:”



N=47 (missing=2).

Source: *Initial Impacts Survey of PIs 2004*.

Question: “Has the IGERT grant resulted in any of the following changes at your university (or other universities participating in your project)?”

Impact on Institutional Structures

As institutional cultures and policies become more supportive for interdisciplinary graduate education, institutional structures such as faculty appointments, courses, and degree programs are altered. IGERT projects have been responsible for some of these changes. In the words of an Associate Provost, “You can look at IGERT as a catalyst. It provides a scope of possibility, and funding. IGERT provides the opportunity to explore ways to break down barriers.”

Joint Faculty Appointments

Nearly all the administrators we interviewed discussed joint appointments – that is, faculty members with appointments in multiple departments – as a way for faculty members to begin to find homes in departments beyond their primary department and have access to resources and information of multiple departments, thereby mitigating departmental barriers. Joint faculty appointments were expressed as a popular way to allow faculty to bridge disciplines while maintaining overall departmental organization. This strategy is clearly common at IGERT institutions, as 77 percent of PIs report that their central university administration allows joint faculty appointments. While the degree to which faculty members obtain joint appointments varies, one IGERT Dean of the Graduate

Division described his/her institution’s organization as “very fluid,” with a third of their faculty members having joint appointments in two or more departments.

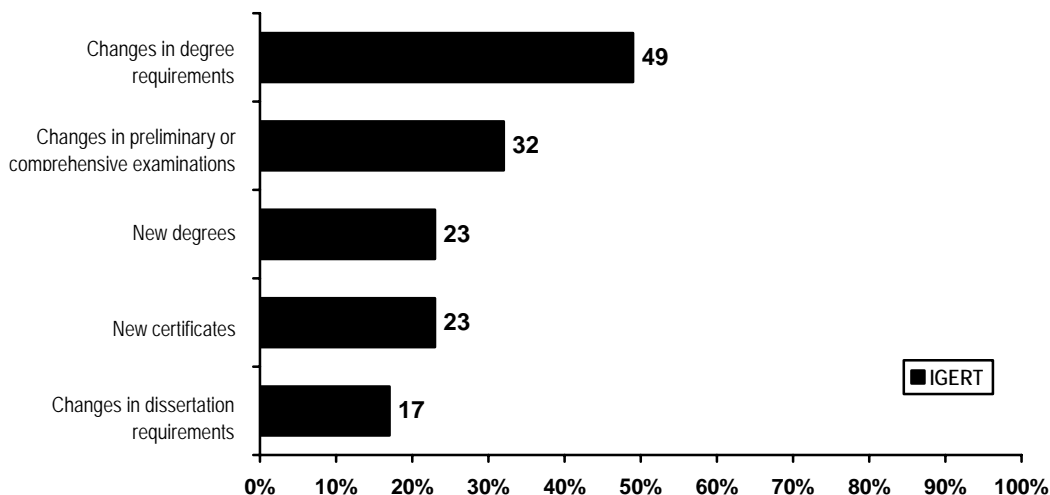
New Interdisciplinary Courses/Degrees/Certificates

The administrators we spoke with indicated that support for new interdisciplinary courses, degrees and certificates are measures of an institutional culture open to advancing interdisciplinary graduate education. The IGERT institutions are in general supportive of such efforts: 79 percent of PIs report that their central university administration provides policy support and encouragement for inter/multidisciplinary degree programs and/or for cross-disciplinary courses. IGERT PIs also report changes to doctoral educational structures as a result of IGERT projects, most commonly with respect to degree requirements and exams (Exhibit 5.7). New degrees or certificates are reported by approximately one-fourth of PIs, a substantial number given the effort and time typically required to develop new degree programs at universities.

Exhibit 5.7

Percent of IGERT PIs Reporting Changes in Educational Structures Resulting from the IGERT Grant

“Our IGERT grant has resulted in the following changes:”



N=47 (missing=2).

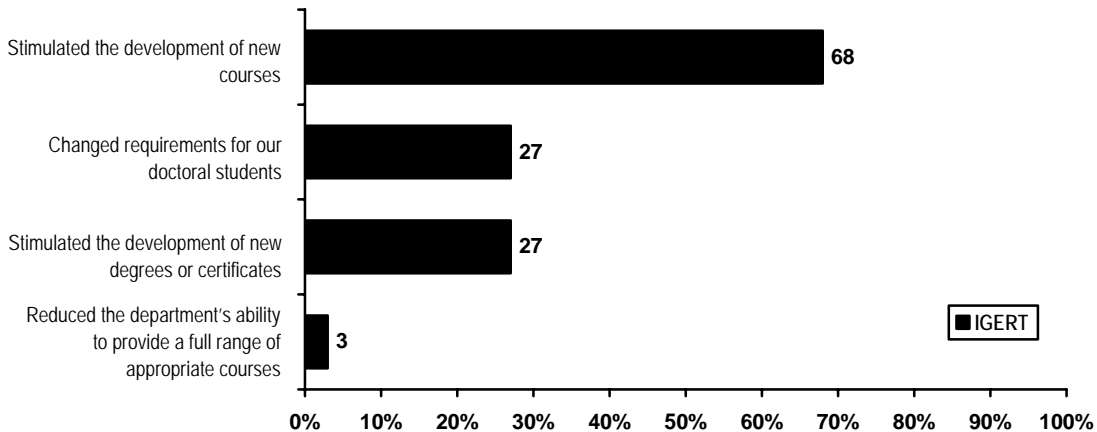
Source: *Initial Impacts Survey of PIs 2004.*

Question: “Has the IGERT grant resulted in any of the following changes at your university (or other universities participating in your project)?”

According to department chairs, most IGERT projects have led to the creation of new courses, and a sizable minority of projects have stimulated the development of new degree programs or altered degree requirements (Exhibit 5.8). The level of recognition that department chairs afford IGERT, by reporting on project impacts at large, can be taken as one sign of the IGERT grants’ profile within their universities, given that department chairs do not always know what various faculty members are engaged in.

Exhibit 5.8**Percent of IGERT Department Chairs Reporting Changes in Educational Structures Resulting from the IGERT Grant**

“Has the IGERT grant affected your department in the following ways?”



N=77.

Note: Reporting the percentage who selected 4 or 5 on a 5-point scale from 1 (“Not at all”) to 5 (“Extensively”).

Source: *Initial Impacts Survey of Department Chairs 2004.*

Question: “To what extent has the IGERT grant affected your department in the following ways?”

Interdisciplinary Centers and Institutes

Research institutions have housed interdisciplinary centers and institutes for several decades. However, most administrators agree that in the last five years the prestige, accessibility and visibility of many of these centers and institutes have grown. These centers and institutes provide an intellectual and physical space for collaboration, and are often highlighted when administrators discuss the interdisciplinary landscape at their institution.

Students are becoming increasingly involved in interdisciplinary institutes. One Graduate School of Arts and Sciences Dean at a non-IGERT institution described a funding program through which graduate students nearing completion of their degree can apply to an interdisciplinary institution, at which they then work while finishing their dissertation. Students present their work every other week to each other, fostering interdisciplinary communication along the lines that IGERT supports. Another administrator explained that in order to create competition and increase prestige, there is competition for graduate students to be accepted into an interdisciplinary institute where they either receive funding from the administration or resources for their research. Along similar lines, one administrator explained that at his/her institution faculty are only allowed to form an Institute at all if it spans across multiple departments, which sends a strong message about the value of interdisciplinarity. The merging of more than one discipline is a major tenet of IGERT, so it is no surprise that several IGERT administrators describe the IGERT project on their campus as having spawned and/or facilitated the expansion of institute(s) on campus.

Leveraging Funds

Several administrators we spoke to mentioned that IGERT was useful in leveraging funds. IGERT PIs and department chairs echo this observation: 89 percent of PIs report that the presence of the IGERT grant has enabled them to leverage additional university resources and 52 percent of IGERT department chairs report that IGERT has increased the department's ability to leverage funds.

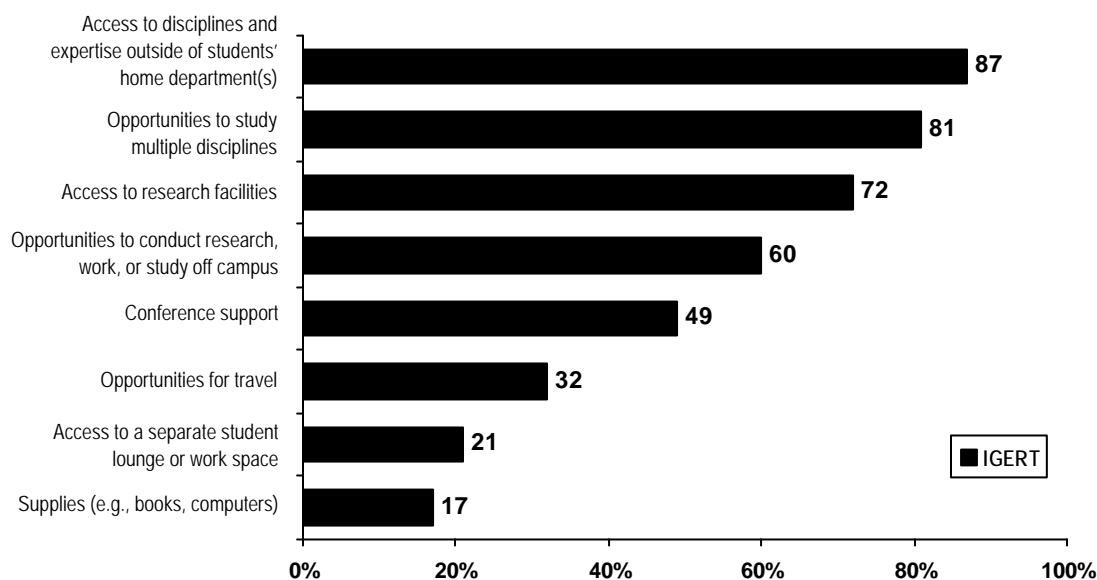
Institutionalization and Spread of IGERT Elements

Sustainability

PIs are confident that they will be able to maintain some student benefits associated with IGERT beyond the funding period, with only four percent reporting that no benefits will be maintained. The most likely benefits to be maintained include those associated with the interdisciplinary nature of the IGERT educational experience – access to disciplines outside students' home departments, and opportunities to study multiple disciplines – suggesting that the interdisciplinary models of education developed by IGERT grants are perceived as valuable (Exhibit 5.9).

Exhibit 5.9

Percent of PIs Reporting IGERT Benefits They Expect to Maintain (Post Funding)



N=47, (missing=2).

Source: *Initial Impacts Survey of PIs 2004.*

Question: Which of the following student benefits often associated with IGERT do you expect to be able to maintain?

PIs are less confident that they will be able to maintain IGERT levels of unrestricted student support, that is, funding that is not tied to specific responsibilities for teaching or research, and which is not linked to a single faculty member or department. Some PIs report that they will either fully (11 percent) or partially (48 percent) maintain such funding; the remaining 41 percent do not see this happening. When asked how they planned to maintain IGERT levels of student support, PIs most frequently pointed to faculty grants or university funding (70 and 63 percent, respectively). They were less likely to suggest that they would rely on departmental funding (44 percent), non-NSF federal funding (44 percent), or other NSF funding (37 percent).

Adoption of IGERT Features by Others

Fifty-nine percent of PIs report that other departments or programs at their university have adopted IGERT program elements. Several administrators pointed to the spread of IGERT features as the core impact of the IGERT grant(s) at their institution. Sometimes IGERT features spread across from IGERT departments to non-IGERT departments, and sometimes they spread more systematically across the whole university. Two IGERT administrators highlight various ways IGERT elements spread.

I think [IGERT has spread to other departments] simply because those departments that do not have IGERT's look upon the departments that do have them with a considerable amount of envy. [It is] stimulating to see that interdisciplinary activities are not just productive for one's research or for training better students but can [also] bring money. (IGERT Dean of the Graduate Division)

Our IGERT grant happened to involve the center for computational biology, chemistry, microbiology, etc, and it just works wonderfully. [Students] can run through three or four labs, meet three or four possible mentors, and when they get done that first year they have a good idea of what lab they want to take, where they want to be. That has led us to a campus [IGERT-like] program in molecular biosciences, supported by the campus that is multi-departmental, for which students come in and have a year to work through honing their interest, then settle down in one department and earn their degree. (IGERT Dean of the College of Graduate Studies).

Summary

Findings from the surveys and interviews suggest that IGERT projects are helping advance interdisciplinary graduate education in their institutions. Project PIs report that their projects have led to policy changes for interdisciplinary coursework and teaching, revised degree requirements, and created new degrees and certificates, as well as increased university support for interdisciplinary education in general. Participating department chairs point to IGERT grants as stimulating the development of new courses, and to a lesser extent, new degrees and requirements for doctoral students. Additionally, faculty members and department chairs perceive stronger departmental and institutional support for interdisciplinary research and education at IGERT institutions than non-IGERT institutions, though support for interdisciplinary education overall is modest compared with interdisciplinary research.

These reported institutional impacts vary across projects and may appear to be small within the scope of universities, but they are an indication that IGERT is catalyzing changes in graduate education via a funding mechanism that primarily supports graduate students. PIs are confident that they will be

able to maintain some project benefits beyond the funding period, especially access to disciplines and expertise outside of students' home departments, and opportunities to study multiple disciplines. Many PIs and administrators report that other departments or programs at their home institutions have already adopted IGERT program elements. In the next chapter we will examine the success of the IGERT program in increasing participation of individuals from diverse backgrounds.