



FACILITATING

Interdisciplinary Graduate Education:



Barriers, Solutions, and Needed Innovations

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In Short

- Organizational hierarchies, policies, and budgetary models often disadvantage interdisciplinary programs and their students and faculty.
- Examples exist across the country of improvements that can be made. However, in some areas—for example, accounting for and reporting interdisciplinary efforts—viable approaches are not yet clear and work remains to be done.
- Improving interdisciplinary graduate education will require strong commitment from university leaders and a willingness to lay out clear, rational, and flexible policies and funding models.

Interdisciplinary inquiry is widely perceived to be essential for tackling the most pressing social and environmental issues we face (Brown, Harris, & Russell, 2010). Scholars from many different traditions have argued that the magnitude and complexity of such problems require the integration of perspectives and expertise from multiple disciplines to see “the whole” of the problem (Callahan, 2010; Kinzig, 2001, p. 709; Lubchenko, 1998). Federal funding agencies have sought to encourage both interdisciplinary research and interdisciplinary graduate training (Committee on Facilitating Interdisciplinary Research [COFIR], 2004); (National Institutes of Health [NIH], 2006); (National Science Foundation [NSF], 2011), and the strategic plans of universities across the United States have placed increased emphasis on interdisciplinary research and teaching (Borrego, Boden, & Newswander, 2014; Kezar & Elrod, 2012). In response, graduate training programs that seek to prepare students as interdisciplinary scholars have proliferated (Fitzgerald & Stronza, 2009; Klingenberg & Rothberg, 2010; McBride, Brewer, Bricker & Machura, 2011; Martin & Umberger, 2003; Vinhateiro, Sullivan, & McNally, 2012; and for a review: Clark et al., 2011).

Graduate student interest in interdisciplinary training is strong, and the experiences they seek range from workshops and short-courses to full-fledged interdisciplinary degree granting programs. Faculty members often argue that interdisciplinary programs draw the “best and brightest” students (e.g. Buss 2003). Though it is difficult to find systematic analyses of the quality and quantity of applicants to interdisciplinary programs across universities, our experiences at the University of Georgia support those arguments. Our university offers six doctoral programs that bring together faculty from different disciplinary units. These programs have a disproportionately high number of students who enter with outside fellowships or who have received university honorific awards.

Cross-university data on student placement by program are similarly difficult to access, but there are indications

that students who do interdisciplinary work—as part of a traditional department or in an interdisciplinary program—do at least as well as their peers who conduct disciplinary research. Bosque-Pérez and colleagues (2016), report on several cohorts of students from one interdisciplinary program and note high graduation rates (90%) and 100% placement. Interdisciplinary doctoral programs at our university have had similar successes. Looking more broadly, Millar (2013) used the Survey of Earned Doctorates and the Survey of Doctorate Recipients to assess outcomes and placement for students who did interdisciplinary dissertation research (as self-reported). She finds that interdisciplinary students publish more papers and that they are more likely than their peers to secure jobs in academia (though there is some question about trends over time for the kinds of jobs they hold within universities).

Though student interest is high and outcomes appear positive, there remain critical challenges in making interdisciplinary graduate education more successful and sustainable. Many of these challenges are structural, and we join Boden and Borrego (2011) in arguing that if they are to be effectively addressed, institutions must examine the rigid hierarchies that pose barriers to interdisciplinary training. While articles detailing barriers to interdisciplinary research and graduate training are many, fewer pieces outline potential solutions and paths forward (for examples, see: Borrego, Boden, & Newswander, 2014; Welch-Devine, Hardy, Brosius & Heynen, 2014).

There is a clear need to take stock of the work done to date, foregrounding potential solutions, in order to provide a firm foundation for faculty members and administrators who wish to improve interdisciplinary education at their institutions. The goals of this article are to aid those who continue to struggle, perhaps unnecessarily, with obstacles for which there are effective responses and to focus attention on challenges that still need creative attention. We conclude by articulating a set of principles that we believe can pave the way for advances in supporting interdisciplinary graduate education.



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OVERTCOMING BARRIERS TO INTERDISCIPLINARY TRAINING

There are three sets of key structural and organizational challenges to interdisciplinary graduate training. These problems are well-established in the literature, and potential responses to many of them also appear in the literature. They have also been identified through our own experiences as faculty members and administrators in conversations with colleagues at other universities and through our participation in forums that bring together graduate education professionals. It is important to note that this is intended to familiarize readers with approaches in place at different institutions but not to suggest any one specific set of best practices.

Isolation and Siloing

Academic departments and disciplines in United States universities are frequently referred to as “silos” (Goodman & Blake, 2006; Miller et al., 2008), and much attention is given to how to build bridges among them (Gosselin et al., 2016) or break them down (Borrego, Boden, & Newswander, 2014; Swap & Wayland, 2013). This is accomplished typically by: (1) encouraging collaboration and exchange between students and faculty in traditional units, or (2) creating new interdisciplinary programs that bridge or sit between disciplines.

There is a wide variety of efforts to provide interdisciplinary experiences to students and faculty members based in departmental programs. Lectures, speaker series, brown bag events, and courses that draw students from multiple disciplines help build community across disciplines and encourage networking and collaboration. Research suggests that these efforts be led by high-level administrators and be focused on fostering interdisciplinary scholarship (Boden, Borrego, & Newswander, 2011; Pfirman & Martin, 2010). Pfirman and Martin (2010).

In addition to increasing exposure to new ideas, terms, theories, and methodologies, these activities provide time and space for the personal encounters that are so important to building understanding between those from different fields. Similarly, high profile events, such as interdisciplinary symposia that showcase interdisciplinary research and teaching, can draw attention to and garner more support for interdisciplinary endeavors on campus. Weiler (2003) and Pfirman and Martin (2010) suggest recognition events for faculty who have made significant contributions to interdisciplinary research and teaching.

The creation of degree-granting interdisciplinary programs serves to train students in new areas or at the intersection of several disciplines in a formal structure. Because they are often not based in traditional departments, interdisciplinary programs tend to exist in the interstitial spaces of the university hierarchy, and traditional reporting and resourcing lines often do not apply (Boden & Borrego, 2011). As a result, even seemingly simple issues such as how directors of interdisciplinary programs obtain information that typically flows from deans to department heads or chairs can be easily overlooked.

Providing interdisciplinary programs with clearly-defined administrative homes can help alleviate several concerns by ensuring clear lines for communication of critical information from and to the central administration. It also gives programs an advocate and “seat at the table” in discussions about resource allocation.

Several institutions, including the University of Washington, the University of Arizona, and the University of Missouri, house their interdisciplinary programs in the Graduate School. Similarly, the University of California, Davis has long used Graduate Groups that are resourced by and report to the Graduate Division to facilitate interdisciplinary training. Other institutions house interdisciplinary programs in interdisciplinary units such as institutes or centers (e.g., Duke University), share them among the participating colleges and schools (e.g., Michigan State, Ohio State), or house them in the most closely-related college (University of Illinois at Urbana–Champaign). In many institutions, (e.g., Pennsylvania State University, University of Michigan, University of Georgia), an interdisciplinary graduate program may be housed in a variety of different ways, each with its advantages and disadvantages.

In instances where responsibility for a program is shared, programs may find themselves in a situation where no dean chooses to step in and provide resources. And when programs are housed in centers or institutes that are not, themselves, well-placed in the organizational chart of the university, programs may still lack adequate communication, advocacy, and resources. The neutrality of a Graduate School as the academic home is often attractive for these reasons.

The dominant organization of universities into departments also means that many interdisciplinary programs do not have their own faculties or physical spaces. As a result, they can feel like “virtual” programs, and both students and faculty members may feel invisible. In some cases they may feel isolated in comparison to their departmental colleagues who are immersed in single disciplines (Boden, Borrego, & Newswander, 2011; Golde & Gallagher, 1999).

There are several steps that universities can take to help foster community and make interdisciplinary students feel supported. Hiring and developing interdisciplinary faculty members creates a cadre of mentors for a new generation of graduate students interested in pursuing similar work (Borrego, Boden, & Newswander, 2014; Golde & Gallagher, 1999), and when interdisciplinary programs have dedicated physical space, it provides access to shared work and leisure spaces that help build community and lead to networking, collaboration, and exchange (Boden, Borrego, & Newswander, 2011).

ILL-FITTING OR CONFLICTING POLICIES, PROCEDURES, AND EXPECTATIONS

At many universities, interdisciplinary research and training have not been adequately addressed in institutional policies and procedures. The most frequently cited issue is that interdisciplinary scholars may be disadvantaged in the

tenure and promotion process (Huutoniemi, 2010). Tenure clocks often do not accommodate the extra start-up time that interdisciplinary researchers may require (Borrego & Newswander, 2011; COFIR, 2004; Pfirman & Martin, 2010), and promotion and tenure committees often have difficulty assigning value to co-authored publications and recognizing interdisciplinary journals, which may be less established, as appropriate publication venues (Bennett & Gadlin 2014; Borrego & Newswander 2011; Campbell 2005; COFIR 2004).

Furthermore, faculty with joint appointments are required to satisfy two or more sets of promotion and tenure expectations, which understandably are sometimes at odds, and often have service expectations that are doubled (Pfirman & Martin 2010; Borrego & Newswander 2011). Faculty members are therefore often advised to wait until after they gain tenure to pursue interdisciplinary work (Boden & Borrego, 2011; Campbell, 2005).

Several institutions, though, are now making changes to faculty recruitment, annual reviews, and promotion and tenure requirements to accommodate interdisciplinary research and teaching (Berrett, 2011; Pfirman et al., 2011). Universities such as Virginia Tech, University of California-Los Angeles, Duke University, and the University of Arizona explicitly state in their promotion and tenure guidelines that interdisciplinary scholarship is valued by the university. Practices that show promise are: to carefully outline expectations for faculty members; to provide adequate mentoring for junior scholars; to provide guidance to committee members on how to evaluate interdisciplinary portfolios; and to include representation from other disciplines on the review committee (Pfirman & Martin, 2010). In some cases, interdisciplinary groups (e.g. UGA's Institute of Higher Education), themselves are designated as promotion and tenure units.

Interdisciplinary programs can also be ill-served by long-standing administrative policies and procedures originally developed for departments. For example, decisions about how students at the university are counted can sometimes pit the needs of interdisciplinary programs against those of departments. Some universities now allow students in interdisciplinary programs to "count" both for the interdisciplinary program and for the department of a student's major professor or committee chair. Such counting is essential in order to more accurately reflect the contribution and impact of an interdisciplinary program and to provide greater incentive for departments to participate in interdisciplinary training.

Careful consideration of the political aspects of this decision, as well as the technical limitations of both the student information systems and reporting applications, is critical to the success of this solution. Because it can be difficult to envision the universe of policies that may be adversely impacting interdisciplinary education, as they will vary so much from one institution to another, university policies and business practices should undergo comprehensive evaluation

to determine which hinder the growth and success of interdisciplinary training.

Resourcing Challenges

Interdisciplinary programs face special challenges with regard to both financial and human resources. Just like traditional disciplinary graduate programs, interdisciplinary programs need sustained funding. However, many interdisciplinary programs do not receive formula-based funding from the central administration as a traditional department would, and when there is no single dean responsible for a program, the needs of the program are often overlooked. This forces the program to "beg for scraps" and expend valuable time cobbling together resources year after year.

To address this, programs and their institutions must think creatively. Efforts to provide sustained funding may include in-house entrepreneurial activities such as offering particular courses or experiences for students in exchange for guaranteed contributions by departments and colleges. In universities in which budgets are tied to instructional hours, interdisciplinary programs may be able to negotiate for a portion of the funding allocation to flow to the program (via the faculty member or the student) rather than to the faculty member's or student's home department.

These programs can likewise negotiate to receive a portion of the indirect cost returns that come back to the university from grants that are closely related to or catalyzed by activities in the program (Holley, 2009). Faculty members can also seek out training grants (such as NIH T32 or NSF NRT) and can consider starting revenue generating master's programs to support doctoral student stipends. Similarly, certificate programs offered to paying professionals who are not full-time students can serve to augment budgets.

Some programs, based on their subject matter, may find that they have opportunities for strategic partnerships with corporations or NGOs to support student stipends or engage in joint fundraising efforts. For example, the University of Georgia's Integrative Conservation program is embarking on a joint fundraising effort with a conservation organization to support stipends for students who may one day join the staff of the NGO.

Whenever possible, high-level administrators should help ensure sustainable funding for interdisciplinary programs. The Virginia Tech Graduate School, through its Interdisciplinary Graduate Education Programs (IGEP) initiative, has been able both to launch new programs and to provide them with long-term funding. IGEPs are designed as a way to test out new ideas that may become standalone degree granting programs. To apply for an IGEP, faculty members must come from at least two colleges and three departments. Successful applicants receive \$100,000 per year for operating expenses and student funding. They retain that funding as long as they continue to perform well.

Human resource problems can be particularly difficult for interdisciplinary programs. When interdisciplinary programs



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do not have their own faculty lines, they may encounter difficulties in maintaining the expertise required for certain courses or for mentoring students in important research areas. If the interdisciplinary program must rely on a participating department to recruit and hire a faculty member to address a particular need, it risks being left with gaps, as the department must also attend to critical needs in other areas of the discipline.

Similarly, departments often must prioritize their own teaching obligations first before allowing faculty to teach interdisciplinary courses, and subsidizing team teaching quickly becomes problematic when teaching efforts cross multiple colleges or schools within the university (Pharo & Bridle, 2012). Faculty members are too often not given full credit for teaching co-taught interdisciplinary courses, even when they may be present for all sessions, and they may find that teaching courses for interdisciplinary programs can only be done as an overload (Boden & Borrego, 2011; COFIR, 2004; Pfirman, Collins, Lowes, & Michaels, 2005).

Universities can ensure that interdisciplinary instructional and mentoring needs can be met by developing policies that encourage departments to allow faculty to teach in interdisciplinary programs (Casey, 2010). For example, policies can assign partial teaching effort of certain faculty members to interdisciplinary programs (Interdisciplinary Working Group [IWG], 2010) and recognize faculty members for their interdisciplinary work at the time of their annual review (Casey, 2010).

MOVING FORWARD

Institutions of higher education across the United States have made important progress in facilitating interdisciplinary graduate education over the past several years. In many cases, where a challenge exists, we can look to our peers in other institutions for inspiration and guidance. However, other challenges do not seem to have readily apparent solutions in the literature or in the examples of other universities.

For example, we still need, as a community, to devise rational policies that govern *accounting and reporting practices* so that faculty are appropriately incentivized and compensated for co-teaching and for directing interdisciplinary programs. It is critical that these decisions be driven by need and common sense rather than by our technological

limitations. If we get the rationale and priorities right, we can create mechanisms that work.

We also still need more creative ways to *provide steady revenue streams* to interdisciplinary programs. Many universities prefer to support new endeavors for short periods of time rather than to commit to long-term support. Interdisciplinary programs need a predictable source of revenue, and solutions such as changing budget allocation models need to be further explored. We also need to better assist faculty members in becoming more entrepreneurial as they look for funding both inside and outside of the university, particularly because fundraising for interdisciplinary programs can be difficult when there is overlap with disciplines that may also have claim to alumni or other sources.

To move to the next level in facilitating interdisciplinary graduate training, we suggest that institutions of higher education must adopt several key principles. First, university policies that affect interdisciplinary training should be *clear and consistent*. Faculty members and students must understand all of their options and the effects of their choices as they join programs, create new programs, and progress through their careers.

Second, universities must become much more *flexible and rational*. No faculty member or student should be hindered in their interdisciplinary pursuits due to outdated practices or because policies do not recognize and account for differences between types of programs. Common sense and willingness to work around rigid codes can go a long way to easing the burden on interdisciplinary faculty.

Third, faculty members doing interdisciplinary work must feel *supported and rewarded*. They should not be made to jump through additional hoops, and their efforts need to be recognized and facilitated. Finally, while incremental and steady change is critical to making advances in interdisciplinary training, we need *bold action* and deliberate leadership at all levels to improve the climate for interdisciplinary education.

As Graybill and Shandas (2010) note, we have asked much of our interdisciplinary faculty and students; it is now time for our institutions to respond in kind. If interdisciplinarity continues to be lauded as the future of higher education but is not clearly and decisively developed and supported in our universities, we run the risk that praise of interdisciplinarity will become hollow rhetoric. □

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