NSF/NIH/CGS Workshop
Support of Graduate Students and Postdoctoral Researchers in the Sciences and Engineering: Impact of Related Policies & Practices

Graduate and Post-Doctoral Financial Support Breakout Group Report
Best Practices for Universities

Leslie B. Sims, Moderator and Reporter

Universities have two primary roles relating to public policy on issues of support for graduate students and postdoctoral researchers:

- To actively participate in and inform the discussions that are the bases for formulation and adoption of public policy This encompasses a joint responsibility – on the part of university faculty and administrators to be assertive advocates for federal support of graduate education and research, and on the part of federal agencies and officials to adequately consult with those who are most affected by public policies in these areas: university faculty, administrators; graduate students, and postdocs. There was some sense among members of the breakout group that there had been inadequate consultation with members of the academic and research community before stipend policies that were the primary focus of this workshop were formulated and adopted. However, since this was not the main task set for the breakout group, most attention and time were devoted to the other primary role of universities relating to public policies.

- To translate public policies into institutional policies and practices that

    1) Benefit graduate students and/or postdocs, or at least hold them harmless;

    2) Sustain the excellence of the U.S. graduate educational enterprise (including postdoctoral education/training) and, hopefully, improve the practice of graduate education.

The discussion of this role was wide-ranging, and the group considered its discussion to be best summarized not as "best practices" but "best ideas" that, given the proper financial resources, time, and place, could be transformed into exemplars of policies and practices for universities to emulate as "best practices" in accommodating public policy to institutional culture, mission, and strategic goals. These "best ideas" will be presented under a few generic topical areas.

<u>The Two Models of Support</u>

A significant discussion centered on the two primary models of support of graduate students and postdocs:

The **entrepreneurial** model: support included on research grant awarded to an individual faculty member, who has more or less autonomous control of selection of students/researchers to conduct the work proposed;

The **Traineeship** model: support provided through a block grant to an institution, department, or (most likely) a group of faculty with shared/collateral research interests. Selection of students is, ideally, a consensus decision of the faculty group, having reached a consensus on program goals and the process of graduate education and professional development to be provided to students to accomplish the goals.

There was general agreement that both models will persist for the foreseeable future, and that universities and funding agencies should attempt to maximize the strong points of each model, while decreasing the potential pitfalls. In particular, the group identified the following as recommended areas to be addressed by universities:

- Decrease the faculty self-interests inherent in the entrepreneurial model as a result of faculty pressures to establish productive research programs as a basis for promotion/tenure and for securing continuing grant support to sustain their research program.
- Increase the professional development opportunities for graduate students and postdocs participating in faculty-sponsored research projects. In particular, provide incentives for faculty to support participation of graduate students and postdocs in activities such as communication skills building, curriculum development, professional networking beyond the immediate laboratory setting, etc. While money can be a powerful incentive, many participants cited such things as: convincing faculty that such activities are seen be students as highly beneficial and including them as part of the graduate program will lead to an increase in the quality of students attracted, better skills that improve students' confidence, effectiveness, and efficiency in research, leading to better performance, decreased attrition, and shorter time to degree and increased completion rates.

  Other model programs were mentioned by discussants: a course run by the graduate program in which senior graduate students designed laboratory experiments for undergraduates based upon their research, critiqued initial drafts as a group. The author of each experiment then led undergraduate laboratory students in performing the experiment according to instructions fine-tuned by group discussion. The end result was a laboratory manual that is to published and used by the program in its undergraduate teaching program. Research mentors did not view this course as interfering with students' research progress, since each student's contribution was based upon their research and learning how to communicate the results of that research.

  Another example was a department or university course for an inter-collegiate group of students from assorted STEM departments in which a curriculum was developed on an aspect of science spanning the fields represented in the

group. Yet another example consisted of a graduate school initiative inviting proposals from graduate students to design a “model project” that they felt would improve graduate education in their department/program. Such programs could be linked to issues associated with graduate student support.

- Reduce the barriers for faculty to participate in interdisciplinary research and for students to experience interdisciplinary and team-based research. The barriers were perceived to range from promotion and tenure guidelines (having [especially young] faculty involved in developing/revising P&T guidelines was perceived as a positive step) to strategies for sharing indirect costs and credit for mentoring among team members in collaborative projects.
- Communication of expectations of performance and responsibilities in graduate and research programs was seen as a critical factor in realizing the benefits of student support through either model. Expectations need to be developed with participation of all stakeholders: faculty, students, institutional officials, within the framework of the requirements of the funding agency.

Flexibility and Timing of Support

A second area of discussion focused on issues of how universities can accommodate disparate levels of support and provide the most appropriate type of support to students during different stages of their graduate program. NSF fellows provided an example: fellows are allowed to use three years of support over a five-year period, which provides some flexibility. However, the support must be full-time for a full year at a time, say years 1-3 or years 1, 2, and 5 of graduate study. There was general agreement that the mandate to "hold students harmless" meant at least to maintain the stipend at the $30,000 per year level during periods between or after the conclusion of NSF support. The problems engendered are not wholly financial (financial aspects were adequately discussed during other workshop sessions.) For example, early participation in exceptionally good TA training programs can significantly improve students' communication abilities and their confidence in full participation in research, program seminars, etc. Greater flexibility to allow students to, say, participate at least part-time in teaching during their second semester would allow the full benefit of the full-time free of responsibilities provided by the fellowship during the early weeks (first semester) of the graduate program, while allowing relatively early participation in a major aspect of socialization into the discipline and program, while improving communication and interpersonal skills.

In general, there was broad consensus in favor of allowing greater flexibility in accessing fellowship funds than at present, allowing students to "bank" fellowship support for times when concentrated effort without assigned duties tied to support would be most beneficial. Universities could develop programs of "staged" support, from one or more sources, at critical "transitions" in the graduate career that proves most beneficial to student progress and surpassing the common periods of peril to student success – comprehensive exams, preparing a research prospectus, etc. The suggestion was made the fellowship support be broadly flexible, allowing full-time support at some periods, with relatively more admixtures of support – say 50% fellowship, 50% TA – at appropriate times during the graduate program.

There was support for the "cafeteria" model of fellowship support: an award of, say, $200,000 for a doctoral program, with flexibility for use of the funds by the student (although the need for guidance from an advisor or mentor seemed appropriate.) The "year 1 + year 5" model of support mentioned during another workshop session was one that several members of the group found particularly attractive. In particular, the year 1 support discussion was expanded to include newer models of admission (as the Harvard model of admission to a general "bioscience" category) in which students are supported in the first year to explore the different possibilities or "fits" between their developing professional interests and the opportunities provided by the array of research themes represented by individual faculty and interdisciplinary collaborations. Rotations during this early stage allow students to make a more informed decision about the critical issue of "fit" and choosing or identifying a mentor, which should benefit both faculty and students through the remainder of their graduate apprenticeship. Responsibility for support could rightly be placed more firmly on faculty through research grants once students had committed to an area of research. Models of first year support that provide

these sorts of "experiential discovery" by new graduate students included federal fellowship support and "pooled" support derived from individual faculty, departments, graduate schools and provosts. Testimonials were provided that the end result of "higher quality students" applying and enrolling in graduate programs were offered as a sufficient incentive – after a "pilot project" demonstrating this outcome – to assure that the system sustains itself.

Trickle-down Impacts

A third area of discussion centered on the unintended effects of stipend and support policies on other aspects of the graduate educational enterprise. A maxim generally subscribed to was that those with the greatest claim to institutional resources are programs, fields and individuals that have the least opportunity for support from agencies external to the university. For example, the arts and humanities, and to some extent the social sciences, enjoy meager possibilities for extramural support compared to science and engineering, and despite the unquestioned importance of S & E to the economic health of the country, the arts and humanities represent a less obvious value to the cultural heritage, structure, and stability of society. And many of the problems faced by the country – now and in the future – are not limited to science, but have important challenges relating to social sciences and humanities. To the extent that S & E science policy requires re-allocation of institutional resources to supplement the funds provided by funding agencies, there will be a corresponding impact upon – and likely weakening of – other areas of graduate study. Universities much face this challenge openly and devise strategies that make sense in terms of preserving the strength of the entire enterprise of U.S. graduate education.

Diversity and Quality

The breakout session followed immediately upon Professor Freeman's presentation on economic perspectives of graduate and postdoctoral support. One aspect of his presentation was that most economic models and recommendations for support yielded much greater impact upon quantity than on quality of outcomes of graduate education. This augmented points made in earlier workshop sessions concerning the "trade off" between numbers of fellowships and levels of support, and the relationship between these and quantity and quality (a larger number fellowships linearly increases quantity, but may lower quality; higher stipends will likely mean fewer fellowships and a decrease in quantity, but is projected to lead to only a marginal or negligible increase in quality.) However, the inherent value of any national fellowship, and especially the imprimatur of an NSF GRF, is significant, and can be an important factor in influencing admissions decisions, especially for students who may not present "traditional" indicators of success (e.g., GRE scores, UG GPA) that faculty admissions committees normally expect as markers of quality. It would be a rare admissions committee, indeed, that would turn down an NSF Fellow for admission, since an NSF GRF is a widely accepted indicator of quality and potential for success in graduate studies. Similar arguments apply to other national fellowships, such as NIH NRSA fellowships, as well as to postdoctoral fellowships. If the number of such fellowships were substantially increased, and selection committees sufficiently educated as to the value of non-traditional indicators of success, a

greater number of minority and other underrepresented students would likely be awarded fellowships, which could significantly increase the number of students from underrepresented groups in STEM graduate programs.

The group was informed of one university that uses enrollment of underrepresented students in graduate programs as one indicator of quality in constructing quality indices. The indices are used, in turn, as the basis for allocation of graduate school funds to graduate programs. Not only does this indicate that success in promoting access and diversity has a direct link to funding, but it also sends the message that diversity is looked at as one aspect of quality, and that diversity, like any other aspect of quality, is valued by the institution.

Institutional Commitment

Finally, one participant made the point that the university administration must understand and provide mechanisms for addressing issues relating to stipends and funding for graduate students and postdoctoral researchers. The example provided was a commitment from the Provost of a "line of credit" to the graduate school to address year-to-year issues relating to stipends and graduate student support, with an understanding that budgets had to be balanced over a five-year period. Thus, if supplemental funding were required to maintain the stipend of students with NSF GRF awards in any particular year, the graduate school could draw against the line of credit to fund the supplement, without creating a negative impact upon other programs requiring funding from the graduate school.