

Promoting Undergraduate Research: Institutional Support Mechanisms

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Undergraduate students have been involved in original research for generations, dating at least to the middle of the 19th century when Yale, Williams, and Johns Hopkins began using scientific laboratories and the prospect of discovery to recruit and engage students. But institutional efforts to integrate independent scholarly work into the undergraduate experience are a relatively new phenomenon—with notable exceptions such as the College of Wooster's fifty year old Independent Study program. The founding of the Council on Undergraduate Research in 1978, the first National Conference on Undergraduate Research in 1987, and the publication of the Boyer Commission Report on Reinventing Undergraduate Education in 1998 served as benchmarks in the growing awareness that undergraduate education is enriched by original inquiry and collaborative work with members of an academic faculty.

At the individual or departmental level, faculty members develop and conduct meaningful undergraduate scholarly experiences regardless of what is happening across campus, but organizational theory suggests that an alignment of goals and resources within a university is essential to purposeful development. If a college or university wants to support and increase student research, several components of the institutional structure can be configured to support student research. This chapter presents a survey of campus-level mechanisms that support student research at various colleges and universities in the United States.

The Broader Research Enterprise

Student research often flows from the scholarly work of faculty, and an active faculty culture of scholarship is a powerful building block for student research. Thus, the mechanisms that support faculty scholarship are important to student research as well. For example, offices of sponsored programs and research (grants offices) aid faculty in the pursuit of extramural funding to support research. Faculty members who have just completed doctoral programs

at research intensive universities sometimes bring an expectation that undergraduate students are not prepared to work on high level research, and therefore do not consider this option. Grants offices can often introduce the idea of student participation in research. Funding agencies understand that undergraduate students—properly prepared—can make significant contributions to research programs while developing their own capacities for engaging in independent scholarship. Two critical issues for research proposals that include undergraduate students are to have reasonable effort expectations (students have classes and other activities competing for their time) and to have specific activities described so that reviewers will be able to assess the reasonableness of the plan.

Grants offices can also support student research by steering faculty toward specific funding opportunities designed for smaller programs or that support student research. For example, the National Institutes of Health have a cross cutting AREA program (Academic Research Enhancement Award) that is intended “to stimulate research in educational institutions that ... have not been major recipients of NIH support” (<http://grants.nih.gov/grants/guide/pa-files/PA-06-042.html>). Likewise, the National Science Foundation (NSF) has a cross cutting RUI Program (Research in Undergraduate Institutions) that provides support for researchers at primarily undergraduate institutions (those awarding fewer than 10 PhD or DSC degrees per year). The RUI program funds specific research proposals, shared use equipment acquisition, and collaboration with NSF funded researchers at other institutions. NSF also has a Research Experience for Undergraduate program (REU) that supports faculty-student collaborative summer research programs.

Other funding programs also support undergraduate research, such as the NCUR/Lancy Program (ncur.org/lancy.htm), the Howard Hughes Medical Institute (www.hhmi.org/grants/institutions), and the U.S. Department of Education McNair Scholars Program which prepares undergraduates for future doctoral study.

Some sponsored programs offices also support departmental efforts to build grant-seeking skills among students through activities such as presenting mini-workshops to class sections, where the process and principles of grantwriting can be covered. While these efforts at outreach will rarely lead to new extramural funding for the institution, they can be an important part of departmental efforts to build research skills among undergraduate students.

Institutional Review Boards are a second administrative function fundamental to the research enterprise. Known as IRBs, these committees are formed to ensure the protection of human research subjects. Research protocols that gather data from or about living people must be approved by an IRB, whether the research is conducted by faculty or students. This means that students—particularly those in psychology, exercise science, and sociology—frequently encounter IRBs if they are conducting research.

As with any regulatory body, IRBs can improve interaction with their constituencies through effective outreach and education. This includes informing the campus about policies (what types of projects need review), conducting information sessions that prepare investigators for submitting protocols to the IRB, and explaining the review process. These outreach efforts should target students as well as faculty, including speaking to class sections where appropriate. In response to federal policy, many campuses are requiring investigators to undergo training before conducting human subjects research, which challenges IRBs to determine when and how to conduct training for student researchers. The training should not be onerous, but still provide the researcher with knowledge and a framework for protecting research subjects.

A final element of aligning IRBs with student research is to include a student on the board. This provides the student with direct experience in reviewing protocols, as well as access to the committee discussion and related policy issues. A collateral benefit is that other board members come to understand the student perspective. As with sponsored programs, IRBs are created to support faculty research but they can also be an important and positive part of a culture that develops young researchers at the undergraduate level.

Many institutions of varying sizes are home to research centers that provide a vehicle for interdisciplinary research. Examples include the Center for Environmental Affairs at Middlebury and the Materials Science Center at the University of Wisconsin - Eau Claire. While such centers are typically organized to facilitate faculty research, they

offer a good opportunity for engaging undergraduates in interdisciplinary research.

Student Research Mechanisms

Colleges and universities have a range of mechanisms dedicated specifically to undergraduate scholarly activity. Administratively, the models vary from a committee—such as the Undergraduate Research Council at the University of Nebraska at Kearney—to an administrative position such as the Associate Dean for Undergraduate Research at Middlebury College. Some institutions create a position to direct an office of undergraduate research, while others incorporate undergraduate research into the portfolio of an existing dean.

In each case, the intention is to make student research a part of the institution's undergraduate experience by dedicating a position to developing opportunities for students to engage in original scholarly activity. The most appropriate model for a particular institution depends on the responsibilities and resources that will be invested: How much personnel time is to be dedicated? Is this a strategic position, or an administrative support office? What functions will be performed by the committee or office? Campus level programs range from the free to the expensive. Some examples are offered below.

Student Research Celebrations

One of the best ways to encourage student scholarly activity is to celebrate and recognize the good work that is being done across campus. An annual event can be as easy as setting up a large room with tables or easels. This type of forum allows students who conducted original work—from high profile programs to off-the-radar collaborations with faculty—to present their work on research posters like those displayed at professional scientific meetings. Except for poster printing, this can be a very low cost event. Institutions can enhance the event with prizes for the best posters, a luncheon for presenters and their mentors, and concurrent sessions for oral presentations and fine arts performances. Some institutions cancel classes to boost attendance.

Undergraduate Research Journals

A second mechanism for celebrating student research is to publish a journal of student papers. Such publications are often open to all disciplines, and submissions are reviewed by faculty members. Once accepted, a faculty or student editor may proof the copy, and then on-campus or for-profit printers can print and bind the journal. These publications

become effective marketing items that can be sent to on-campus and off-campus constituencies.

Student Research Grants

While many institutions provide internal support for faculty research through competitive grants, a second channel for undergraduates to apply for small grants is increasingly common. Students receive operating support for their projects, as well as the experience of developing a competitive proposal. Funds can cover lab supplies, survey materials and postage, travel, and other costs associated with project implementation. Students receiving grants can be required to present their work at student research celebrations to ensure dissemination.

Research Interns and Fellows

To engage lower division students in research as soon as possible, some institutions offer stipends on a competitive basis to students who participate in research programs. At the University of Wisconsin – Eau Claire, *research apprentices* receive a small stipend to work alongside upper division student researchers. This provides exposure to the culture, expectations, and excitement of research, which helps prepare students for taking on their own research as they develop. At Utah State University, incoming freshman can be awarded *research fellowships* which carry a stipend and an opportunity to work closely with faculty on research projects.

Summer Research Programs

The NCUR/Lancy Initiative and other efforts to increase multidisciplinary student research have led to the development of Summer Undergraduate Research Experiences (SUREs) or Summer Student Research Programs (SSRPs). These programs differ from more traditional research grants by complementing faculty-student collaborative research with broader developmental activities. SUREs may involve 10-20 or more students each summer, forming a community of scholars who challenge and support each other. Stipends of \$3000 or more enable students to dedicate a significant portion of their time to research in the summer. Weekly meetings provide a forum for discussing cross-disciplinary issues like ethics, leadership, and graduate school, or more specific topics for students working together on an interdisciplinary project. Stipends for students and faculty, operating budgets, and travel money can make SUREs expensive, but they can also become the centerpiece of an institution's student research offerings.

Faculty Mentor Awards

As with any organizational objective, institutions must send appropriate signals to faculty about what is valued on campus. One way to do this is to give recognition to individuals who stand out as exceptional in certain areas. The University of New Mexico and the University of Nevada Reno are but two examples of institutions that give Undergraduate Research Faculty Mentor awards. Typically, winners are announced at annual student research celebrations, and may receive cash awards up to \$2000. Such awards express to the faculty that the long hours they invest in student scholars are noticed and appreciated by the institution.

Institutional Commitment

While many of the institutional programs that support undergraduate research and scholarship are low cost, others can be very expensive. Examples include summer multidisciplinary research programs (stipends for 10 students alone can top \$30,000) and sending students to NCUR (\$600 or more per student). In times of declining state funding, expenditures at this level can be difficult to support. The University of Nebraska at Kearney developed permanent support for a summer undergraduate research program during a system-wide prioritization process. Students also approved a student fee that includes up to \$70,000 per year to support activities such as student dissemination of scholarly works. At the University of Wisconsin Eau Claire, the UW Board of Regents established The Center of Excellence for Faculty and Undergraduate Student Research Collaboration in 1988. A differential tuition measure directs over \$1 million to enhance student experiences, including faculty-student collaborative research and scholarly activity.

Undergraduates have been involved in independent inquiry since perhaps the beginnings of higher education. Four year colleges and comprehensive universities have found that in a tightening market of higher education, they can define a competitive niche by becoming particularly good at offering undergraduate students opportunities to apply their knowledge and develop academic skills through independent scholarly activities. The activities described above appear in different forms at institutions around the country, and can be adapted in whole or in part at colleges and universities seeking to enrich their climate of student research and scholarly activity.