

Undergraduate Research as Faculty Development

Overview

Undergraduate research at Bridgewater State University (BSU) developed from individual efforts to an institutional initiative in 2000 with the creation of a comprehensive undergraduate research program that grew out of both faculty and administrative leadership—the Adrian Tinsley Program for Undergraduate Research (ATP). In 2006 the university created the Office of Undergraduate Research, adding a full-time administrator, office space, and clerical support. The intention was to take the undergraduate-research movement from a program focused primarily on summer research grants to one that would leverage institutional change through collaboration with other departments and long-term continuity in administrative leadership.

Ten years later, undergraduate research has become not only part of the cultural fabric of BSU, but the loom itself, weaving the patterns of faculty development and student growth into the broader cloth of student—and faculty—retention, success, and intellectual community. The original leadership consisted of a five-member faculty board. Today one in 10 faculty members serves on the Undergraduate Research Advisory Board, and, since 2000, over half of our faculty members have mentored individual student research projects. This article analyzes this powerful institutional transformation.

It is important to note that undergraduate research at BSU looks different than programs at similarly sized institutions on two very fundamental levels. First, when the program began in 2000, it was modestly funded with institutional and foundation support, and with the clear stipulation that it be available to students and faculty members in any discipline on campus. This led to complicated discussions of the very nature of scholarship in a wide range of disciplines—where that research took place, what equipment it needed, how it received funds, and what “counted” as scholarship across the university. The result was a program that yielded high participation from the beginning from faculty members and students in the natural sciences, social sciences, humanities, and fine arts.

Second, at BSU the student, and not the faculty mentor, applies for funding from the undergraduate research program, whether for semester research expenses, summer research projects, or travel to conferences. Thus, the project, however connected

to a faculty member’s research agenda, is the student’s project. That student-centered focus paradoxically furthered the function of undergraduate research as faculty development by placing the focus on helping faculty members teach research skills throughout the curriculum.

Undergraduate research has long been valued for its benefits for faculty research productivity and in student retention and success. At BSU, we have realized additional benefits. For us it has been a powerful tool for faculty recruitment and satisfaction, as the experience of mentoring crosses disciplinary boundaries and creates communities of faculty around mentorship and student development. These organic communities, while partly dedicated to research, are really vehicles for faculty members to achieve intellectual fulfillment through their students, their teaching, and through the many different kinds of mentoring that go into the project of undergraduate research.

This is no small feat: Faculty members come to BSU, a public master’s-level comprehensive institution with a teaching mission, from graduate programs that validate discipline-based scholarship, a mode of professional activity that infuses excitement into teaching, but that also pulls faculty members away from the teaching itself. Undergraduate research provides a hybrid mode of professional activity that blends the scholar’s need for intellectual engagement with the institutional reality of a bracing teaching and advising schedule. It validates both the rigor of scholarship and the institutional and individual benefits of widespread student success.

Participation in undergraduate research has also provided an unusual school for faculty leadership development. Many of the faculty members involved in mentoring students here have moved into other leadership roles (for instance, three of the four contributing authors moved into other administrative and faculty leadership roles through engagement in undergraduate research as faculty members). The experience of speaking with colleagues across disciplines—and learning enough about their scholarship, their disciplines, and their curricula to assess their students’ applications for research grants—have provided a grounding in collaboration and institutional operations that prepares people for broader responsibilities and encourages an

interest in pursuing them. Placing student success at the center of faculty development engenders a highly charged and effective energy directed toward institutional change.

The three examples of change below highlight the role of undergraduate research in creating a community of shared values that drive and sustain institutional change in providing the foundations for first- and second-year students to conduct research; in how Writing Across the Curriculum (WAC) has joined with the Office of Undergraduate Research to change pedagogy; and in the ways particular departments' cultures and curricula were transformed. The examples demonstrate how undergraduate research, when understood as a student-centered process, can catalyze widespread, disparate, and broadly shared interests in faculty development, as well as drive changes throughout the curriculum and the institutional culture.

Horses Before Carts: The Midyear Symposium and Faculty Development

By fall 2006, the undergraduate research program (ATP) had been funding student research on campus for six years. During that time, those of us who coordinated the program came to realize a challenging truth. For our students, understanding what research could mean for their current college experience and their post-graduation lives often came too late for them to participate in the program in any meaningful way. We determined that in order to increase the pool of exceptional researchers among our juniors and seniors, we needed to begin developing students as researchers in their first and second years of college.

Our answer to this problem was an event celebrating freshman and sophomore success: the "Midyear Symposium for First & Second Year Students" (MYS). We already celebrated advanced student research, typically by juniors and seniors, at the end of the spring semester during our Undergraduate Research Symposium. The midyear symposium offered a venue for first- and second-year students to display their scholarship at the end of the fall semester.

This took advantage of a major recent institutional change: Just a year earlier, the university had adopted a new core curriculum with two new seminars focusing on writing and speaking skills, as well as two first-year writing courses, the second one focused on research. Seeing the opportunity to drive undergraduate research through the core, the undergraduate

research office partnered with the faculty coordinators of the seminar courses, the First Year Writing program, and the Honors program, and encouraged students in these courses to apply.

In the first year of the midyear event, 76 students presented work, high participation for a new and untested forum. Even so, it became clear that, unlike at a professional or even advanced undergraduate conference, first- and second-year students seldom had developed the skills to be good presenters. Greater participation in research by freshmen and sophomores required that faculty members develop research experiences appropriate to new researchers and embed them within coursework for these students.

Not all faculty members thought this was possible or even desirable. However, the coordinators for the core-curriculum seminars, First Year Writing, and the Writing Across the Curriculum initiative came together to offer purposeful faculty development that asked faculty members to rethink coursework in a more student-centered and research-focused manner. We asked them to incorporate early in a student's coursework the model of undergraduate research as it had come to be understood at BSU.

BSU already had major faculty-development programming during the academic year, and the undergraduate-research office became part of those events, offering workshops focused on how to break down the relevant methodologies of a discipline, create modest assignments appropriate to new students, and prepare students to make presentations at the end of the semester. This spread to further collaborative programming during the semester and into the summer, including the collaboration with the Writing Across the Curriculum program.

In the second year of the midyear event, more than 200 students presented; in the third year, more than 400; and at the most recent MYS in December 2009, more than 500 first- and second-year students presented their research. We understood going into this event the effect it would have on individual students, but we could not have predicted the effects on faculty members and on first- and second-year courses.

Each year, faculty members who attend the midyear event take notice of what their colleagues are doing, what students are producing, and how a culminating event such as the MYS can give shape and joy to a semester of modest research and students' introduction to the research methodology of various disciplines. Each year more and more faculty seek out the



Faculty and ATP-funded summer researchers introduce incoming STEM students to research in the lab. L to R: Senior Joshua Weaver, Senior Miichel Darazi, incoming first-year students Alex Barbeau and Lacey Vasconcelos, and Edward Brush, Professor of Chemistry.

faculty-development opportunities we have created around the MYS. The innovation was almost accidental: We created an event first, built faculty interest around that event, and used that interest to drive faculty development around undergraduate research to a previously unfathomable, but highly successful, scale.

Since the MYS has been running, participation on the other end of the undergraduate research spectrum—the one-on-one mentored research that is funded through the ATP Summer Research Grants—also has increased significantly. In 2006 the program successfully funded 19 student researchers for 10 weeks of summer work, although we had funding for 25. In 2010 we funded 35 students out of an applicant pool of 54. Increasing quality and participation in the summer program was our primary goal in creating the MYS, and we have been successful. We have increased student participation in not only the summer-grant program, but in our other student research-grant programs as well. This has happened both because research is put on students' agendas early, and because the MYS gets student research into faculty members' course development early on.

Writing Across the Curriculum and Undergraduate Research

An unexpected collaboration between our Writing Across the Curriculum (WAC) and Undergraduate Research programs—not often closely aligned—has also pushed faculty development in directions both unpredictable and highly fruitful for each. For scholars of composition and rhetoric, the research paper is one of the more contested sites of college writing instruction. Bruce Ballenger (1999) has argued that the research paper

is the least theorized of all academic genres. He argued that too many faculty members assign research papers that are research-driven (rather than inquiry-driven), rely heavily on secondary sources (rather than on primary research), and demand that students write in the genre of the “student research paper” (rather than invite students to write in a genre that fits their rhetorical purpose).

Students often respond to this assignment by “patchwriting”—piecing together material closely paraphrased from text-based sources (Howard, 1993). Faculty then often respond to student research papers by focusing exclusively on the citation format, which Ballenger has likened to the “grammar of the research paper” — as well as watching for signs of plagiarism (personal correspondence, August 25, 2009). Often finding citation problems as well as plagiarized text, instructors assume that students need more practice in writing research papers, and the cycle begins anew. This empty writing process denies students the experience of using writing as a means of inquiry and using research as a means for answering real questions, experiences that are key to scholarly endeavors and identity.

Early conversations between personnel involved in Writing Across the Curriculum and the Office of Undergraduate Research at BSU made clear that issues encountered in writing programs were similar to those faced in other disciplines, and often prevent faculty from achieving the critical goal of integrating opportunities for student research into curricula. We also realized how closely aligned the two programs were in mission and philosophy. Begun in the early '70s, WAC aims to infuse writing in courses across the disciplines as both a mode of learning and an end in itself (Bazerman and Russell, 2005). Susan McLeod (1992) lists assumptions foundational to WAC:

[T]hat writing and thinking are closely allied, that learning to write well involves learning particular discourse conventions. ... WAC assumes that students learn better in an active rather than a passive (lecture) mode, that learning is not only solitary but also a collaborative social phenomenon, that writing improves when critiqued by peers and then rewritten. Faculty must see these as important and useful ways of teaching before they will institute them in their own classrooms.

Many of these assumptions are also foundational to undergraduate research. WAC and undergraduate research are thus perfectly poised to combine efforts for integrating inquiry-driven writing across general education and major curricula.

In WAC, the major vehicle for faculty development is the faculty workshop. The first workshop jointly sponsored by WAC and the Office of Undergraduate Research focused on the design of writing assignments and led faculty through a series of activities focused on integrating student research and writing into scaffolded assignments, “chunking” large writing projects into smaller assignments that are spread throughout the semester. Another workshop focused on approaches for incorporating undergraduate-research-sponsored student presentation and publication venues into a course’s design. We also led a series of informal workshops that invited faculty to share curricula that joined student research and writing, as well as share the challenges they experienced in implementing such curricula. In our most successful venture, we organized a full-day workshop entitled “Writing to Inquire,” led by Bruce Ballenger, in which more than 45 faculty members met in late summer to explore approaches for building student inquiry into course design—and so further the curricular underpinnings of undergraduate research.

These joint ventures have led to innovative pedagogies in courses across the curriculum. Many faculty members now ask students to write a proposal for one of the campus undergraduate-research conferences as an initial course assignment, a proposal that spurs an inquiry-driven project as well as leads to a conference presentation. Many other faculty members now embed student inquiry into their courses, with the goal of a final project submitted to *The Undergraduate Review* (a BSU journal of undergraduate research writing) or a student-research conference. Many others enrich curricula with low-stakes, inquiry-driven activities, such as observation journals, interviews, research logs, dialectical journals, and evaluation of secondary sources. Departments have asked themselves what they want their seniors to be able to do in terms of both research and writing by graduation, and then have worked backward, integrating inquiry and writing into key courses across the majors.

The collaborations between Writing across the Curriculum and the Office of Undergraduate Research have allowed us to reach more faculty across campus, better integrating student research into the fabric of the institution. By joining resources and missions, WAC and undergraduate research have energized the ways that student research is conceptualized, assigned, and performed in curricula and faculty development generally across campus.

Chemistry and Biology: Cultural Change

The beginning of ATP in 2000 also inaugurated a decade of changed student and faculty culture for many of the STEM (science, technology, engineering, and mathematics) disciplines at BSU. For example, since 2000 more than 70 students in biology and chemistry applied for and received competitive summer-research grants. Many of these students have chosen to continue their research during the academic year and have played a critical role in *recruiting new students to begin research projects*. As a result of this unexpected outcome of our summer-research program, a need arose to better integrate research-training opportunities into our chemistry and biology curricula.

Departmental program reviews led to curricula that introduce guided-inquiry pedagogy in lecture and laboratory courses. Students are presented with open-ended problems and are asked to use individual and small-group initiatives to determine appropriate techniques and methods that allow for problem-solving, hypothesis-testing, and evidence-gathering. The chemistry department developed a new course, Introduction to Science Research, to familiarize freshmen and sophomores with the basic skills needed to propose and carry out a research project, and to encourage early involvement in research.

The biology department introduced the Friday Informal Seminar Hour (FISH), which provides a relaxed, non-threatening environment for undergraduates and faculty members from multiple disciplines to talk about their research and brainstorm about problems, gaining insights from other students. The students who participate graduate with a better understanding of science, a shared appreciation of the excitement inherent in scientific investigation, and a deeper sense of science’s power and limitations.

The impact on students’ professional development and career paths is evidenced by the dramatic increase in the number of biology and chemistry majors accepted into graduate and professional schools. This is a direct result of institutional and departmental priorities that focus on undergraduate research, and of the curriculum changes that grow out of such priorities.

Fueling this transformation have been generational turnover and departmental expansions by the biology and chemistry faculty. Job descriptions now include mentorship and undergraduate research as departmental expectations. Furthermore, the prospect of starting one’s career at an institution that values and supports undergraduate research has attracted faculty who

share a strong commitment to engaging students in collaborative research programs. The impact of undergraduate research on faculty leadership development has been significant. Ten STEM faculty members have served as ATP coordinators and/or advisory board members prior to undertaking broader responsibilities as department chairs and coordinators of other campus programs.

The institutional investment in undergraduate research is also beginning to have an impact on the culture of faculty grant-writing success. This is a critical component of STEM faculty development in academia, as this grant-writing expertise helps to ensure continuing research opportunities and access to state-of-the-art instrumentation. Biology and chemistry faculty have been principal investigators or co-principal investigators on major grants funded by the NCUR/Lancy Foundation, NSF, NIH, and the Research Corporation.

The growth of faculty and student research at BSU comes with strong administrative support for faculty development through increased funding for conference travel, cost-sharing on grants, start-up research funds for new faculty, and the upgrade and/or replacement of outdated equipment and instrumentation. Beginning in fall 2009, the Center for Sustainability began faculty-development opportunities in support of summer and semester sustainability-research projects, inaugurating a new period focusing on student and faculty collaborations from across the academic disciplines to work on sustainability initiatives.

In a relatively short period of time, a model of STEM faculty scholarship has evolved at BSU, defined by engaging students in high quality and transformative research-training opportunities based on intensive student-faculty collaboration. The result is students graduating with the confidence and abilities to take leadership roles in graduate and professional schools, technical jobs, and teaching careers.

Conclusion

Undergraduate research has been successful in higher education for decades, in large part defined as students taking part in faculty members' research; the students benefit tremendously, but the primary focus is the quality of the research itself. At Bridgewater, we have instead emphasized student transformation and faculty development, rather than discipline-based accomplishments for students and faculty. These are not mutually exclusive, but rather a matter of balance.

By focusing our efforts and resources on student learning, we may sacrifice some of the research attainment of faculty members who could produce more on their own than they can as mentors, even in the natural sciences where students really can take part in faculty scholarship. Rather, we gain a community of faculty members dedicated to student success—thus tying their intellectual energies to this most significant purpose of public higher education. That makes good collegiate citizens of us all.

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