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Chapter 4

The Benefits of Undergraduate Research, Scholarship, and Creative Activity

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Impacting Key Stakeholders

The involvement of undergraduate students in collaborative research, scholarship, and creative activity with faculty members is a proven and powerful practice in view of the many educational benefits gained by students, the professional rewards accorded to faculty mentors, and the contributions provided to the wider research community. Undergraduate research[3] has gained further national prominence as an effective educational strategy given the changing demographics of our students, the expanding scope of institutions providing undergraduate education, and the enhanced appreciation for active-learning strategies (Carroll, 2005). Indeed, undergraduate research impacts all key stakeholders of higher education: students, faculty, two-year and four-year institutions, graduate and professional institutions, business and corporate associates, and non-profit community partners.

Defining Undergraduate Research, Scholarship, and Creative Activity

The process of establishing and strengthening departmental and institutional programs is facilitated by having a shared understanding of undergraduate research. Several definitions of undergraduate research have been proposed and are variously used, both informally and formally, throughout academe. A generally accepted definition and one that has been adopted by the Council on Undergraduate Research (CUR) is: "*Undergraduate research [scholarship, and creative activity] is an inquiry or investigation conducted by an undergraduate in collaboration with a faculty mentor that makes an original intellectual or creative contribution to the discipline*" (Wenzel, 1997). This definition encompasses all modes of research from both disciplinary and interdisciplinary fields, recognizes and employs a "teacher-scholar model" for participating faculty members, and ensures that both students and faculty mentors have a vested interest in the research experience.

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[1] 2008-2009 CUR President
[2] 2007-2008 CUR President
[3] While we prefer to use the all-encompassing phrase "undergraduate research, scholarship, and creative activity" to be inclusive of all disciplines, we will often use the more succinct term "undergraduate research" to capture all forms of scholarship and creative endeavor in a concise manner.

To expand on the definition above, all forms of undergraduate research, scholarship, and creative activity are characterized by four unifying features: mentorship, originality, acceptability, and dissemination.[4]

Mentorship. Mentorship involves a serious, collaborative interaction between the faculty mentor and the student, in which the student is intellectually engaged in the scholarly problem or project. The faculty mentor guides the student into deeper intellectual engagement over the course of their collaboration. The faculty mentor's attention is equally focused on the student's development and on the results or product of the scholarly or creative project.

Originality. The student needs to make a meaningful and authentic contribution to the scholarly problem or project, and the work must be entirely or partially novel. In the end, the problem or project may reveal more questions than answers; given the nature of the research enterprise, this is an acceptable outcome of the student's experience.

Acceptability. The student's work should employ techniques and methodologies that are both appropriate and recognized by the discipline. The scholarly problem or project must also include a reflective and synthetic component that is appropriate to the discipline.

Dissemination. The project must include a final tangible product for which both the process and results are peer-reviewed, critiqued, juried, or judged in a manner consistent with disciplinary standards.

Benefiting Students

A body of knowledge has been amassed in recent years that clearly indicates that engaged forms of learning, including involvement in research, are transformational experiences for undergraduate students (e.g., AAC&U, 2002, 2007; Hathaway, 2002; Hunter, *et al.*, 2006; Kardash, 2000; Sharp, *et al.*, 2000; Ishiyama, 2002; Kuh, *et al.*, 2005, 2007a; Lopatto, 2006; Russell, 2006; Summers, Hrabowski, 2006; Seymour, *et al.*, 2004). Such experiences, occurring within the curricular and/or co-curricular arenas, are almost always characterized by serious student involvement and regular student-mentor interactions (Astin, 1993; Barr, Tagg, 1995; Pascarella, Terenzini, 1991; Malachowski, 1996, 2006; Kuh, *et al.*, 2005).

As expected, such engagement also yields an array of greater educational outcomes in comparison with those of students who do not participate in these experiences. These gains are related to cognitive and intellectual growth, professional growth and advancement, and personal growth. Examples of specific gains attributed to the participation in undergraduate research are noted below. Faculty and institutions may find this list helpful in generating initial interest among students who may not understand the value of such an experiential endeavor, particularly students from groups traditionally underrepresented in undergraduate research. The list may also be used to align undergraduate research with learning outcomes (see Chapter 3).

Advancing Cognitive and Intellectual Growth

The benefits with regard to cognitive and intellectual growth are particularly rich and in many cases are demonstrated by metrics that institutions and departments track. They fall into two main categories outlined below:

[4] These features were identified in personal communication with Michael Nelson, 2001-02 CUR President.

Gains in knowledge and skills. Measured by performance on traditional evaluations (exams, quizzes, papers, reports, etc.) and demonstrated by self-reported improvements in intellectual and practical skills, benefits in this category include the following:

- Greater gains in mastering both content and contextual knowledge
- Enhanced ability to put classroom knowledge into practice
- Increased creativity and critical thinking
- Enhanced problem-solving skills
- Enhanced communication skills, both oral and written
- Enhanced technical skills within the discipline
- Greater understanding of the intersections of disciplines

Academic achievement and educational attainment. Measured by grade point averages, persistence, and pursuit of advanced degrees, benefits in this category include the following:

- Higher retention rates
- Greater increases in course grades
- Greater persistence in the major
- Higher graduation rates
- Higher rates of acceptance into and enrollment in post-baccalaureate education (graduate/professional schools)

Students participating in undergraduate research also experience cognitive and intellectual growth in ways that are not as readily demonstrated but are likely correlated to those benefits listed above. Two include the following:

- Increased connection to the major department and the institution
- Greater participation in intellectual activities within the discipline and the intellectual life of the campus

Fostering Professional Growth and Advancement

The benefits with regard to professional growth and advancement are commonly acknowledged by students pursuing undergraduate research. Relating primarily to career development, they include formulating career plans and acquiring the special skills and competencies needed in various career fields. Benefits include the following:

- Enhanced ability to work collaboratively with others in teams
- Stronger relationships with mentors and other professionals
- Deeper integration into the culture and profession of the discipline
- Enhanced ability to identify and make informed decisions about appropriate career interests
- Enhanced professional credentials
- Higher rates of acceptance into and enrollment in post-baccalaureate education (graduate/professional schools) and/or directly securing employment in the workforce

Promoting Personal Growth

Personal growth reflects non-cognitive (affective) behavior that leads to the examination and development of attitudes, values, aspirations, and beliefs. The benefits with regard to personal

growth are commonly acknowledged by students pursuing undergraduate research and include the following:

- Stimulation of curiosity
- Enhanced ability to learn independently
- Enhanced development of personal initiative
- Increased confidence
- Enhanced ability to understand the philosophy of lifelong learning
- Greater recognition by peers
- Enhanced opportunity to serve as an academic role model

Maximizing "High Impact" Learning Experiences

The educational gains from student engagement for those from traditionally underrepresented groups are even greater when compared to students from majority groups. From the outset of their matriculation into higher education, many minority, low-income, first-generation, and disabled students face an academic preparedness gap and lack role models in professional/academic disciplines. These factors make the transition to college more challenging and often lead to greater attrition rates (e.g., Seymour, Hewitt, 1997; Gandara, *et al*., 1998; Gandara, Maxwell-Jolly, 1999; Langley-Turnbaugh, *et al*., 2007). However, for underrepresented students, deep engagement in undergraduate research with a faculty mentor is positively correlated with improvement in student grades, first-year to second-year retention rates, persistence to graduation, and motivation to pursue and succeed in graduate school (e.g., Ishiyama, Hopkins, 2002; Barlow, Villarejo, 2004; National Research Council, 2003; Kuh, *et al*., 2007b).

Indeed, for all students, interactions with faculty members significantly affect an individual student's cognitive and behavioral development and directly impact student satisfaction and learning (Astin, 1993). Recent results of the National Survey of Student Engagement (Lipka, 2007) corroborate that participation in undergraduate research with a faculty mentor is a "high impact" learning experience. Additional studies verify that the collegial and collaborative partnership of undergraduate students and faculty members contributes significantly to the personal and professional gains reported by students as a result of their research experience (Seymour, 2004; Hunter, 2006). These results reinforce the importance of faculty and institutional dialogue on the need to increase student engagement and the use of transformational pedagogies and practices within the institutional culture.

Benefiting Faculty

The powerful student learning outcomes derived from participation in undergraduate research are often cited by faculty members as the most compelling reasons to provide such opportunities for students. Although high levels of student engagement and learning outcomes can occur through a range of curricular and/or co-curricular experiences, we would suggest that undergraduate research provides the most natural, and perhaps best, opportunity for faculty members to deeply engage students. First, the majority of faculty members come to their positions at colleges and universities with significant scholarly experience themselves (through their graduate education); very few new faculty members arrive with training in other avenues for student engagement such as student leadership development, study abroad mentoring, or internship coordination. Second, most faculty members are already engaged in some form of scholarly or creative work; this is a

key component of their academic lives and it is a requirement for reappointment, tenure, and promotion at many institutions. Moreover, as the demographics of the professoriate have changed in recent years, more faculty members are engaging undergraduates in research because they engaged in it themselves when they were undergraduates and found the experiences to be transformational (e.g., Russell, 2006).

Faculty members cite a multitude of reasons for their involvement in undergraduate research (Karukstis, 2003; Koch, 2000; Malachowski, 1996, 2006; Prince, 2007; Zydney, 2002). These motivations fall into broad and overlapping categories. Faculty and administrators may find the following lists helpful in generating interest in undergraduate research and convincing colleagues of the value of including undergraduate students in their scholarly and creative programs.

Enhancing Mentoring and Teaching

Many faculty members pursue research with undergraduate students in order to foster the high levels of engagement and the many student benefits noted above. They value the following opportunities:

- To mentor quality and engaged students
- To be an academic role model and influence the careers of undergraduate students
- To break down barriers between faculty members and students
- To directly integrate scholarship and teaching
- To improve classroom teaching
- To foster synergy between graduate and undergraduate programs

Achieving Research, Scholarly, and Creative Outcomes

Involving undergraduate students in scholarly activity can provide fresh insights to research questions. For many faculty members, particularly those at two- and four-year institutions, undergraduate students facilitate the pursuit of those research, scholarly, and creative endeavors that allow the faculty member to maintain his/her professional expertise, enthusiasm, and engagement. Undergraduates can indeed be considered "junior colleagues" and scholarly collaborators in the truest sense. These faculty members value the following opportunities:

- For intellectual invigoration
- To remain current in the discipline and field
- To establish collaborations, both interdisciplinary and/or disciplinary
- To produce results and advance a research program

Integrating Scholarship and Teaching

With the multiplicity of faculty roles that make it increasingly challenging to find time and resources for professional development, connections with undergraduate students serve as a vital reminder that teaching and research are not mutually exclusive enterprises, but rather are intrinsically intertwined. Indeed, many faculty members find that their research activity continually suggests new approaches and content for their courses.

Furthermore, it may be argued that to best serve as a role model for students and as a mentor for new faculty hires, faculty members must remain engaged as educators and contributors to the scholarship of their discipline. Developing and sustaining a vibrant research program involving

undergraduate students in research of high quality and productivity is an outstanding example of the integration of research and education.

Increasing Job Satisfaction and Personal Development
The pursuit of scholarly activities with undergraduate students brings faculty members some additional benefits that enhance satisfaction with their career and their personal development. These include the following:

- Opportunity to renew and reinvigorate enthusiasm for working with undergraduate students
- Intellectual stimulation and confidence associated with creative and critical thinking
- Excitement created by intellectual activity
- Opportunity to establish or re-invigorate a research, scholarly, or creative program
- Opportunity to promote and model lifelong learning to students and colleagues
- Internal and external recognition

Broadening the Impact and Benefits to the Faculty
Engaging underrepresented students in undergraduate research can benefit faculty members in additional specific ways. For example, the greater educational gains achieved by underrepresented students, as noted above, provide faculty members with immediate and powerful rewards for their mentoring efforts. Students from underrepresented groups also bring new and different perspectives and approaches to research questions, thereby providing opportunities to positively influence the direction of a scholarly or creative program. Furthermore, mentoring underrepresented students allows faculty members to foster connections with a wide range of campus offices, better integrating undergraduate research into the institutional culture.

Benefiting Institutions

In addition to citing the benefits to students and faculty mentors, advocates for undergraduate research, scholarship, and creative activity highlight the value that such endeavors bring to the campus and partnering institutions. Benefits extend far beyond anticipated outcomes, such as the national recognition received when results of student and faculty work are disseminated and the receipt of external funding when grant proposals are successful.

Building a Community of Scholars
A culture of undergraduate research that extends across an institution brings intellectual vibrancy to the campus and fosters an engaged community of scholars (teacher-scholars and student-scholars). Belonging to such an academic scholarly enterprise both on campus and across campuses is a key to student success and advancement (Nagda, *et al*., 1998; Alexander, *et al*., 2000; Hunter, *et al*., 2006) and a way for faculty members to remain engaged professionally and serve as role models of lifelong learners.

In addition, an intellectually stimulating and dynamic campus environment benefits those beyond the immediate group of faculty and student scholars by creating a strong legacy for the future. A community that provides a “pyramid of mentoring relationships” and a self-perpetuating social infrastructure is essential to successful recruitment and retention of underrepresented undergraduate students (Alexander, *et al*., 2000). Indeed, a collaborative scholarly and creative atmosphere attracts motivated students, talented and committed faculty and staff members, and

devoted trustees, all of whose involvement further advances the overall academic program of the institution.

Deepening Relationships with Alumni

Alumni with undergraduate research, scholarly, or creative experiences express significantly higher gains and satisfaction with their undergraduate years (Bauer, Bennett, 2003). For institutions, such perceived added value from participation in undergraduate research can lead to more involved alumni (Gaier, 2005). This involvement can be manifested in many ways, including the following:

- A greater presence on campus for alumni and institutional events
- More significant contributions of time in various activities, including admissions programs, professional and career-development offerings for undergraduate students, and advisory committees
- More substantial monetary contributions to institutional programs and funding drives
- Greater enthusiasm and motivation to promote the institution and raise its visibility

Fostering Innovation and Cross-Talk

Although an undergraduate research movement may start with one faculty member and one student, many different constituencies are needed to establish a campus-wide undergraduate research program. Successful institutional transformation requires contributions from an array of talented hands. The broader the involvement of faculty and staff members from across the institution, the more likely different perspectives and different assumptions will be brought together to enrich the discussion and encourage the exchange of ideas. Furthermore, an institutional commitment to undergraduate research will increase the opportunities for engagement of the campus in national discussions of trends in higher education and new research directions.

As undergraduate research is rooted in discovery, a strong institutional scholarly and creative culture fosters innovation and risk-taking beyond the research arena. Campuses with an appreciation for the passionate pursuit of undergraduate research will value and nurture new ideas, encourage innovation by dispelling fears of failing, and provide sufficient time for new ideas to incubate and transformative practices to take hold.

Sharing a Sense of Purpose and Achievement

Broad engagement in the pedagogy of collaborative undergraduate research, scholarship, and creative activity provides an institution with a unifying educational objective and a common sense of direction. Such a cohesive community and purpose creates a strong network of support and reinforces institutional progress. Students sense the importance and value of a particular pedagogical approach when it is applied in many different settings. A collective approach to student learning through undergraduate research can achieve numerous objectives:

- Generation of a strong voice to emphasize the importance of learning through discovery
- Provision of a multitude of ways to demonstrate and enhance creative thinking
- Emphasis of the importance of acquiring skills to work in diverse, multidisciplinary teams
- Demonstration that the skills of adaptability and effective leadership can be cultivated in students in a variety of disciplines

Recognition of the common objectives, benefits, and needs associated with undergraduate research can prompt the community to look for synergies and design a cohesive and consistent research program, rather than just a collection of independent research groups. With a successful and unifying undergraduate research program, an institution may enjoy an enhanced academic reputation, achieve external recognition, and attract external funding to support a wide array of new initiatives, such as academic programs, faculty and staff positions, equipment, and facilities.

Enriching an Institution's Curriculum

Many campuses have undertaken transformative efforts to infuse education with the excitement of research and discovery (Karukstis, Elgren, 2007). Research-supportive curricula are effective in engaging students and achieving many of the benefits noted above, including enhancing student learning and developing their reasoning, critical thinking and research skills early in their careers. Furthermore, by creating more dynamic learning environments that foster inquiry and discovery, research-supportive curricula strengthen the scholarly cultures on campuses.

Incorporating curricular elements and teaching-and-learning strategies that develop critical research skills into curricula requires departmental and often institutional consideration. This process can lead to a number of significant outcomes, including the following:

- Enhancement of interdisciplinary offerings stemming from research collaborations
- Collaborative curriculum development and reform as faculty members learn about effective elements of academic programs outside of their discipline
- Innovative approaches for creating time for scholarly activity through a thoughtful consideration and integration of teaching, research, and service responsibilities
- Thoughtful facility design and resource acquisition to promote a research-supportive curriculum and enhance an institutional research culture

Providing Opportunities to Engage with the Local Community

Community-based research—research developed and conducted in service of unmet community-identified needs—is an increasingly popular experiential opportunity for undergraduates that can have beneficial outcomes both inside and beyond institutional walls (Paul, 2003, 2008). Community stakeholders include not-for-profit community service and welfare organizations; local governmental agencies; local public and private schools, libraries, museums; faith-based organizations; small businesses owned and operated locally; neighborhood groups; and even individuals who reside in the region. Any one or even a combination of these stakeholders may serve as the focus for undergraduate civic engagement. Most importantly, the community is at the center of the research project, and the objective of the partnership among community representatives, faculty members, and students is community betterment and service (Paul, 2003).

The collaborative nature of community-based research ensures that all participants—each with different perspectives and complementary skills—contribute to and benefit from the experience (Nyden, 2003; Paul, 2003; Karukstis, 2005). Non-profit community organizations often are understaffed, have insufficient financial resources, or lack access to the skills and expertise necessary to conduct the critical research necessary to meet a particular need. In exchange for the desired technical assistance and resources, community partners contribute extensive professional and "life based" expertise and experience to the project (Paul, 2003). For faculty members, community-based research provides a connection to the local community and an opportunity to become involved and invested in the community in which they reside (Karukstis, 2005). New

research avenues, additional funding sources, and new outlets for publication and dissemination are often additional tangible outcomes. Furthermore, faculty members find a powerful active-learning experience often absent in traditional curricula. Students, too, see the practical value of their work and gain significant satisfaction from making a meaningful contribution to their community (Karukstis, 2005). Experiencing the human dimension of a research question can be a motivating force that brings deeper understanding of social issues (Nyden, 2003). The service and outreach components of community-based research not only provide tremendous personal rewards for faculty and student participants alike, but such efforts also enhance the visibility and image of the institution and improve "town-gown" relations.

Embracing Opportunities

The importance and nature of collaborative undergraduate research and mentoring at different types of institutions vary widely across the academy. Regardless of institutional type, however, there is tremendous value in fully engaging undergraduate students in this vital facet of their education. The benefits to students, faculty, institutions, and external stakeholders alike are numerous, and we hope this brief chapter helps to facilitate institutional dialogue, cultural change, and, of course, increased undergraduate participation in research, scholarship, and creative activity.

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