

Developing an Office for Undergraduate Research at Howard University

Introduction

Undergraduate research is defined as the inquiry or investigation conducted by an undergraduate that makes an original intellectual or creative contribution to the discipline (Silva *et al.*, 2004, www.cur.org). Such co-curricular activity has been found to be a valuable component of the integrated undergraduate academic experience. Several benefits of students' participation in undergraduate research include increased interest in a career in science, increased persistence in pursuit of an undergraduate degree, and increased levels of pursuit of graduate education (Lopatto, 2004; Bender, Ward, Wells, 1994). Because of this capacity to enhance the undergraduate experience, there exists a national need to increase the number and quality of research opportunities available to undergraduate students. This need is critical for African Americans and other traditionally underrepresented minorities and women, particularly in the STEM (Science, Technology, Engineering and Mathematics) disciplines. Recent evidence suggests that strategically developing undergraduate research experiences helps promote career pathways for members of underrepresented populations by increasing the retention rate of minority undergraduates and increasing the rate of graduate education in minority students (Lopatto, 2004).

Yet another benefit of undergraduate research includes enhanced skills that demonstrate the ability of the student to not only carry out research, but also acquire information and speak effectively (Lopatto, 2004). Acquiring these skills encourages faculty-student interaction, stimulates problem-solving skills and new scholarship, and prepares students to better adapt to workplace demands and to enter graduate study. Undergraduate research also breaks down divisions between students and teachers, and between academic disciplines by broadening the foundation to include interdisciplinary work (Halaby, 2001). Most of all, because students are working closely with faculty members, they have ongoing opportunities for regular advising, for substantive one-on-one mentoring and for inculcation of the ideas, practices and attitudes that are critical for a research career.

Many reports further suggest that the undergraduate research experience is an excellent indicator for subsequent success in graduate school, yet, at Howard University (HU), there existed no systematic

way of cataloging the efforts of undergraduate research experiences or for providing a core set of resources and enhancements to support undergraduate research. HU is a comprehensive, research-oriented, historically Black private university with particular emphasis on the provision of educational and experiential learning opportunities to underrepresented minorities, in particular, African Americans, to meet the workforce demands of a rapidly changing global community. This is accomplished through instruction and experiential learning. HU continues to uphold a strong commitment to enhancing undergraduate education and to increasing the number of African-American students and students from other underrepresented populations who complete the doctoral degree. Therefore, it stands to reason that the University should offer a comprehensive Program in Undergraduate Research (PUR).

Howard University, like many other research universities offers, many advantages to undergraduates such as access to numerous ultramodern laboratories and state-of-the-art facilities (Bender *et al.*, 1994). Further, modeling the successful undergraduate research programs of other peer institutions provides a platform of best practices for expanding the undergraduate research opportunities already available at Howard University, thus allowing for the establishment of an Office for Undergraduate Research to foster: 1) the growth of an infrastructure to supplement, enhance and support the faculty-student mentoring model and 2) the implementation of key developmental elements. In this article, we describe the overall development and implementation of a PUR at Howard University. Emphasis is placed on the use of the SWOT analysis to construct short and long term strategies, as well as specific program features aimed at enhancing the professional development of HU undergraduate students.

Methodology

The HU Office for Undergraduate Research was established in the fall of 2005. It has as its mission to promote, enhance and maintain undergraduate research activity at Howard University. The goals of the Office for Undergraduate Research are to 1) provide access to intramural undergraduate research opportunities, 2) track and evaluate undergraduate research activity and progress, and 3) infuse all aspects of

undergraduate research into general education and discipline-specific curriculum requirements. Initiation and implementation of the Office for Undergraduate Research was applied in two major phases (Figure 1).

Figure 1. Timeline of Howard University Office for Undergraduate Research – Year 1

Phase I				Phase II (ongoing)								
				Short Term Strategies				Long Term Strategies				
HU Undergraduate Advisory Board established				Evaluation strategies implemented				Evaluation implemented				
Office for Undergraduate Research (academic affairs) and established				Campus-wide campaign launched				Travel awards for Undergraduates				
				Technical workshop developed and implemented				Undergraduate research journal				
				Research activities held for students and mentors								
				Program on the Hill (undergraduate research) implemented				Undergraduate journal				
Aug '06	Nov '06	Feb '07	May '07	Aug '06	Nov '06	Feb '07	May '07	Aug '06	Nov '06	Feb '07	May '07	Aug '07

In order to initially determine the short and long term strategies, a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis was performed. Characteristically used for businesses and corporations, the SWOT analysis can be applied to the academy, as well, in an effort to assess the current resources available at an institution in light of the goals to be achieved. In the SWOT analysis, strengths and weaknesses of the institution comprise factors that are intrinsic to the institution while opportunities and threats focus on factors that are external to the institution. Thus, the SWOT analysis can be used to not only categorize the goals and objectives of a Program in Undergraduate Research, but also assess the institution's capacity to meet those goals and objectives given its resources.

In conducting our SWOT analysis, several strengths were noted. These included access to a cadre of talented, underrepresented minority students, a commitment to research excellence, a plethora of externally-funded research programs that featured undergraduate research and an administrative commitment to developing an all-inclusive program in undergraduate research for the campus. Weaknesses that were of particular note included a high mentee:mentor ratio and paucity of support for faculty mentors in terms of dedicated research staff such as postdoctoral fellows and senior laboratory technicians.

External factors that contributed to the development of goals and objectives included opportunities to enhance the quality and competitiveness of Howard University graduates who could ultimately matriculate into graduate programs and the opportunity to serve as a model institution for others who desire to implement similar programs in undergraduate research. The greatest threat was perceived to be

reduced national emphasis on undergraduate research and a concomitant decrease in the availability of external funding streams.

Based on this analysis, short and long term strategies were developed to best utilize the institution's strengths to maximize its opportunities in addressing the national need of engaging underrepresented minority students in undergraduate research. To further classify these strategies, they were systematically divided into two phases (Phase I and Phase II) based upon our ability to meet particular goals and objectives within an actual and projected time frame.

Therefore, Phase I was comprised of all short-term strategies. The accomplishment of these activities was deemed feasible within the first year. These strategies included, but were not limited to: implementation of evaluation strategies to extract baseline data, launching a campus wide campaign, development and delivery of technical workshops and implementation of a campus wide research symposium to highlight the achievements of undergraduates. Phase two, on the other hand, is ongoing and primarily encompasses implementation of evaluation methodologies, provision of travel and research awards for undergraduates and development of an undergraduate research journal.

Organizational Structure

The Office for Undergraduate Research has been in existence for approximately one year. Its evolution stems from the shared mission of the Office of the Vice Provost for Research and Office of the Dean of the Graduate School, which recognize not only the overall benefit of engaging the entire campus in higher order thinking activities, but also the advantages of preparing highly competitive undergraduate students who later become successful graduate students.

The administrative structure of the HU PUR was established in an effort to centralize services and linkages to all existing and future undergraduate research programs. This structure consists of both physical space and personnel. Specifically, the Office for Undergraduate Research is housed in the office suite of the Vice Provost for Research. This space provides resources and services associated with performing undergraduate research. The Office maintains a small computer laboratory with accompanying discipline-specific software, copying/duplication services, and a large format printer for producing presentation-quality posters. The physical location also offers enhanced campus visibility for the PUR.

The administrative office of the PUR is staffed by a Director, Coordinator, Administrative Assistant and Graduate Assistant. Additionally, the Director is supported by an internal Advisory Board consisting of faculty and administrators representing all disciplines on campus. The Advisory Board meets monthly to discuss relevant issues, make decisions and determine new priorities for the PUR. An external steering committee will be structured in the not too distant future and will consist of individuals with noted expertise in promoting valuable undergraduate research experiences.

Funding for the Program in Undergraduate Research is allocated from the Office for the Vice Provost for Research. This funding supports, in part, the salary of the Director as well as all programmatic activities. Efforts to secure external funding are also underway. These sources include government agencies as well as public and private foundations.

Program Activities

A recent report of the National Research Council, *Biology 2010: Transforming Undergraduate Education for Research Biologists* (NRC, 2003), set forth a series of recommendations proposing concrete mechanisms for modifying biology curricula in the nation to meet the changing needs of future biomedical researchers (Kennedy & Gentile, 2003). In keeping with one of the themes of this report, which encourages independent research as early as is practical in undergraduate education (Brenner, 2003), participation in the PUR is open to all HU undergraduates regardless of classification, academic major, or level of prior research experience. The activities of the HU PUR are based upon the model of undergraduate research described by Hakim, which includes the four main characteristics of mentorship, originality, acceptability and dissemination (Hakim, 1998). Specifically, PUR activities include: mentored undergraduate research experiences, an undergraduate research symposium (Posters on the Hill), an undergraduate research journal, professional and personal development seminars, and an evaluation plan.

Mentored Undergraduate Research Experiences - Students who are HU PUR participants are provided access to a database of faculty research projects with available undergraduate research slots (both funded and unfunded), and are directed to select a proposed faculty research mentor from among those projects. Student research is then conducted under the oversight of a faculty research mentor. Given

the significant variations among disciplines, student-mentor dyads maintain full discretion in determining the appropriate means, schedule and location for students to conduct their research. Students are expected to demonstrate research progress during the course of the yearlong component through several mechanisms, including, but not limited to bi-weekly submission of a research log signed by the mentor that summarizes work conducted and presentation of their work at the Annual Undergraduate Research Symposium.

Undergraduate Research Symposium - All undergraduate researchers are invited to present their research at the annual *Posters on the Hill* Undergraduate Research Symposium each spring. This event recognizes the scholarly accomplishments of both undergraduate student researchers and their faculty mentors. Modest awards are distributed for the most outstanding presentations. Further, this forum not only features the intellectual enterprise of HU undergraduates, but also provides a forum for networking and interacting with exhibitors representing ongoing undergraduate research and training programs on the campus and with recruiters representing graduate programs at Howard. Students, therefore, are provided unique opportunities to discover co-curricular activities available to them, which can foster and possibly even improve their continued level of academic excellence.

Undergraduate Research Journal - The HU PUR, with the internal Advisory Board, will publish the premier issue of the HU Undergraduate Research Journal in the fall of 2007. This journal will welcome all original manuscript submissions from undergraduates and will serve as a peer-reviewed publication of the campus. This research journal will reflect the brilliance and creativity of HU undergraduates. It will include research papers, student commentaries, mentor highlights, and announcements for undergraduate research opportunities and letters to the editors. It is expected that Howard University faculty and staff will serve as editors of the Journal. The HU Office for Undergraduate Research will maintain annual publication of the Journal.

Professional and Personal Development Seminar Series - While discipline-specific seminars are held regularly in all academic departments on the HU campus, the PUR also provides seminars aimed at holistically encouraging and supporting undergraduates in their pursuit of a doctoral degree. Such seminars include an array of topics focusing on issues such as, alternative careers associated with the PhD, graduate

school application workshops, ethical and responsible conduct of research, personal statement development workshops, as well as support therapy for managing stress, health and wellness. At least one lecture or discussion is held each semester, and all events are open to the entire university community. Symposium speakers are selected from among local, regional and national individuals with demonstrated expertise in their respective fields and/or with extensive research portfolios.

Evaluation - Evaluation of the HU PUR is conducted on a continual basis by internal and external evaluators annually. The current evaluation plan assesses the program's effectiveness in meeting its stated objectives, as well as its operational success. Operational success is assessed through formative evaluation, and results are used to continuously improve the program. Objective success is assessed in summative evaluations that take place at specified intervals, and results are used to both improve the program in the succeeding year and to document the program's success for the purposes of obtaining additional resources, promoting and expanding the program, and recruiting student and faculty participation.

Conclusion

Overall, our Office for Undergraduate Research, in its first year, has met resounding success. Specifically, there has been a significant increase, approximately 74%, in the number of undergraduate research presentations delivered on campus (over 40 individuals participated in Posters on the Hill), and the Office for Undergraduate Research has been highlighted in several campus-wide publications since its inception in the fall of 2005. This has significantly increased campus visibility and raised campus awareness of the importance of undergraduate research.

Given these results, we feel that there are three major keys to the successful development of an Office for Undergraduate Research, which include the following: 1) it is necessary to garner and galvanize campus-wide support from all disciplines by involving key personnel and participating in a campus-wide campaign to both raise awareness of the benefits of undergraduate research and promote cooperation with the Office; 2) a designated stream of funding is needed to promote institutionalization of the Office; and 3) determination of key evaluation measures is critical to the development of the Office and ensures that students' needs are met.

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CALL FOR BIDS to CUR Meetings

The Council on Undergraduate Research requests bids for the 2009 Annual Business Meeting and 2010 National Conference and Annual Business Meeting.

**THE DEADLINE FOR SUBMISSIONS IS
MAY 1, 2007.**

Please visit

<http://www.cur.org/bidprocess.html>

for more information as well as bid documents.

Should you have any questions, please contact

Julie Nicholson at julien@cur.org.

CALL FOR Nominations for CUR Fellows

The Council on Undergraduate Research requests nominations for the CUR Fellows Awards. The CUR Fellows Awards are presented at the biennial National Conference to two CUR members who have developed nationally respected research programs involving undergraduates. Each CUR Fellow will also be awarded a Brian Andreen-CUR Student Research Fellowship that they will give to a deserving undergraduate at their respective institutions. Awardees have established outstanding records of obtaining funding for their work and for their students, and have published research findings with undergraduate co-authors. They reach out to students of all backgrounds, incorporate research activities into the courses they teach, and lead efforts to institutionalize research on their campuses and across the nation. In sum, they are leaders and role models for countless faculty and students. Full details of the CUR Fellow criteria and biographies of past CUR Fellows are available at www.cur.org/CUR_Fellows.html.

Any member of CUR may submit a nomination for the CUR Fellows Awards. A nomination consists of a two-page letter highlighting the nominee's contributions to all areas of undergraduate research. Additionally, a two page C.V. of the nominee should be included. Although abbreviated, the CV should detail the nominee's contribution to undergraduate research, ranging from mentoring undergraduate students with resulting publications to promoting undergraduate research beyond the local level. The letter and C.V. must be submitted to the CUR National Office as a single PDF document attached to cur@cur.org with CUR Fellows in the Subject. The deadline for nominations is MAY 4th, 2007. Questions may be addressed to cur@cur.org.

