

# **The University as Mentor: Lessons Learned from UMBC Inclusiveness Initiatives**

*Volume One in the CGS Occasional Paper Series on Inclusiveness*

by

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**COUNCIL OF GRADUATE SCHOOLS**

THE CGS OCCASIONAL PAPER SERIES ON INCLUSIVENESS, VOLUME ONE

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# TABLE OF CONTENTS

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<b>Introduction</b> .....	4
<b>Lesson One – Campus Leadership</b> .....	9
<b>Lesson Two – Campus-wide Involvement</b> .....	12
<b>Lesson Three – Graduate Admissions</b> .....	14
<b>Lesson Four – Mentoring Systems</b> .....	16
<b>Lesson Five – Monitoring Graduate Student Progress</b> .....	19
<b>Lesson Six – Orientation</b> .....	21
<b>Lesson Seven – Financial Support</b> .....	24
<b>Lesson Eight – Recognition and Rewards</b> .....	27
<b>Lesson Nine – Support Systems for Underrepresented Students</b> .....	29
<b>Lesson Ten – Professional Development</b> .....	32
<b>Conclusion</b> .....	34
<b>References</b> .....	36

# INTRODUCTION

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Graduate education is inherently decentralized, as much of its success depends upon the close relationship between the student who aspires to a career in a discipline and his or her mentor who is one of its leading researchers or practitioners. This relationship is often described as part of an “apprenticeship model” of graduate education, which places much of the responsibility for creating the conditions for a student’s success on a single individual mentor or advisor. Presented in this booklet is a comprehensive approach that replaces the solo apprenticeship model with one that enhances and augments the student-mentor relationship with increased oversight, monitoring and support by the broader campus community. At the University of Maryland, Baltimore County (UMBC) we have sought to establish a Graduate Community Convergence Initiative (GCCCI) which seeks to provide the graduate student with support for academic development, along with social and emotional support, financial support, health care, safe housing, and career preparation. It is not only the responsibility of the faculty mentor, but also that of other university faculty and administrators to determine what can be done at the department, college, and university levels to ensure that each student has a quality experience. In short, it takes convergence of the entire graduate community to provide the intellectual, social, and administrative environment for doctoral students to achieve their full potential and successfully complete their degrees.

The pursuit of a doctoral degree can involve the establishment of very close bonds among peers and between students and faculty, but it can also be a very lonely and isolating experience. The GCCCI experience enriches doctoral education at UMBC through strategic involvement of the many participants in the university community. Campus services that are often designed with undergraduates in mind are catalyzed to provide a welcoming and inclusive environment for all students at the university. This requires not merely offering to graduate students the same campus services that are offered to undergraduates, but tailoring appropriate services to the needs of an adult population focused on advanced research.

This booklet outlines the key actions that UMBC has taken to achieve an inclusive graduate community and describes those actions in a way that we hope will be applicable to all universities. It builds not only on the UMBC experience, but also on important research and publications on the topics of doctoral student attrition, retention and mentoring. Many of the issues surrounding graduate students’ attrition have been explored in recent articles and book-length publications, including: Barbara Lovitts’ *Leaving the Ivory Tower* (2001); the National Academy of Sciences’ *Adviser, Teacher, Role Model, Friend* (1997); the Council of Graduate Schools’ *Ph.D. Completion and Attrition: Policy, Numbers, Leadership, and Next Steps* (2004); and Michael Nettles and Catherine Millett’s *Three Magic Letters* (2006).<sup>1</sup> In 2004, the Council of Graduate Schools (CGS) launched the Ph.D. Completion Project, of which UMBC is a research partner, to assess a comprehensive set of intervention strategies at universities across the

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<sup>1</sup> Graduate attrition has been the focus of a number of articles in the *Chronicle of Higher Education* including “Doctor Dropout” by Scott Smallwood (2004) and “10 Ways To Keep Graduate Students From Quitting” by Cary Nelson and Barbara Lovitts (2001). A forthcoming publication by Ronald Ehrenberg and colleagues also addresses graduate student attrition and degree completion. The “Lessons Learned” presented in this publication have been informed by the expertise of these authors and many others.

country to determine what practices are most effective, and to create a national data set that can be used for universities to benchmark their progress. Publications that document the activities and impact of this project are forthcoming.

During the 1970s and 1980s there was a concerted effort to increase the number of women and underrepresented minorities pursuing undergraduate degrees in engineering. Special programs were designed and implemented to provide a welcoming and supportive environment. It was soon realized that all engineering students needed and benefited from these programs, and these best practices were institutionalized across many universities. At UMBC, we have applied this concept to graduate education broadly: the university must provide a welcoming and supportive environment for all graduate students in order to achieve an inclusive community for underrepresented groups. The extensive experience we have had with our nationally recognized undergraduate Meyerhoff Scholarship Program to increase diversity in science, technology, engineering, and mathematics (STEM) areas, and more recently with our Meyerhoff Graduate Fellowship Program in biomedical science and engineering, is being implemented campus wide through PROMISE: Maryland's Alliance for Graduate Education and the Professoriate (funded by the National Science Foundation's AGEP program). Recognizing that underrepresented minority graduate students will spend much of their time in laboratories with graduate students from across the U.S. and around the world, their success will be enhanced by including the whole lab in our AGEP activities.

The ten *Lessons Learned* presented in this booklet apply to all doctoral students, domestic and international, across all disciplines, with an emphasis on STEM fields in general, and on women and underrepresented minorities in STEM fields in particular. The authors firmly believe that the outcomes of the recommendations presented here will lead to institutional transformation by affecting the nature and quality of the doctoral student/faculty relationship, the role of graduate education in the greater university community, and the culture of the broader educational process experienced by all doctoral students. Implementing this comprehensive collection of activities is already helping to create a convergent graduate community at UMBC. This publication is intended to provide a model of convergence that will prove successful at other universities.

## **Two National Challenges for Graduate Education**

This publication addresses two major challenges now facing higher education in this country, and ultimately facing American society:

- (1) the number of domestic students who obtain doctoral degrees and move into careers in the fields of science, technology, engineering, and mathematics (STEM)—*especially underrepresented minorities—African-Americans, Hispanics, and American-Indians—and women*; and
- (2) the drop-out rate of doctoral students, *especially among women and people of color*.

## *1. The Recruitment Challenge*

**Too few domestic students, minorities, and women are pursuing degrees and careers in STEM fields.** To remain globally competitive, the U.S. must cultivate and develop a knowledge-based workforce by maximizing the educational potential of *all* its citizens. Students must be nurtured and developed into the future experts who can engage the highest wisdom in their respective fields and enhance the nation's basic requirements for research, economic development, homeland security, innovation, leadership, understanding, and prosperity. In other words, the key to the future security of the United States is the cultivation of intellectual talent (CGS, 2005).

However, the reality in American research universities is that too few domestic students are attracted to doctoral programs in these fields, leaving a potential shortfall of skilled personnel in agencies and companies conducting research that requires some minimal aspect of national security. Many recent studies have found that the pipeline of scientists and engineers will be under-supplied, based on the current condition of math and science education (e.g., Quimbita, 1991; NAS, 2007). The *Science and Engineering Indicators 2004* (NSF, 2004) documents a disturbing trend—a decline in the number of U.S. citizens training to become scientists and engineers, coupled with a growth in the number of jobs requiring science and engineering skills (p.9). Despite recent increases in doctorates awarded in science and engineering, the U.S. continues to experience a shortfall in faculty—documented by the growing number of science and engineering PhDs who have found non-academic, non-faculty employment. Over the past three decades, science and engineering PhDs were more likely to find employment outside the academy (NSF, 2004). One explanation for this faculty shortfall, of course, may be that PhDs are deliberately choosing non-academic employment because of more attractive career options and salary levels outside the academy.

But the decision of minority and women students not to go into the STEM fields is even more problematic. The same institutions that have struggled to attract the best domestic graduate students are even less able to attract women and people of color. There are several arguments for why this sector of the population *should* be employed at the highest levels of science and industry. One compelling reason can be called the “domino effect.” If there are few if any minorities and women employed as university faculty and senior research scientists in industry and government, subsequent generations of minority and women students will continue to be discouraged from entering those fields. Their absence will be perpetuated generation after generation because of the lack of role models. Such models are needed both for students planning their careers as well as for employers who may lack the experience of having on staff well-educated minority and women scientists and mathematicians, engineers, and technology experts. Without a diversity of ideas represented, science does not move forward at the pace needed to sustain global competitiveness.

The University of Maryland Baltimore County has been recognized as a leader in the national effort to attract domestic students generally, and underrepresented minorities and women specifically, into doctoral programs in the STEM fields. *This publication addresses this first challenge by describing the steps that must be taken to create a welcoming and positive environment for underrepresented students, an environment that will attract and support*

*doctoral students throughout their academic careers and position them to be successful in the job market.*

## *2. The Retention Challenge*

**Minorities and women drop out of doctoral programs, nationally, at rates that should cause concern on every campus.** Research shows that, historically, attrition from doctoral programs has been consistently higher among students from underrepresented groups (summarized in CGS, 2004). But the problem of doctoral student dropout is not limited to minority and women students; this pattern is true for all doctoral students (Mitchell-Kernan, 2005). Barbara Lovitts (2001, p.1) estimates that as many as 50 percent of the students entering doctoral programs in U.S. institutions do not obtain the degree.

The inability of our nation's universities to support to degree completion large numbers of graduate students has wide-ranging consequences for the future health of the academy. The waste of human and financial resources that results from the failure of higher education to address the problem of dropout cannot continue when those same resources are at such a premium. The impending retirement of the baby-boom generation of faculty and top scientists in the STEM fields poses a challenge to higher education and the greater society. Young scientists and researchers must replace these individuals; sufficient PhDs must be produced. This replacement is not currently being accomplished.

Lovitts (2001) effectively argues that the failure of large percentages of doctoral candidates to complete their degrees is primarily the result of institutional policies, procedures, and environment rather than the "fault" of students who begin doctoral studies; the high dropout rate of doctoral students, including but not limited to women and minorities, she argues, is due not *primarily* to the failures of individuals that need remediation but to institutional causes. Granted, some students enter graduate school academically unprepared, and these students need to be appropriately counseled and offered supportive academic services. But Lovitts' data show that the primary contributors to students' departure from doctoral study are problems in the culture of higher education that must be addressed with system, program, and policy changes. The evidence that she produces strongly points to a systematic pattern of institutional practices that sets up barriers, fails to nurture, discourages careful attention to individual needs of students, and perpetuates a culture of mystery and obfuscation.

*This document addresses this second challenge by describing how research universities can change their institutional environment in ways that promote success among its doctoral students, paying particular attention to fostering degree completion of underrepresented minorities and women.* The intended result is an education system that enables most students that enter doctoral programs—including those students that are vulnerable—to depart with degree in hand.

### **Lessons Learned and Shared**

The ten *Lessons Learned* presented in this booklet cover three major areas of graduate education: *cultivating new students, building a supportive community, and fostering professional development.* Included are brief descriptions of programs, strategies, goals, and objectives that

address these areas. In other words, they cover areas of *recruitment, admissions, progressions, graduation, and student support services.*

***Lesson 1: Identify and cultivate the campus leadership—administrative, academic, and intellectual—to assist in developing initiatives that foster student retention and success.***

***Lesson 2: Work continually to gain faculty and staff engagement, involvement, and ownership in creating a campus atmosphere that fosters student success among an inclusive community of scholars.***

***Lesson 3: Work with graduate program admissions committees to establish appropriate recruitment strategies and admissions criteria.***

***Lesson 4: Ensure that every graduate program has in place a system that supports a successful mentoring relationship throughout the student's progress.***

***Lesson 5: Have in place a mechanism for record-keeping and reporting to monitor graduate student and departmental successes and failures.***

***Lesson 6: Provide an extensive orientation to new graduate students and establish a support system to assist in the transition to the culture of doctoral education and research.***

***Lesson 7: Establish within each program a clearly articulated policy regarding financial support for doctoral students.***

***Lesson 8: Establish recognition and rewards for students and mentors as they progress over the academic hurdles.***

***Lesson 9: Recognize that underrepresented minority and women doctoral students are especially vulnerable, and put into place programs and services that foster engagement and minimize potential marginalization.***

***Lesson 10: Prepare students deliberately and explicitly for the next phase of their lives—life after graduate school.***



# LESSON 1 – CAMPUS LEADERSHIP

## **IDENTIFY AND CULTIVATE THE CAMPUS LEADERSHIP— ADMINISTRATIVE, ACADEMIC, AND INTELLECTUAL—TO ASSIST IN DEVELOPING INITIATIVES THAT FOSTER STUDENT RETENTION AND SUCCESS.**

Academic institutions are, by nature, paradoxical beasts. On the one hand, they support pioneering innovations and discovery by faculty and students who are engaged in both research and learning. On the other hand, they can be conservative and bureaucratic, operating sometimes quite effectively and efficiently in maintaining the status quo and in perpetuating sometimes outdated policies and procedures.

An initiative that proposes to change some of the institution’s most cherished practices, environmental conditions, and myths will meet a sure death without support from the top administrative leadership and the most respected educators and researchers. Having the top administrative and academic leadership supporting these initiatives for change is essential to implementing the following “lessons learned.” However, for these initiatives to succeed, it is essential that they initiate from within the campus community itself, and are not imposed by the upper administration upon faculty and staff.

Active support from the president and academic vice president or provost is critical. In times of tight financial and human resources on university campuses, successful initiatives that require new resources and energy depend on top-level administrative commitment. Moral, financial, and administrative support for graduate student success and diversity at the highest levels of the university must be visible to the entire community. Support must be available, for example, to ensure that faculty have the time for successful mentoring and receive appropriate acknowledgment and rewards for their efforts. While genuine support at the top administrative levels is critical to long-term success, an intervention aimed at graduate students need not start there.

Participation from the intellectual leadership among the faculty is essential. Quite often the most distinguished scholars and the most exceptional teachers are less involved with the day-to-day management of the university. Being fully engaged with teaching and research, they have less time for administration, relegating more responsibilities to the deans, chairs, directors of graduate programs, center directors, or leaders of campus governance. Nevertheless, those leading scholars and educators are key constituencies to cultivate, as they can provide a unique level of credibility on campus.

Therefore, it is important to build a network of some of the campus’ *most distinguished scholars*—to secure their buy-in and participation in the planning and implementation of a new graduate initiative. These distinguished scholars are nationally recognized senior professors who have compiled a substantial body of research and other exceptional scholarly accomplishments,

and bring a *cachet* and credibility to whatever they do inside or outside the university. One must capitalize on their demonstrated campus leadership, extensive professional networks, and substantial knowledge within their academic disciplines. Customarily they are not the most involved with educational reform, as much of their time is dedicated to research. But it is these individuals who provide important credibility to the change process. They are by far the best role models to share knowledge, experience, and expertise to help graduate students achieve their highest scholarly potential. Getting the leading scholars involved helps to demonstrate to their peers and others in the academic community that fostering student retention and degree completion are worthwhile endeavors.

Arguments to use in convincing campus administrative leaders and scholars of the critical importance of doctoral student retention are the following:

- *The dearth of domestic students completing doctoral degrees in the U.S.—especially in the sciences and engineering—is a matter of national concern.* In most major American research universities, a large number of doctoral degrees in the physical sciences and engineering are awarded to international students, some of whom return to their home countries taking their expertise with them or work for America’s economic competitors (NAS, 1995). The pipeline of scientists and engineers will be greatly curtailed if more American students with doctoral degrees in these fields are not energetically recruited, especially women and underrepresented minorities.
- *Many universities are dependent upon a steady flow of high quality international applicants. Should this flow be interrupted due to larger world events, academic research could be severely hampered.* The September 11, 2001, terrorist attacks on the U.S. initiated a tightening of visa regulations, with the result that many applicants from outside the U.S. were discouraged from applying to study in this country. A dramatic decline in the number and percentage of international graduate student applicants resulted.<sup>2</sup> While this immediate situation has abated, American universities remain vulnerable to the consequences of larger world events. In addition, other nations are seeking to retain their own graduate students and are competing for an increasing share of the international student population. To avoid sudden shifts in the pipeline of quality graduate students, it is in a university’s long-range interest to cultivate a steady flow of domestic students—including underrepresented minorities and women.
- *The continuing failure (across disciplinary boundaries) to graduate a high percentage of entering doctoral students, year after year, points to an institutional culture that demands attention.* If departments hold dear to myths of high completion rates among their doctoral students, those myths can by can be exploded by producing reports—department by department—showing *actual* cohort retention rates, years-to-degree-completion, results from exit interviews of departing students, and graduation rates.
- *The money, faculty, and staff devoted to graduate student recruitment, admission, record-keeping, orientation, and classroom instruction are wasted when significant percentages*

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<sup>2</sup> See <http://www.cgsnet.org/> (Research: International Research) for CGS reports published 2003-2007.

*of doctoral students never make it even as far as the candidacy stage, much less to graduation. This inefficiency in managing the success of our recruitment and admission efforts is an enormous drain of university resources.*

- *The waste of human potential represented by doctoral student dropouts requires our immediate attention. We “woo” to our campuses the “best and brightest,” and then at times do not provide a setting where they can succeed. We entice them to graduate school with assistantships and fellowships, and then we expect them to sink or swim with assistance not fully matched to their needs.*
- *The retention and success of doctoral students are in the personal best interest of the institution’s academic leaders. Students who are treated well and nurtured effectively are more productive. The time and energy spent by faculty in recruiting and mentoring doctoral students is wasted if they drop out *en route* to the degree. Campus leaders are in the best position to advance this argument to faculty colleagues.*

## LESSON 2 – CAMPUS-WIDE INVOLVEMENT

### WORK CONTINUALLY TO GAIN FACULTY AND STAFF ENGAGEMENT, INVOLVEMENT, AND OWNERSHIP IN CREATING A CAMPUS ATMOSPHERE THAT FOSTERS STUDENT SUCCESS AMONG AN INCLUSIVE COMMUNITY OF SCHOLARS.

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The active involvement and support of faculty and staff across campus—including those outside of academic affairs—are critical to the success of any initiative and are particularly pivotal in efforts at enhancing institutional culture and establishing new student support programs. Whether the graduate enterprise is decentralized to the department or college level, or whether it is centralized at the graduate school level—or a combination—it is vital to have the underlying support for institutional change provided by faculty and by staff in offices that serve students.

The importance of having strong campus-wide involvement cannot be over-emphasized:

- *Ownership by faculty of the entire range of decisions involving improving the graduate student experience makes it more likely that changes will filter down to all graduate students in all classrooms and labs.* Faculty participation must be present at all levels and stages—recruitment, admissions, orientation, mentoring, institutional policy-making, and the development of departmental procedures. Lack of widespread faculty involvement will limit the impact of initiatives put in place to foster diversity and student success.
- *A key to successfully shepherding most doctoral students to graduation is, first, recruiting and admitting students who “fit” well with existing faculty’s research interests.* In many graduate programs faculty *are* involved in the recruitment and admissions processes; but in some programs recruitment is left to the graduate school, and admissions is handed off either to administrative staff or a very small faculty admissions committee. When faculty are involved in the recruitment and admissions processes—and these decisions are not relegated to a departmental administrator or committee-of-one—it may be easier to see that the doctoral students brought into their program are appropriately matched to the faculty who are expected to serve as mentors. Much research on doctoral student retention points to the importance of effective faculty mentoring, and this involvement ensures that mentoring begins even before the student enrolls in a program.
- *Because of the one-on-one apprenticeship-learning model that is typical of traditional graduate programs, the way the mentoring system is conducted is critical to student success.* To bring about successful change, faculty must be willing and committed to making adjustments to the traditional graduate training experience characterized by the one-on-one mentoring relationship. These adjustments include working with other faculty and staff; including the student’s entire doctoral committee in the mentoring process;

sharing information on the student's progress; ensuring that the student has the foundation, skills, and knowledge to be successful in graduate school; and being open to the idea of students spending constructive time with other students. Faculty must see their mentoring as part of their core responsibilities as members of the graduate faculty.

- *Changing the culture of graduate education to be more supportive and welcoming may also lead to an increase in talented domestic students pursuing academic careers who are now opting for other careers or professions.* The academy has often been the loser in the battle for the *crème de la crème* of college graduates. Industry provides the enticements of higher salaries, generous fringe benefits, bonuses, and free on-the-job training. As academic departments face retirements and the need to replace departing faculty, they must emphasize the competing benefits available with an academic career. The first step is to make the experience of graduate education a positive and successful one.
- *Professional and support staff play an important role in developing a supportive campus environment.* Staff across campus are in a key position to enhance student engagement and success. Professional and support staff in the financial aid, student billing, student registrar and records, counseling, health services, student affairs, housing, and admissions offices are essential to fostering an atmosphere of helpfulness, courtesy, tolerance, and efficiency. Their ability to establish and adhere to policies and procedures that facilitate good customer service cannot be overlooked. They must be involved in developing diversity initiatives and regularly trained to be sensitive to the often complex needs of graduate students generally, and especially those with needs atypical of the prevailing campus culture.
- *The graduate school must take the lead in coordinating the modification of campus-wide support systems to meet the needs of graduate students—needs that are typically very different from those of undergraduates.* The design and provision of on- and off-campus housing, student co-curricular events, computing services, student accounts payable procedures, mental health services, and career counseling for the wide variety of graduate students should reflect the unique requirements of this population. The marketing of campus services and alumni relations should be targeted to a constituency significantly different from undergraduates. The challenge is to go beyond fostering a mood of support and inclusiveness to actually changing the campus systems that profoundly affect the academic experience of graduate students.

## LESSON 3 – GRADUATE ADMISSIONS

### **Work with graduate program admissions committees to establish appropriate recruitment strategies and admissions criteria.**

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While some faculty members are actively engaged in student recruitment and admissions, many faculty are neither knowledgeable about nor particularly interested in technical aspects of the recruiting process. Nor are they informed about the latest strategies of graduate admissions. Such faculty may feel that they are “academics,” after all, and that their primary role at the university is to serve as subject-matter experts in their particular disciplines. Yet faculty can be the most effective recruiters of doctoral students, and their admissions decisions are basic to enrollment management and high degree completion rates. When they are provided the skills and resources to recruit and admit, they are often quite willing and highly successful.

Faculty may need to be reminded that extrapolating a few negative experiences to a general admissions “policy” is inappropriate and unfair. If a previous student from a particular ethnic or racial group, gender, country of origin, social class, or type of undergraduate college did not succeed in a doctoral program, this experience must not color future decisions to admit students with that characteristic or background. The admissions process must assure an objective review of applicants’ qualifications and interests without prejudice.

The graduate school staff should put in place a process for sharing with faculty best practices for recruitment and admissions.

- *In periodic meetings of graduate program directors, the graduate school staff can present materials and ideas for improving program recruitment processes.* Departments and programs that have effective practices in place can showcase their activities. Staff from other campus offices (student advisement, admissions, etc.) can be invited to make presentations.
- *Graduate faculty, staff, and current graduate students can be included in events held in conjunction with campus visits of underrepresented minority undergraduates.* Departmental visits can be included in the campus visit, and can include tours of labs, meetings with faculty and current graduate students, and presentations geared to attracting such students to their programs.
- *Through regular e-mail communications with graduate program directors, the graduate school staff can share announcements, best practices, and faculty resources to assist in effective management of the graduate programs.*
- *The graduate program admissions committees should be made aware of the appropriate use of GRE scores in their selection process.* The selection criteria for graduate students should adhere to the Educational Testing Service’s (ETS) Guidelines for the Use of GRE

Scores. “The GRE Board Statement Regarding the Fair and Appropriate Use of GRE Scores” was adopted by the GRE Board in 2004 and was endorsed by the Council of Graduate Schools’ Advisory Committee on Minorities <[www.ets.org](http://www.ets.org)>. The *Guide to the Use of Scores (ETS, 2005-2006)* advocated for the use of multiple criteria to ensure fairness and to balance the limitations of any single measure of knowledge, skills, or abilities. Multiple criteria can include undergraduate grade point average, personal statements, letters of recommendations, samples of academic work, and life and professional experience potentially related to graduate study. GRE scores should not be considered the only predictor of the student’s potential for academic success. Moreover, the guidelines note the importance of supplementing the scores with other criteria, especially when it comes to assessing the abilities of historically educationally disadvantaged students, students for whom English is a second language, and returning students.

- *Whenever possible graduate faculty should attend professional and student conferences and graduate fairs, especially those targeting minorities and women, to assist in the recruitment process.* If these are not conferences normally attended by faculty, the department and graduate school may help fund the trips. Faculty may find these conferences to be educational—particularly in demonstrating for them the presence of large numbers of underrepresented students in their disciplines who are potential recruits—such as African American engineering students, women mathematicians, and Hispanic physicists. Participating in recruitment events can also help provide faculty with skills at selling their program and marketing their scientific labs to potential applicants.
- *Assist faculty in following up with prospective students and in undertaking the ongoing process of “wooing” newly admitted applicants.* The establishment of instant messaging functionality and chat rooms on the web can facilitate faculty communications with prospective students. The graduate school can encourage faculty to reply to applicant inquiries and establish an internet and telephone relationship with applicants as a way of cementing their relationship with their graduate program. These methods of communication prior to enrollment help ensure that the students who are admitted are, indeed, appropriate for the faculty and research at that institution and are more likely to accept an offer to enroll.

## LESSON 4 - MENTORING SYSTEMS

### **Ensure that every graduate program has in place a system that supports a successful mentoring relationship throughout the student's progress.**

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Because mentorship is central to doctoral education, the design and monitoring of the processes for “managing” this one-on-one relationship between faculty and student are critical. And precisely because the relationship is personal, it easily avoids evaluation and scrutiny.

A graduate school can emphasize to students and faculty alike the importance of positive mentoring by providing workshops and discussions about mentoring for faculty and graduate students. Another resource is the Faculty Development Center that could provide ongoing mentoring workshops. Faculty members who have never served as graduate mentors should be provided workshops on successful mentoring. A speaker series devoted to mentoring could be made available to faculty and graduate students. The Graduate Student Association can offer an annual mentoring award to recognize the effective mentors on campus. There are multiple ways to encourage greater dialogue about the importance of the mentoring role.

An effective mentoring system should address the following issues:

- *The process of matching mentors and students should be openly explained to new doctoral students in the departmental orientation program.* While some departments assign students an advisor upon admittance, others encourage students to choose their own advisor based on their preferences and schedule. The first option may make sense in some disciplines where research is very specialized and students are expected to carry forward aspects of research closely aligned with that of their faculty advisors; in such cases, a student's “fit” within a program and the intersection of research interests between student and mentor may be closely related. In other fields, however, this early assignment of student to advisor may be too “random,” failing to take into account personality differences and the existence of a more suitable mentor. The second option, while more personalized, can have the disadvantage of being a protracted process. Without the support and guidance of an experienced advisor, some students may wander aimlessly through what they feel to be a maze of written and unwritten rules, regulations, roadblocks, and personal obstacles. Some departments opt for a group of advisors for each student rather than one mentor, and in some disciplines this strategy works effectively. The graduate program, led by the chair or the graduate program director, should have in place an effective system for this match-making and make it clear to everyone—students and faculty alike—how it works.
- *The selection of a mentor for students from underrepresented populations should be handled with some sensitivity.* Women, underrepresented minorities, and international



students in the sciences and engineering often prefer mentors who are their same race, nationality, and/or gender. However they frequently experience difficulty finding such a mentor because of the dearth of minority, international, or women faculty in their departments. Furthermore, students who might move from a nurturing liberal arts undergraduate experience to a more impersonal research university can be in for a culture shock. Being sensitive to the differences and backgrounds students bring can be helpful in fostering a more supportive atmosphere. At the same time it is important to help students find a mentor who has the most to offer in terms of guiding the research experience and building a professional career.

- *There should be a clearly articulated process for changing mentors if the match does not “work.”* When either the mentor or student is unhappy with the match and has no way out of the relationship, the results can lead to unnecessary conflict and eventual student drop-out. If the student is supported by the mentor’s grant, he/she may think that changing mentors will lead to the loss of an assistantship, and so the student either gives up or struggles miserably to the end. Written procedures developed by the graduate program for addressing such mismatches will make it more likely that the atmosphere of doctoral education is healthy for all involved.
- *Regular meetings of faculty and students in each graduate program can facilitate communication and serve as a support system.* These meetings can be either formal or informal, monthly or less frequent, but their ultimate purpose is to improve communication skills, share concerns, build trust, promote networking, and uncover problems before they become major.
- *An annual student performance review should take place by a team of faculty in the graduate program, including the research mentor.* The review helps to track performance, highlight areas of growth and improvement, and pinpoint any potential problems that might exist. The process helps to foster an environment of continuous communication and feedback and provides students with a broader mentoring support. The review also provides an opportunity to evaluate the status of the mentoring relationship, and identifies or anticipates potential difficulties within the relationship. Should a situation arise in which a student wishes to switch advisors, this process provides a safe way to do so. A discussion about the student’s progress among a group of faculty beyond just the mentor will provide an opportunity for problems to be dealt with before they threaten the success of the student’s degree completion. The student should be made aware that he/she can appeal to this committee if problems arise that cannot be resolved by the mentor. Such a mechanism provides support for both the mentor and student by enlarging the scope of the research experience beyond the mentor/student relationship.
- *Establish a mechanism for identifying and addressing weaknesses in the academic background of new students.* Even with a rigorous admissions process, some students will invariably require some background coursework or individualized tutoring around some specific subject. International students in the natural sciences, for example, may be better prepared for graduate study than some domestic students. Students from small, undergraduate institutions may lack the same breadth of academic instruction as those

from larger research universities. And, finally, those students for whom graduate study is not appropriate should be provided counseling and assistance to pursue other options as early as possible. The graduate program that is cognizant of and aware of these individual differences in academic background will be in a stronger position to foster the success of all their graduate students.

- *A peer-mentoring program for new doctoral students can supplement the mentoring provided by faculty and help build community within the graduate program.* Peer mentors selected from more advanced graduate students should be trained at providing support to new students in their graduate program. Peer mentors are often able to decipher the unwritten rules of the institution or the dominant culture and can be more effective than faculty in sharing survival skills. This approach can be particularly helpful to women and students of color when matched to a successful student of the same race or gender. These student mentors might receive a modest supplement to their graduate assistantships to perform this service. Such a program provides not only academic but also social support to both peer mentors and new graduate students.

# LESSON 5 - MONITORING GRADUATE STUDENT PROGRESS

## Have in place a mechanism for record-keeping and reporting to monitor graduate student and departmental successes and failures.

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Regardless of how decentralized the administration of graduate education and research may be, a system of monitoring graduate student progress is critical to assuring that the graduate experience is successful across all graduate programs. This can be done through an annual report (by program) of student progress and degree completion.

University-wide records and reporting can benefit the creation and maintenance of an academic environment that fosters diversity and student success in several ways:

- *Department or program anecdotal examples of success and failure often do not match reality.* Faculty perceptions of the demographic composition of their students, the extent of student “stop outs” and “drop outs,” and the effectiveness of certain mentors should be challenged by institutional data. The performance of faculty members who regularly mentor and appear successful but whose students never or rarely complete their degrees is often hidden by the failure to view students’ graduation rates by mentor. Programs that boast an extraordinarily high graduation rate typically discount students whose failures fall below the visibility radar.
- *The monitoring of students’ academic progress should first and foremost occur at the departmental or program level so that student, faculty/mentor, and program-wide problems are discovered and addressed early.* Each program should establish a mechanism for tracking individual student’s academic progress so that faculty and mentors are aware when a student is floundering academically or has failed to register for classes one semester. This system would also alert graduate program directors to mentors whose students exhibit unusually high drop out rates.
- *Significant differences in student completion data by department/program can provide indications of localized departmental problems that can be addressed quietly and effectively.* If completion data and time-to-degree are negative for only certain departments, remedies need to be focused and individualized; if the data are negative for the entire campus, the problem is widespread and requires different solutions.
- *The monitoring of student progress at the graduate school or university level enables diagnoses and interventions to be enacted that address “the forest,” and not simply “the trees.”* When viewing the failure of a particular student, it is easy and quite often incorrect to attribute that failure to the student. When viewing the performance—positive and negative—of an entire program, patterns emerge that point to systemic issues. One program may have no more highly qualified students than the next, but the support

systems in place lead to consistent student successes. Discerning these patterns is helpful in institutional problem-solving and the replication of successes.

- *Generating and distributing reports on student progress help move the responsibility for successes and failures beyond the mentor or the graduate program to the larger graduate community.* An ongoing centralized “progressions” audit helps to ensure that all graduate students stay on track. If a student begins falling behind members of his/her cohort, the graduate school can bring this fact to the mentor’s attention. There can also be reminders to students of critical filing deadlines and the provision of all necessary forms to complete. If a student misses a deadline, the mentor and graduate program director should petition the graduate school for an extension. When the graduate school monitors the students’ grade point averages, leaves of absences, unauthorized “stop-outs,” and missed deadlines, this serves as a sort of safety net—a sounding of an alarm to the mentor, graduate program director, and student.

## LESSON 6 - ORIENTATION

### **Provide an extensive orientation to new graduate students and establish a support system to assist in the transition to the culture of doctoral education and research.**

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Many students who go directly from undergraduate to graduate school are often still operating in full academic discipline mode. Consequently they may not be as intimidated by the rigors of graduate study. Nevertheless, transitions from an undergraduate college to a large research university or relocation to a new part of the country can pose significant challenges for students. In addition, students who are returning to the educational environment after some years may face even greater challenges. Their absence from academia may result in a degree of culture shock, especially when they are faced with both family responsibilities and the volume and difficulty of reading, lab-work, and classroom assignments required for graduate study.

The process of obtaining a postgraduate degree differs greatly from that of an undergraduate degree, and this process should be clearly articulated in an extensive program of orientation for all new graduate students. The program may be sponsored by a combination of units—the graduate school, the departments, and the graduate programs. More institution-wide processes and procedures may be covered by the graduate school whereas program/discipline-specific information may be covered by departmental and graduate program orientations.

Such an orientation should include:

- an overview of university policies regarding such topics as academic integrity, responsible conduct of research, sexual misconduct, grading, registration, and deadlines;
- an explanation of university procedures and services such as parking, library hours and resources, food options, postal services, health care, counseling and mental health services, career development, child care services, and insurance;
- help in securing Social Security Numbers for foreign students;
- advice on obtaining on-campus or off-campus housing and banking services for new arrivals, and student identification cards;
- discipline-specific policies, e.g., regarding the use of human subjects, animal care and use in research, and lab safety training;
- departmental policies and procedures for graduate students, including mentor selection, lab and office assignments, building and room keys, applying for financial assistance;
- explanation of course loads, the advising system, the core curriculum, research opportunities, and thesis and dissertation expectations;
- clear information about the departmental milestones students will confront as they progress towards the degree (e.g., comprehensive exams, candidacy, dissertation defense);
- tours of the main campus buildings (library, recreation facilities, and student center), department and labs;

- introductions to key university administrators, Graduate Student Association leadership, department chair and faculty, graduate program director, and current graduate students;
- social events that foster networking and bonding.

Besides a formal program of orientation, each student should be supplied with a graduate student handbook (printed and/or on the university's website) that provides both academic and non-academic information of importance and interest to graduate students. The handbook is a compendium of information about the university's policies, procedures, requirements, and resources relevant to all graduate students.

In addition to the orientation provided to new students, an on-going, systematic program of student integration and community-building is essential in creating an environment that is nurturing to all students. While some of this integration activity naturally occurs at the program or departmental level, the graduate school can assure that these programs are campus-wide in scope, across colleges and between departments. Particularly when the number of students from underrepresented populations is small, it is important that activities, programs, events, and initiatives are in place that cut across college or departmental boundaries. Student support staff may need to be hired to organize affinity groups and operationalize such activities as the following:

- Encourage and support departmentally based graduate clubs or organizations that organize lectures and social events.
- Sponsor speaker series to bring in distinguished scholars in one or more related disciplines.
- Offer workshops and informal opportunities for research sharing and professional development for both faculty and students.
- Create regular seminars that address common problems of graduate students—getting along with their mentors, time management skills, writing grant proposals, getting research published, dissertation pitfalls.
- Provide campus-wide as well as departmentally-based social events for graduate students and faculty. If the number of students representing one minority group (e.g. American Indians) and/or gender (African American women) is relatively small, a social event highlighting that group provides an opportunity for students to become acquainted with similar students and faculty in other departments.
- Resources that encourage departments to sponsor annual or semi-annual off-campus retreats for faculty and graduate students. These retreats could include adventure and recreational activities such as snow skiing, white-water rafting, hiking, or a social service project to help break down communication and other potential barriers.
- Organize career fairs or luncheons with representatives from the top industries and employers in the discipline.
- Encourage a strong Graduate Student Association on campus in order to foster student leadership, graduate student services, social opportunities, and cross-disciplinary, campus-wide networking.
- Encourage graduate students in each program to assume responsibility for building a supportive community for other students. Peer support can provide a valuable atmosphere

for students to both commiserate about the challenges they encounter and celebrate their achievements.

# LESSON 7 – FINANCIAL SUPPORT

## **Establish within each program a clearly articulated policy regarding financial support for doctoral students.**

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One of the greatest challenges facing graduate students throughout their educational process is how to *pay* for their schooling. Full-time students are most likely directing the majority of their concentration to their studies, although it may be necessary to secure part-time employment to help fund their education. Most part-time students face the even greater life challenge of having to balance full- or near full-time jobs with school, families, and other personal commitments. In either case, financial support is usually a critical issue for students to be able to successfully balance their personal and academic lives.

Lack of adequate funding is one of the top reasons graduate students give for not completing their degree (Ehrenberg, Jakubson, Groen, So, & Price, 2005). Time is money, and the longer the student stays in graduate school, the more it will cost. However, work and family commitments, as well as other distractions, all influence the length of time a student spends pursuing an academic degree.

Students with the shortest time-to-degree generally receive some type of funding assistance in the form of fellowships, traineeships, or research assistantships (Barnhill & Stanzone, 2004). Those with teaching assistantships and other forms of funding, such as loans, take longer to complete their degrees. The longer a student takes to finish the degree, the less stable his or her funding becomes, and therefore the likelihood that the student will attain the degree lessens.

Several recommendations for managing the financial support of graduate students have proven successful:

- *Faculty entrusted with determining financial awards must be sensitive to the reality of funding graduate education from the student's perspective.* In numerous instances many decades have passed since faculty were themselves struggling graduate students, and the survival needs facing students no longer supported by their parents can be relatively invisible to faculty. An open line of communication between faculty and students about financial problems students may be experiencing is important in understanding the pressures they may be experiencing. Often peer mentors and other advanced students can be a source of information about how to manage on a student stipend.
- *The graduate faculty should be aware of sources of information regarding alternative funding available for their students.* Keeping up-to-date on financial aid options, federally subsidized and unsubsidized loans, university scholarships, and websites that point to fellowships sponsored by outside groups can make it possible for faculty to direct students to additional sources of income; this information can make the difference between a student's dropping out and continuing graduate studies. In addition, the



graduate program administrators should learn about the university's financial aid deadlines so that they can give their students maximum options for funding support.

- *Advocating for the financial support of graduate students should be an ongoing agenda of faculty charged with administering graduate education.* Such support can go beyond grant or state-funded assistantships or traditional university awards. The development office should be sensitized to possibilities of establishing donor-supported scholarships and fellowships for graduate students. The financial aid office should be alert to applying for and making available federal funds available only to graduate students, such as Perkins Loans. And faculty can recruit sponsors of paid internships in the community and work-study opportunities that relate to the students' research.
- *Advocating for the improvement of university systems that may cater primarily to undergraduate students will lead to changes in procedures that can make graduate students' experience more welcoming.* In some universities many of the student administrative policies and procedures were developed with undergraduates in mind. The policies and procedures may not be fully applicable to graduate students. Graduate school staff, for example, can work with the financial aid office to assure that awards are available in a timely manner, since these graduate students are typically not financially supported by their families. Further, some graduate students may be working professionals and arrive in the evening to find the bursar's or financial aid offices closed. When a student accounts receivable office automatically sends invoices to the student's permanent mailing address (presumably for parents to pay), that bill may end up in China or Brazil at a home where English is not read, or in Muncie or Birmingham where the residents at that address have no financial responsibility for the student. Encourage university offices, if they do not do this already, to examine their services from the perspective of an adult graduate student.
- *It is simply honest and humane to be up-front about the graduate program's policy regarding financial support for the education of its students.* Faculty typically use grants, fellowships, scholarships, and assistantships to recruit the best and brightest students, and they usually award them on a discretionary basis without consideration of the student's financial need and without a clear declaration of how long this support is available. If the policy is to support doctoral students through the entire degree process, regardless of the time it takes, that should be stated (and widely publicized). If support is guaranteed for a certain number of years but will be terminated if the student takes longer to complete the degree, this too should be communicated. If support is contingent on the good performance of the student, the student should be informed at the beginning of his/her study. If financial awards are determined annually, based on number of students, pool of money, and performance, the student needs this information to plan for contingencies. This will allow a student to plan and determine whether they may need to secure a loan, a job, or pursue a program of study elsewhere.
- *Whatever the funding policy of the graduate program, continuing students must be informed of the status of their future financial support as early in the current academic year as possible.* If a student is informed in July or August that the assistantship will not

be available for the new academic year, he/she may well have missed the deadline for submitting the Free Application for Federal Student Aid (FAFSA) and for arranging for alternative funding sources through the financial aid office or elsewhere. Even if such alternative support is forthcoming, it may not arrive until well after the first tuition, rent, health insurance, and utility bills are due. This may be the death knell in the student's plan to complete the degree.

- *Recognize that teaching assistantship responsibilities— unlike research assistantships or fellowships— can be a diversion from the student's research and can lengthen the time that is required to complete the dissertation* (U.S. Department of Education, 2000). Teaching assistantships can be excellent for developing knowledge and skills for teaching, and are therefore important to those seeking a career as a professor; nevertheless, dedicated instruction takes time. In some cases, doctoral students find the responsibilities of teaching overwhelming, and have been known to begin to neglect their own studies (Smallwood, 2004).

## LESSON 8 - RECOGNITION AND REWARDS

### **Establish recognition and rewards for students as they progress over the academic hurdles and for mentors as they assist with that progression.**

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The circuitous maze from admission to graduation is often, for the doctoral student, one long and solitary journey through class work, examinations of gained proficiencies, and the research mountain to be climbed at the end of it all. Because graduate work takes years and because it can be so solitary, it is important to establish and recognize milestones along the way and to offer encouragement and congratulations from the entire academic community.

In addition, there are few, if any, rewards *for faculty* for successfully mentoring students through the process, so it is helpful to establish mechanisms to remind faculty that mentoring is as valued as teaching, research, publishing, and committee assignments. Departments typically fail to provide encouragement and support to *the mentor* through rewards and incentives that mark the accomplishment of major milestones.

- *A university-wide ceremony to recognize all doctoral students who have attained candidacy is a positive way to (a) teach students what candidacy means, (b) encourage students to reach that stage, (c) congratulate those who have achieved this milestone, (d) honor the mentors who have shepherded them this far, and (e) inspire faculty to encourage their students to achieve candidacy.* Adding this formal ceremony can make candidacy something to which students aspire. A small certificate might be presented during the ceremony to each student, accompanied by his/her mentor. Friends, family, and colleagues can be invited to share in the occasion. Instituting this type of recognition can help transform the culture of a graduate school, providing a nurturing and supportive occasion to launch students into the dissertation phase of their journey.
- *To keep doctoral students "in the fold" at the dissertation stage, the graduate program might provide periodic social events or retreats especially for these students.* Some students may no longer need to be on campus on a full-time basis, may be working off-campus, and may experience a detachment from the university; others who are working full-time on their research may be feeling depressed or bogged down or forgotten in their labs or field work. This is probably the loneliest phase of graduate education. Events that bring dissertation cohorts together can provide support and encouragement. One idea is for the university to provide regular dissertation writing sessions and for the counseling center to sponsor for doctoral candidates support groups to address the stresses of this phase of degree completion.

- *Dissertation fellowship awards provided by the graduate school on a competitive basis can provide students with a needed push to the finish line.* These awards can be significantly less than assistantships. They are available to students who are nearing the end of their research and can use some extra support for research, living expenses, or release time from work in order to complete the dissertation. This comparatively small award in many cases can make the difference between almost finishing and finishing the dissertation.
- *Most universities provide a robing or hooding ceremony during the graduation ceremonies for doctoral students, and such recognitions not only honor the graduate and mentor, but they also serve as incentives to other students.* Master's candidates and colleagues not yet finished with their doctoral research view the robing or hooding ceremony as a positive goal, and an enticement to complete the journey.
- *University awards for excellence in graduate student mentoring offer public acknowledgment of the importance of this faculty role.* Mentoring awards are given to recognize individual faculty members for their outstanding contributions to students' academic, intellectual, and professional development. Many prestigious organizations validate this concept. The National Academy of Sciences, National Academy of Engineering, and Institute of Medicine all advise that one of the first steps to recognizing a distinguished mentor is to create an institutional award similar to that of the prestigious *American Association for the Advancement of Science (AAAS)*, or the *Presidential Awards for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM)* established in 1996. Moreover, they “recommend that institutions incorporate mentoring and advising effectiveness in the criteria used for appraisals of faculty performance, including evaluations for the purposes of promotion and tenure” (NAS, 1997, p.3).
- *The Graduate Student Association (GSA) might offer mentoring awards by annually nominating a faculty member for excellent mentoring, pinpointing mentoring as one of the foundations of an excellent education.* The GSA could select an outstanding advisor or teacher who strives to aid graduate students in their academic and professional pursuits. The winner might receive a plaque, a modest monetary award to use toward educational or research supplies, or a gift certificate.

# LESSON 9 – SUPPORT SYSTEMS FOR UNDERREPRESENTED STUDENTS

**Recognize that under-represented minority and women doctoral students may be especially vulnerable, and put into place programs and services that foster engagement and minimize potential marginalization.**

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Although the degree completion rate for doctoral students in general is unacceptably low (Smallwood, 2004; Lovitts, 2001), that rate for underrepresented minorities and women is even lower (CGS, 2004; Smallwood, 2004). Often students are disadvantaged for many reasons. Being a minority of any kind (e.g., race, ethnicity, gender, age, and health) can be challenging, and that fact, when added to the rigors, competitiveness, and impersonality of graduate education, is often a heavy burden to carry.

For these and other reasons, a university that is committed to inclusiveness and diversity must deliberately put into place a series of safety nets that make success possible and that seek to address the challenges of being, for example, a woman physicist or an American Indian biochemist, particularly when you are one of the only students of this background. These individuals have often been marginalized within their disciplinary communities, and overcoming that marginalization takes a determined effort.

The university should focus not simply on financial incentives, but also on the support systems and networks undertaken by the university's administrators, faculty and staff, ancillary professionals, and graduate students. In other words, creating campus awareness about the importance of inclusiveness and diversity and providing support backed by institutional resources are critical for overall success. Existing student support offices on campuses often focus their efforts on undergraduates. These offices must be sensitized to their responsibility for serving graduate students who are from racial and ethnic minority groups or other nations.

In the overall mission to create a campus environment of inclusiveness, building a sense of collective support and excitement about the learning environment among underrepresented minority students is likely to be attractive. Students from a variety of underrepresented groups are especially helped by programs, faculty, and current students who can decipher the "unwritten rules" of the institution or the dominant culture.

Throughout these *Lessons Learned* are scattered examples of programs and initiatives that can address the vulnerable situation of minority doctoral students. Their provision should not be a last-minute add-on; they should be basic to the university's culture.

- *Components of the new student orientation should highlight successful current women and minority graduate students and faculty. Setting an example of inclusivity from the start will set a positive tone.*
- *A strong, visible Graduate Student Association can be a very effective mechanism for supporting a diverse graduate student population and for sponsoring activities that strengthen community-building among minority students. These services might include peer-mentoring provided by advanced graduate students from underrepresented minority groups. Or GSA could sponsor weekly breakfasts in their offices.*
- *Summer bridge programs provide an added head-start to graduate education and can be an effective mechanism to help students with specific vulnerabilities get launched on a positive note. These experiences are key to socializing the student into graduate study.*
- *The provision of support services around writing, editing, and statistics for graduate students can be especially helpful. While many students have strong skills in these areas, others need a support system. Such services provide a cost-effective way to facilitate the completion of publications and academic milestones.*
- *Periodic meetings with staff members from key student administration offices on campus —Financial Aid, Housing, Student Accounts Receivable, Counseling, and Mental Health —can make these staffs sensitive to the complex needs borne by students who not only are graduate students, but are also from minority segments of the population. A successfully inclusive academy serves all students.*
- *Departmental or campus-wide speaker series should include leading scholars who come from various underrepresented groups. This is another area where faculty and staff engagement and ownership is critical to achieving an inclusive community of scholars.*
- *Retreats, workshops, and social events that are designed to address the needs of underrepresented minorities across departments and graduate programs are crucial to facilitating networking and community-building. Such events could, for example, bring together women doctoral students, or Hispanic STEM students. The Office of Student Affairs could assist in sponsoring these important social events that build informal support systems for minority individuals.*
- *Graduate program directors and mentors need to be sensitive to signs of academic struggling among students so that appropriate and timely interventions can occur. The agenda of monthly meetings of graduate program directors can periodically include topics relating to diversity and inclusiveness among the graduate population. Reminders can be made that GPAs should be monitored; the*

mentor-student match should be carefully made and changed if necessary; opportunities for special study groups or additional background courses might be recommended; and referral to the counseling or advisement centers could be made where appropriate.

- *Support staff in each graduate program office should be included in the effort to make the campus environment one that is welcoming and supportive to all students.* Monthly meetings of the graduate support staff can provide a mechanism that, among other benefits, highlights the importance of seeing that all graduate students—including non-traditional students—succeed and receive help when required.

# LESSON 10 - PROFESSIONAL DEVELOPMENT

## Prepare students deliberately and explicitly for the next phase of their lives— life after graduate school.

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A university that is committed to maintaining an environment that fosters inclusiveness and success will have in place programs that go beyond the purely academic aspect of the students' education. It will acknowledge the importance of preparing graduates for success in careers and will provide mechanisms for students to move to that next step.

These programs can be offered periodically and regularly so that students can participate when they are ready.

- *Provide an opportunity for doctoral students to present academic papers within the safety of the department.* These presentations could be videotaped and constructively critiqued by fellow students and faculty prior to presentations to external audiences.
- *Encourage doctoral students to join professional associations in their discipline, to develop professional networking beyond the campus.* These experiences are important in socializing the student into the profession. They encourage networking and foster confidence-building for new initiates.
- *Make it possible for students to publish in professional journals and present at national conferences.* The willingness of faculty to share authorship with doctoral students is critical to professional development. Helping the student take the steps necessary to publish an article and submit an abstract for a conference presentation are basic aspects of good mentoring.
- *Provide workshops on skills necessary to obtain employment in the students' areas of interest, including role-played interviews.* This is especially important for underrepresented students (minorities and women in some fields) who may have greater barriers to overcome in obtaining the best jobs. Job interview and negotiation skills can be taught.
- *Bring professionals in a variety of fields— including ethnic minority and women leaders—to campus to share their experiences and provide networking opportunities for students.* Because of the small numbers of underrepresented minorities in the STEM fields, students from underrepresented minority groups often have difficulty finding “models of identity” in their chosen academic field. A program might sponsor a visiting scholars program that would help students build alliances across universities, business and industry, and government agencies. Distinguished minority scholars can be invited to campus to participate in a lecture series hosted by minority doctoral students. Minority students are able



to not only meet one on one with experts in their field but also to network with a role model with whom they can identify. Distinguished alumni from a variety of disciplines can be invited to participate in campus research fairs or speaker series, thereby providing concrete examples of success stories!

- *Offer seminars on topics such as writing for publication, grant writing, role of the postdoctoral student, tenure and promotion, and how to obtain a tenure track academic position.* Many students leave school with stellar academic credentials but lack these basic skills that are the key to professional success.
- *For those students considering an academic career, workshops or courses on effective college teaching can make the difference when the graduate steps into the academic job market.* The faculty development center on campus can be a partner in providing such training for both new faculty and upper level doctoral students.
- *Career planning programs that widen the vision of doctoral students beyond the academy are crucial for graduates of many disciplines.* The tight job market in higher education is widespread, and students need information about alternative employment options. The research and development needs of many small- and medium-sized companies are increasing as they continue to develop new technologies. The natural advance of technology is creating a plethora of new opportunities that require graduates to be able to work across disciplines. In addition, government agencies are converting some of their defense-oriented efforts to research in environmental work, communication, information, and other “hot” fields.

## CONCLUSION

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The ten *Lessons Learned* identified in this report are intended to provide deans and faculty with a guide on how to improve the inclusion of underrepresented groups in graduate education. Our approach, involving what we have labeled a Graduate Community Convergence Initiative, has served the university well in broadening the engagement of other faculty, students, and professionals, in addition to the mentor, in the graduate experience. Often, but not exclusively, our efforts have been focused in the STEM fields and involve domestic students, women, and minorities in graduate education. At UMBC we have found that by redefining graduate education into a more supportive educational experience, we are improving the overall quality of advanced study for *all* students. The process of change is one that involves all units in the university that work with students, not just the graduate school or the faculty.

While the recommendations identified are designed for any research university, they are informed by our experiences at UMBC. The catalyst for change on this campus was the impact of the successful undergraduate Meyerhoff Scholarship Program, which has provided structured support to talented students in the STEM fields. As a consequence of the success of this program, UMBC has become a leader in the production of African-American undergraduates who go on to M.D. degrees or Ph.D. programs in the STEM fields. Not only do undergraduates from UMBC go on for further study at America's finest research universities in fields where there have been historically small numbers of individuals like them, but they excel. Dr. Michael Summers, director of UMBC's Howard Hughes Medical Institute commented, "The Meyerhoff program [initially funded completely by the Meyerhoff family], which started out supporting only a dozen or so students, is clearly having a much broader impact. Perhaps the most exciting thing is that, at this point, we have no idea how far the effects of this program will reach. It's like throwing a stone in a pond and watching the ripples as they extend away from the shore. The difference is that the Meyerhoff's threw more than a stone, and the ripples are more like a tsunami, washing away misconceptions and outdated ideas and sweeping in new concepts for educating and encouraging the youth of our country."

We in graduate education are also involved in the wave of interest in creating an environment that is attractive for all of the nation's best prospective students. We have increasingly become aware that to do this involves changes in the way graduate education is overseen, administered, and managed. To be more attractive, graduate education needs to become more welcoming and more supportive of its students. Even something as basic as the mentoring relationship, which is so central to graduate education, needs further attention and refinement on most university campuses. Joseph Heathcott noted that sometimes we confuse mentoring with the "master-apprentice" role so common historically in the trades. He writes, "Molding a graduate student in our own image through a period of indentured servitude does not constitute mentoring. Although our primary task is to model intellectual rigor and commitment, mentorship also includes the work that we do to nurture aspirations, accentuate native talents, impart skills, build confidence, and direct energies without crushing a set of goals that may be different from our own." (2005, p.3).

Improving the graduate experience, and as a consequence making graduate education more welcoming to those who have historically been underrepresented, involves undertaking a set of tasks that are achievable. Take for example, the number of African-Americans who received a Ph.D. in physics in academic year 2004. A total of 13 African-Americans received a Ph.D. out of the 1,186 doctoral physics degrees awarded—a small number and percentage indeed. The same was true for all Hispanics; a total of 13 individuals received a Ph.D. in physics. Imagine, if each physics doctoral program in the United States produced one Hispanic or one African-American per year, this dismal number of minority doctoral productions would begin to be shattered.

These are things graduate deans can help facilitate. We can encourage an environment that is more supportive for graduate students, we can make information on admissions and recruitment more widely available, we can encourage best practices in mentoring and the management of graduate progressions, we can advocate for student support systems that are more responsive to the graduate community, and we can develop activities outside of the classroom or laboratory (across programs) that further support the educational experience, prepare for the future career, and build a viable social support network.

Through the interventions suggested in *Lessons Learned* we are changing the face of graduate education and, in doing so, we are responding to the pressing national need for more domestic students, women and minority graduates in the STEM fields and improving the quality of the graduate experience for all.

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