UMBC

AN HONORS UNIVERSITY IN MARYLAND

University of Maryland, Baltimore County

Baltimore, Maryland

Self-Study

Presented to:

Middle States Commission on Higher Education

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CHAPTER 1 INTRODUCTION

1 Overview of University of Maryland, Baltimore County

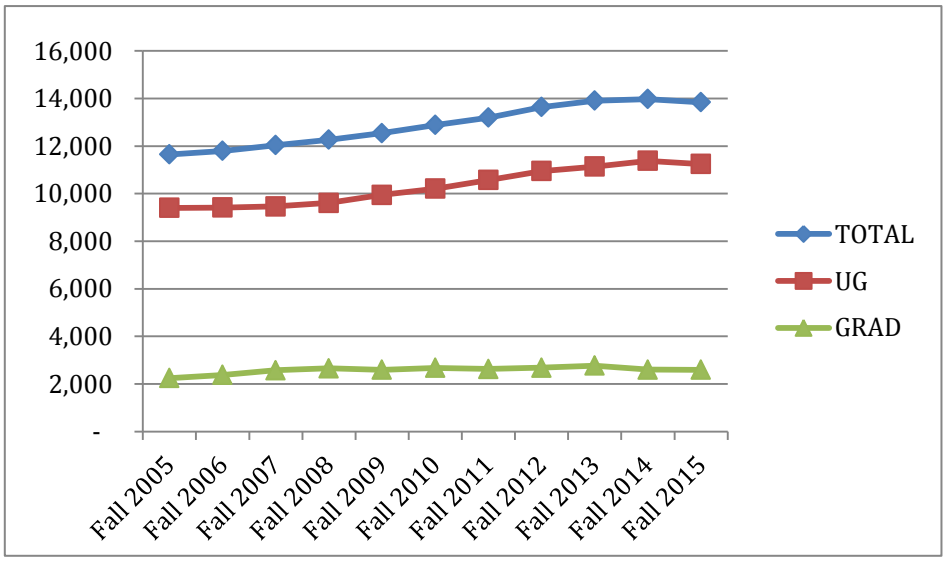
Founded in 1966, the University of Maryland, Baltimore County (UMBC) is a mid-sized public research university in the Baltimore-Washington corridor. It is a member of the University System of Maryland (USM). UMBC is classified by the Carnegie Foundation for the Advancement of Teaching as a doctoral university with higher research activity. The University delivers a distinctive undergraduate educational experience characterized by a strong liberal arts and sciences core, and it offers graduate programs emphasizing selected areas of engineering, information technology, science, public policy, and human services. The UMBC mission statement reflects the University's aspiration to "integrat[e] teaching, research, and service to benefit the citizens of Maryland."

Most of our academic programs are offered on our 500-acre main campus near Baltimore with some programs offered at the Universities at Shady Grove campus--a partnership of nine USM institutions--in Rockville, Maryland. UMBC offers 55 majors and 35 minors, as well as 24 certificate programs, spanning visual and performing arts, engineering and information technology, humanities, sciences, pre-professional studies, and social sciences.
UMBC's Graduate School offers 41 master's degree programs, 24 doctoral degree programs, and 24 graduate certificate programs. UMBC's Division of Professional Studies offers an array of professionally focused master's degrees, graduate certificates, individual courses, and non-degree training programs. Thirty-five new academic programs have been added since 2006, including three new departments: gender and women's studies, media and communication studies, and marine biotechnology.

UMBC's fall 2015 enrollment of 13,839 included 11,243 undergraduate students (84.8 percent of whom were full-time) and 2,596 graduate students (45.7 percent of whom were full-time). More than 67 percent of the 1,629 new freshmen in fall 2015 and 49 percent of the 1,242 new transfer students declared majors in science, technology, engineering, and math (STEM). The average SAT score of freshmen who joined UMBC in the fall of 2015 was 1210 for the two-part SAT and 1792 for the three-part SAT. Approximately half of all full-time undergraduates and 75 percent of all freshmen live on campus. Our student body continues to reflect the diversity of Maryland from which we draw more than 80 percent of our students. Last year, 16 percent were African American, 18 percent were Asian American, and 6 percent were Hispanic or Native American. Approximately 40 percent of each year's new undergraduates are transfer students, originating primarily from Maryland's community colleges.

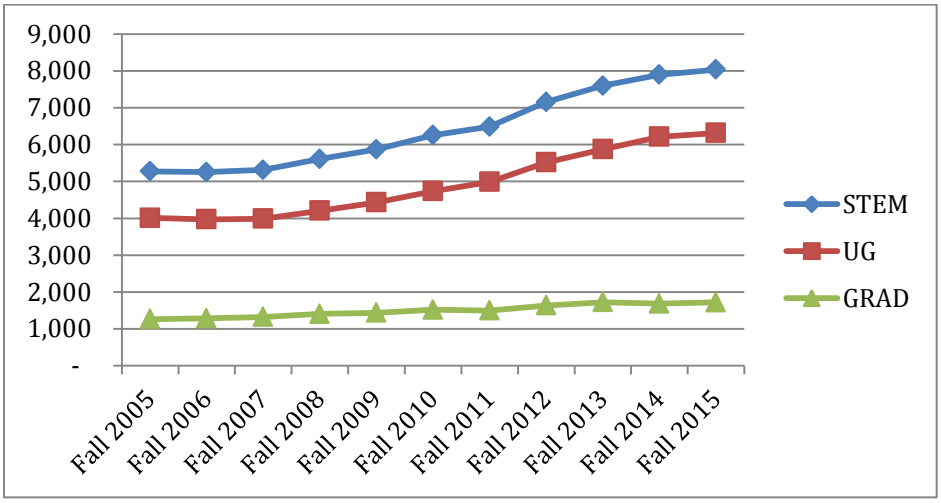
Since the last Middle States accreditation review in 2006, UMBC's undergraduate headcount enrollment has grown by 19.4 percent from 9,416 in fall 2006 to 11,243 in fall 2015. Over the same period graduate enrollment has increased by 16.3 percent, from 2,231 to 2,596. These changes are shown in figure 1.

Figure 1: Total enrollment trends of undergraduate students and graduate students



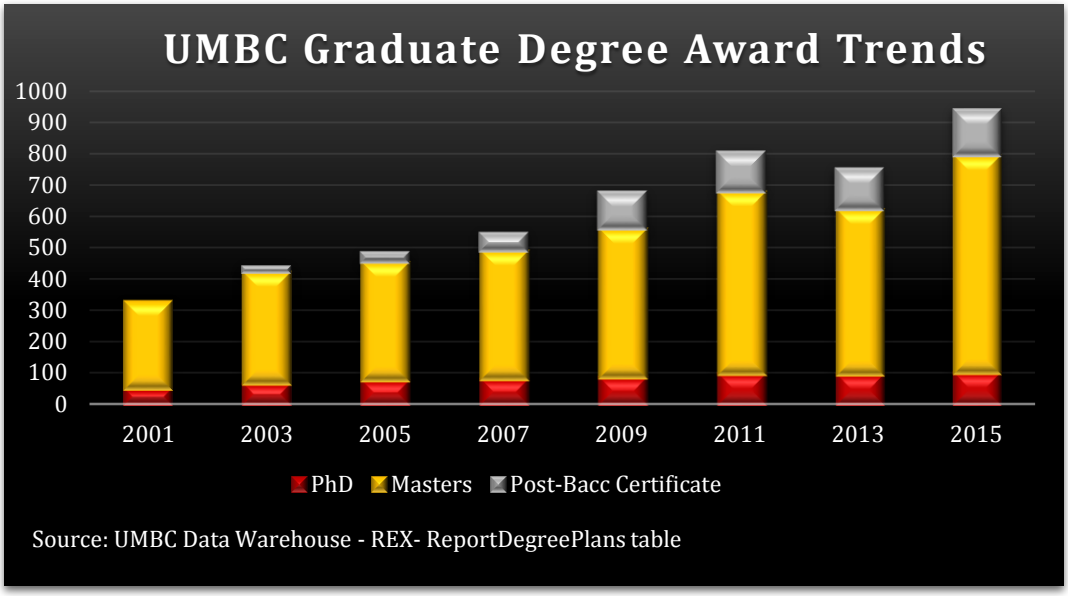
The number of STEM students has also increased among both undergraduate and graduate students in the past decade, as shown in figure 2. Total STEM enrollments rose from 5,274 to 8,035 from fall 2005 to fall 2015.

Figure 2: STEM enrollment trends of undergraduate students and graduate students



The campus has continued to increase the number of graduate degrees awarded, from 679 in 2011 to 794 in 2015, as indicated in figure 3.

Figure 3: UMBC graduate degree award trends



UMBC achieved the milestone of over 100 PhDs awarded in a single year in 2014. One hundred and ten PhD students were admitted to candidacy in November 2014, the highest number in the history of the University. In addition to these nearly 14,000 students enrolled in our traditional degree programs, UMBC serves students in summer and winter programs, the English Language Institute, and the UMBC Training Centers for a total of about 20,000 students enrolled annually.

UMBC has 527 full-time instructional faculty and 268 part-time faculty members. From 2008 to 2012, the University filled 58 new tenure-track and tenured faculty positions. We also reallocated funding from part-time faculty budgets for 20 new full-time lecturer positions to advance the curricular innovation and the quality of teaching we value.

One of UMBC's primary goals is to offer our undergraduate students an honors university experience that combines the learning opportunities of a liberal arts college with the creative intensity of a top research university. Another is to build our research and creative activity within one of the country's most inclusive graduate education communities.

In addition to these teaching and research missions, UMBC serves the state of Maryland through other means, as expressed in our mission statement. UMBC's government and industry partnerships advance entrepreneurship, workforce training, K–16 education, and technology commercialization, contributing to the state's economic development. More than 100 companies and organizations (primarily in the technology, bioscience, and environmental areas) are located at the bwtech@UMBC Research and Technology Park, home to Maryland's first cyber-business incubator. Two groundbreaking programs at the park, ACTiVATE® and INNoVATE™, work to increase the number of nontraditional entrepreneurs. The park's companies typically employ more than 100 UMBC student interns a semester and regularly partner with faculty on challenging research problems, while creating thousands of jobs and generating significant tax

revenue for Baltimore County and the state. Additionally, our education department trains teachers and provides professional development opportunities for teachers throughout central Maryland in partnership with Maryland school districts.

We are a young university with a national and international reputation for innovation and student success, particularly in STEM. UMBC has led the *U.S. News* national university rankings for strong commitment to undergraduate teaching for seven years. UMBC was ranked No. 1 in the *U.S. News* rankings of "up and coming" universities for six consecutive years. In the fall 2015 ranking of "most innovative schools," UMBC was No. 4 in the nation. These rankings reflect results of a poll of presidents, provosts, and admissions officers at other national research universities. *Times Higher Education* has five times recognized UMBC as one of the world's top 100 young universities for strong research, innovation, and an international outlook. The *Princeton Review*, *Kiplinger's Personal Finance*, and *Fiske Guide to Colleges* have repeatedly named UMBC a "best value" university. *The Chronicle of Higher Education* has recognized UMBC as a "great college to work for" for six consecutive years, highlighting the campus on its "honor roll" for the past four years.

2 Important recent advances

When UMBC was established in 1963, the law insisted that qualified students from all backgrounds could attend. Thus, we refer to ourselves as a "historically diverse institution." That birth has shaped our identity. In serving the people of the state of Maryland, one way we exercise social responsibility is to foster a diverse campus community.

The goals of the strategic plan in effect during this accreditation cycle call for excellence—in our research-linked undergraduate program, our graduate programs, and in the research and creative achievements of our faculty. The excellence we envision draws from diversity both as a matter of strategy and of moral commitment. The shorthand we often use for this overarching goal is "inclusive excellence." We have become one of America's distinctive public universities by pursuing inclusive excellence. We also, characteristically, emphasize innovation as a means to such excellence.

Many of the important advances on the UMBC campus in the past ten years reflect our embrace of excellence, inclusion, and innovation. Highlights include:

- Growth in enrollment at both the undergraduate and graduate levels, especially at a time when other universities struggled to maintain their size. (We have had a 40 percent increase in applications over the past five years.)

- Innovations in teaching, learning, and student support. We added departments, courses, and more than 30 programs; student-affiliation opportunities; transfer-student support; assistance for near-completers; and opportunities for real-world connections in an increased numbers of internships, volunteer placements, and programs in the Alex. Brown Center for Entrepreneurship. Pedagogical innovations include redesigned courses, "flipped" classrooms, and team-based learning.

- Research-infrastructure expansion, including creation of the patent office, new internal seed-funding and core research facilities, and institutionalization of collaboration with the University of Maryland, Baltimore.

- Programs for increasing the number of women faculty and students in STEM fields where they are underrepresented (such as UMBC ADVANCE) and for growing the number of faculty and graduate students who are members of underrepresented minority groups (such as the PROMISE program).

- Introduction of a budgeting process that closely ties expenditures to strategic goals while retaining the broad-based inclusiveness of the University's shared-governance structures and processes.

- Opening of the Performing Arts and Humanities Building (2012, 2014), which provides cutting-edge facilities for music, dance and theater; renovation of the Fine Arts—to be renamed the Global, Cultural, and Visual Studies--Building, which addresses critical space shortages in both the academic and research programs (2015); planning for a new Interdisciplinary Life Sciences Building to open in fall 2019. From 2006 to 2016, $455 million was provided for the construction of new facilities and the renovation of existing ones.

- Strengthening of our internal research and evaluation operations represented by a new name for our research unit: the Office of Institutional Research, Analysis, and Decision Support (formerly Office of Institutional Research, now IRADS). Along with our Division of Information Technology, IRADS established a data warehouse and reporting system that has greatly enhanced the use of data for improvement.

3 Our Self-Study

As we embarked upon the Self-Study process, we identified several intended outcomes:

- Meet the requirements of the Middle States Commission on Higher Education

- Link accreditation and strategic planning, providing a more comprehensive view of where UMBC has been and where we are going than either process could accomplish alone

- Help us better achieve our mission of integrating teaching, research, and service to benefit the citizens of Maryland, particularly by continuing to embed into UMBC the culture of assessment and effectiveness, as described in the 2008 UMBC Assessment Plan.

3.1 Why we chose the selected topics model with a focus on assessment

We chose the selected topics model, with an emphasis on assessment, in recognition of the fundamental importance of assessment, especially in light of the funding challenges that universities face. To continue our progress, we know we must find ways to allocate our resources more effectively. The entire university community has recognized that state resources have been unable to keep pace with our growth for at least a decade, and the community has banded together to find ways to advance our mission through an exceptionally strong shared-governance process. But it is also now clear that the shortage of resources is a long-term condition related to larger economic forces. To continue to support growth and new programs that advance research and student learning, we must find new methods to improve our effectiveness and use creative approaches to generate additional revenue.

Over the past decade, we have invested in data analytics to better measure and understand learning and success, and we have begun to think about how we might organize to take better advantage of what we have learned. While UMBC and the USM in partnership with the state of Maryland have worked together to limit tuition growth over the past several years, our ability to provide a high-quality education to our students and to maintain access and affordability requires that we examine the process we use to assess what our students learn, rigorously assess the factors that prevent students from succeeding, and take action in response to what we find. Even more than in the past, our decisions must be carefully informed by data, and we are laying the plans now to step up our analytic capacity.

This Self-Study considers standard 1 on mission and goals by examining strategic planning over the accreditation cycle just ended (chapter 2); relevant components of standard 2 on planning, resource allocation, and institutional renewal and standard 3 on institutional resources (chapter 3); standard 7 on institutional assessment (chapter 4); and standard 14 on assessment of student learning (chapter 5).

This Self-Study was conducted in concert with the development of a new strategic plan. To assist with the implementation of the plan, which contains a substantive set of goals and objectives, we used the Self-Study to evaluate our success and our ability to assess. In these ways, it will help us design the infrastructure that will ensure the plan's successful implementation.

UMBC has a strong reputation as an innovative and entrepreneurial campus. We are committed to becoming thought and practice leaders in the kinds of analyses that promote student learning, student success, research, operational efficiency, and the use of assessment results. In the most general terms, the Self-Study serves that end.

3.2 Self-Study Process

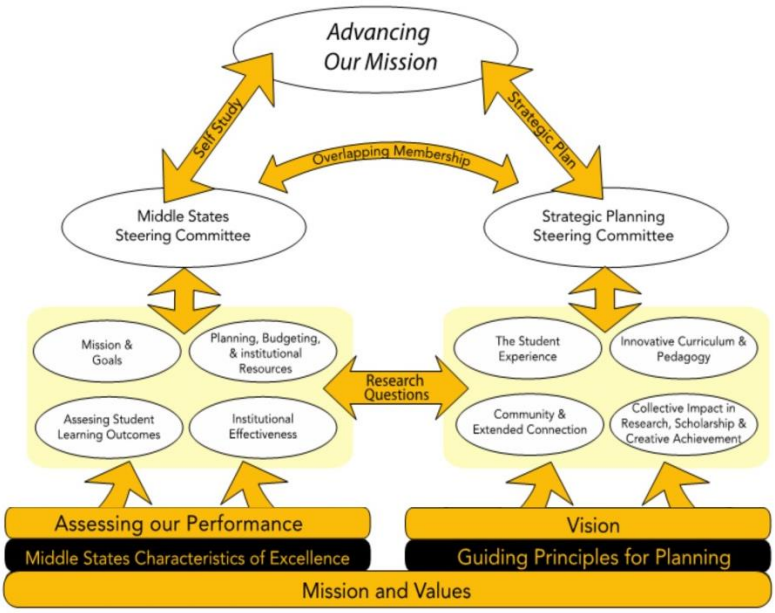
Because our Self-Study started during our campus strategic planning process, we actively engaged members of the strategic planning teams and integrated their material into the Self-Study. We used material from a late draft of the new strategic plan, *Our UMBC: A Strategic Plan for Advancing Excellence,* to facilitate discussions across the UMBC community in order to

construct the section of the Self-Study that addresses mission and goals. We also assessed results from the implementation of our two previous planning exercises, *The Strategic Framework for 2016* (2003) and *Focusing our Resources for Results: Collaborative Initiatives to Advance the University's Strategic Plan* (2009).

Finally, we integrated the research questions prepared and answered as part of the campus strategic planning process into the research questions for the Self-Study. Indeed, the construction of the planning research questions anticipated the accreditation process, and there were important areas where our planning needs and accreditation requirements overlapped closely.

Figure 4 presents a high-level view of how the strategic planning and the Middle States accreditation processes relate to one another. Each process was purposefully designed with a similar structure. Study and strategy groups were charged with answering research questions that address an identified mission, value, or thematic accreditation standard. The information uncovered by the groups was shared across processes. The groups reported their analysis, conclusions, and recommendations to steering committees with inclusive and overlapping membership to provide a more comprehensive view of UMBC. The strategic planning process identified key priorities and goals, while the Self-Study is helping us increase our ability to implement strategic plan initiatives and measure progress toward achieving those goals.

Figure 4:
How the Self-Study and strategic planning are linked



UMBC's Self-Study was an inclusive process with input from a broad range of campus stakeholders. In addition to the formal committee structure described below, community members including students, faculty, staff, alumni, and external stakeholders were invited to provide their insight and feedback on the Self-Study during multiple phases of its construction.

We provided regular updates to the campus community and to the public through our web site selfstudy.umbc.edu. Finally, as this Self-Study process took place alongside our strategic planning efforts for the University, we leveraged the communications infrastructure from both processes to report progress and results to our internal and external constituencies.

The responsibility for the construction of the Self-Study was distributed across a committee structure with the following components:

Steering committee. The steering committee had broad responsibility for the entire Self-Study process, including ensuring that it was inclusive and representative of UMBC. This group provided oversight and approval of the process at key points and ensured sufficient resources were available to complete the study. Steering committee members represented the senior leadership on campus and included our vice presidents and deans and representatives of our faculty senate, our two staff senates (professional and nonprofessional staff), and undergraduate and graduate student bodies. A representative from the University System of Maryland Board of Regents also served on this committee. The charge to the steering committee can be found in the Self-Study design document.[1]

Operating committee. The operating committee designed the organization and structure for accomplishing the Self-Study. Its executive committee met weekly to manage and coordinate the Self-Study process. Executive committee members also served as liaisons to the study groups.

The operating committee served in an advisory capacity to the steering committee and provided guidance and feedback to the study groups. This committee met monthly throughout the two-year process, and evaluated evidence produced by the self-study process and contributed to and edited the final Self-Study report. One of the co-chairs of each study group participated in operating committee meetings periodically to enhance communication and collaboration between the study groups.

Study groups. The study groups were charged with addressing the five standards that are the focus of our Self-Study. They were responsible for responding to the agreed-upon research questions and providing evidence-based recommendations for how to move UMBC forward.

Each of the four study groups was co-chaired by a senior administrator who was also a steering committee member and a faculty or staff member. Study group I was charged with assessing how well we provide an operational foundation for effective results. It reviewed our planning, budgeting, and other management infrastructure, and documented the institution's continuous quality improvement regarding Middle States standards 2 and 3. Study group II was charged with evaluating our institutional assessment activities and processes and helping us to continue our development of a formalized, periodic, and proactive institutional-effectiveness function, connected to Middle States standard 7. Study group III was charged with assessing student success and learning outcomes pertaining to Middle States standard 14. Study group IV was

[1] UMBC Self Study Design - submitted to MSCHE November 2014

charged with documenting our compliance with the standards not addressed in our selected-topics Self-Study, and this group played a critical role in supporting the other study groups' access to the documentation needed to perform their work. This group oversaw the construction of the document road map, the database that centralizes documentation of our collective institutional-effectiveness efforts.

Each study group met regularly between late fall 2014 and fall 2015 to conduct research on their designated topic. They met with division heads, academic officers, student affairs directors, other faculty, and students to collect information and feedback. Study group chairs presented preliminary findings to the steering committee in June 2015 and again to the campus community at the 2015 University Leadership Retreat in August.

The study groups, while chosen to make best use of the experience and skills of their members in relationship to the standards and functions, were inclusive and reflect an exceptionally strong shared-governance process at UMBC. Additionally, each study group included at least one person who also served on the strategic planning work groups. The charges to each study group can be found in the Self-Study design document.[2]

Reports from the study groups were compiled in a draft Self-Study and reviewed by the operating committee and the steering committee. Subsequent drafts were corrected and revised according to feedback received from these groups and finally from across the campus.

4 Conclusion

The chapters that follow present the conclusions of the study groups. Chapter 2 describes the continuous and comprehensive strategic planning process that UMBC uses to engage the campus in setting and evaluating its mission, vision, and goals and contains information about some of the investments we have made in pursuit of our goals. Chapter 3 presents the process that we use to link budget to mission, vision, and goals and evidence showing that we have been effective in establishing that important link. Chapters 4 and 5 describe the assessment mechanisms and processes that we use to gauge the performance of our academic and other units (chapter 4) and the assessment process we use to monitor and improve student learning outcomes (chapter 5). Chapter 6 presents our conclusion along with high-level recommendations to improve our performance in the future.

To foreshadow, our study groups concluded that 1) UMBC has a culture of assessment that crosses divisional boundaries, but is most developed and communicated in the academic programs, and 2) we must strengthen communication of the results of assessment, obtain more consistency in closing assessment loops, and deepen assessment in some of the academic-support administrative units.

[2] UMBC Self Study Design - submitted to MSCHE November 2014

CHAPTER 2
ADVANCING EXCELLENCE THROUGH STRATEGIC PLANNING

1 Introduction and overview: a community framework for the strategic plan

UMBC receives national attention for effectiveness in linking teaching, learning, research, and technology development to advance student outcomes and the economic, social, and cultural vitality of the state and nation. This attention is in recognition of our ability to deploy limited resources efficiently through an intentional strategic planning process and a clear statement of mission, vision, and goals that are widely known and shared by a broad array of campus constituencies.

UMBC's mission statement was established through consultation with a variety of internal and external stakeholders and approved by the Board of Regents. UMBC's mission statement reads as follows:

UMBC is a dynamic public research university integrating teaching, research, and service to benefit the citizens of Maryland. As an Honors University, the campus offers academically talented students a strong undergraduate liberal arts foundation that prepares them for graduate and professional study, entry into the workforce, and community service and leadership. UMBC emphasizes science, engineering, information technology, human services, and public policy at the graduate level. UMBC contributes to the economic development of the state and the region through entrepreneurial initiatives, workforce training, pre K-16 partnerships, and technology commercialization in collaboration with public agencies and the corporate community. UMBC is dedicated to cultural and ethnic diversity, social responsibility and lifelong learning.

This chapter is organized around our recent strategic planning history, which culminated in the adoption of a new plan in January 2016. Strategic planning is an important and sustained component of UMBC's culture. It is the primary way that the campus reflects upon its mission, vision, and goals and assesses how well we meet those goals.

Over the past 15 years, UMBC has engaged in three major planning exercises resulting in the development of two comprehensive strategic plans. The first of these plans, *A Strategic Framework for 2016*, is described in section 2 of this chapter and has guided the strategic development of UMBC since 2003. In 2008 the Council of Vice Presidents and Deans, in consultation with shared governance groups and the campus community, reviewed UMBC's progress in reaching the goals of this strategic plan. This planning exercise led to the development of the document entitled *Focusing Our Resources for Results* (described in section 3 of this chapter) that was approved by the President and the President's Council in 2009. This document established four strategic priorities and associated intermediate goals to further advance the plan and more closely link budget allocations to those goals. The priorities emerged from specific sub-goals in the *Strategic Framework for 2016.* (For example, the aim of environmental sustainability is listed in the plans for the natural and mathematical sciences, the social sciences, and engineering and information technology.)

UMBC's current strategic plan, adopted in 2016, was developed through a comprehensive three-year planning process. The plan, *Our UMBC—A Strategic Framework for Advancing Excellence,* and the planning process are described in section 4 of this chapter. The concurrence of UMBC's latest strategic planning exercise and this accreditation cycle has meant more efficient use of resources, with the research and reflection for strategic planning deepening the Self-Study. At the same time, by detailing our current assessment programs, the Self-Study has helped us set goals for our future and better understand what implementation of our plan entails.

In addition to summarizing each plan, this chapter documents the collaborative and inclusive processes, central to the culture of UMBC, that were employed to develop each iteration of the plan. The chapter also describes the extensive efforts used to communicate and consult with internal and external stakeholders about the objectives of the plan and how the campus has measured and assessed progress toward goals. Most important, this chapter presents evidence on how strategic planning has allowed resource allocation, the development of policy and procedures, and evidence-based decision making to be closely aligned with UMBC's mission, vision, and goals.

2 *A Strategic Framework for 2016* (in effect from 2003-2009)

The University's foundational planning document for much of the past decade was the *Strategic Framework for 2016*, developed by the campus community and approved in 2003. The vision statement it contains, in combination with the plan's strategic goals, is simple and powerful:

UMBC: An Honors University in Maryland seeks to become the best public research university of our size by combining the traditions of the liberal arts academy, the creative intensity of the research university, and the social responsibility of the public university. We will be known for integrating research, teaching and learning, and civic engagement so that each advances the others for the benefit of society.

The strategic goals were to:

- Provide a distinctive undergraduate experience--Strengthen UMBC's performance as a research university that integrates a high-quality undergraduate education with faculty scholarship and research through a distinctive curriculum and set of experiences promoting student engagement, such as seminars, study groups, research opportunities, mentoring, advising, co-curricular learning experiences, and exposure to diversity.

- Continue to build research and graduate education--Pursue growth in PhDs granted, faculty awards, publications, scholarly activities, creative achievements, and research grants and contracts in order to strengthen the culture of UMBC as a research university and continue to rank in a prestigious cohort of research universities.

The process that resulted in the *Framework* reflected UMBC's long tradition of shared governance, with its established structures for collaboration and communication across academic and administrative divisions and departments. Faculty, students, and staff were represented in major decision-making efforts via representative bodies and *ad hoc* groups.

Recommendations for the plan were put forward by groups studying six important areas of University activity–-enrollment management, advising, continuing education, UMBC's development as an honors university, the research environment and culture, and student life. In addition to a vision statement, the two broad goals, and the numerous recommendations aligned with the mission in the issue areas, the process led to ongoing efforts to more closely match resource allocation and strategic priorities.

The Framework was the centerpiece of UMBC's comprehensive planning during a challenging period. Enrollments, PhD production, and research funding developed more rapidly than faculty, staff, and physical infrastructure. Even in years when the campus received relatively large increases in state appropriations, our budget did not adequately support our vision and goals. Anticipating an environment of declining state funding for higher education, campus leadership understood that public universities would have to develop new management and funding models to support future progress and that UMBC would have to be intentional in its planning and decision-making.

3 *Focusing Our Resources for Results* (in effect from 2009-2015)

In 2008 the Provost led a major reassessment of the *Strategic Framework for 2016* to adapt it to changed conditions. UMBC had made substantial progress toward achieving the goals and sub-goals of the 2003 plan and had also implemented a select set of the initiatives put forward by academic departments and units. While much work remained to be done, the positive impact of our planning was reflected in increases in student graduation rates (see this chapter, p. 17), graduate enrollment (see chapter 1, p. 4), applied professional programs, and research facilities, among other achievements.

At the same time, financial crises beginning in fall 2008 had dramatically reshaped the U.S. economy and the overall fiscal climate for higher education. In Maryland, sharply declining state revenues led to budget cuts for the University System of Maryland (USM) and UMBC. Recognizing the significance of these events, campus leadership took steps to respond to the economic landscape, reflecting a belief that strategic planning and priority setting become more, not less, important when resources are severely limited.

These steps included the review and revision of our principles and approaches for cost containment and the construction of planning scenarios for current and anticipated budget reductions. In addition, the Council of Vice Presidents and Deans conducted a review of our strategic plan that affirmed our dual goals of providing a distinctive undergraduate experience and continuing to build research and graduate education. The Council recommended that new hiring, particularly of faculty, be emphasized in pursuit of those goals and that in hiring, we would increase our historical commitment to diversity.

The result of the planning exercise was a document entitled *Focusing Our Resources for Results*, which was approved by the President and the President's Council in 2009. It identified four priorities:

- Improved student retention and graduation rates
- Increased infrastructure for research and creative activity
- Greater attention to the environment (in both academic programs and campus practices)

and increased environmental sustainability

- Improved campus safety and security

Subcommittees studying each priority were charged with explaining why the priority was important to UMBC, summarizing the status of current initiatives, identifying what initiatives could be expanded and what current initiatives should be protected. They were further charged with developing cost estimates or resource requirements to support the priority, and with determining what metrics would be used to measure progress towards them.[3]

Focusing Our Resources for Results was developed in a highly consultative manner to identify important goals, improve communication, and increase the likelihood of success. The campus community engaged in a series of discussions on strategic planning throughout 2009. Four joint meetings of the Council of Vice Presidents and Deans and the Faculty Senate's Executive and Academic Planning and Budget committees were held. The Provost and the chairs of the four priority subcommittees met with the Non-exempt Staff Senate, the Professional Staff Senate, and the academic affairs directors. Vice presidents and deans shared information and gathered counsel about the priorities within their divisions and colleges. The Student Government Association and the Graduate Student Association were invited to discuss the subcommittee reports. In addition, the priorities were shared for information and feedback with the 180 participants from across the campus at the annual University Leadership Retreat in August 2009. These discussions were robust, collegial, and wide-ranging, and they resulted in substantial changes in the subcommittee reports on each of the four priorities.

Work leading up to the document was used to determine how these priorities and their associated initiatives were to be incorporated into the FY 2010 budget and steps toward execution. Continued progress on strategic priorities was made possible through proactive cost management and development of new revenue. Cost management included a hiring freeze and hiring-exception process; reductions in merit aid and facilities renewal funds; utility savings through new procurement contracts; a Blue Ribbon Commission developing recommendations regarding the future of the library; a work group assessing strategies to increase efficiencies in IT support; an effort to identify and reduce low-enrollment classes; and encouraging the saving of discretionary funds to apply to strategic priorities.

On the revenue side, we used enrollment growth to help support the priorities. Plans included growth in out-of-state enrollment; growth in selected master's programs and summer/winter session offerings; and increased student retention. We also increased revenues from research grants and contracts and from fundraising.

In 2010 the Provost reported to the campus on continuing planning and key strategic initiatives.[4] The work of the deans and vice presidents in advancing the four priorities, undertaken with advice from the Budget Committee and the President's Council, was underpinned by strong

[3] *Focusing Our Resources for Results: Collaborative Initiatives to Advance the University's Strategic Plan* (July 2009)
[4] *Update on Initiatives to Advance UMBC* (March 2010)

commitment from other leaders across campus. Remarkably, the campus was able to continue its progress on the strategic priorities during the greatest economic contraction since the Great Depression because of the dedicated efforts of faculty, staff, students, and support from the state of Maryland and the USM Board of Regents.

To ensure widespread communication, more than 200 faculty, staff, and students gathered at the University Retreat in August 2011 and discussed the evidence for progress on the priorities. The data sparked conversations that were also forward-looking, exploring ways the work of the campus should be different in the following five years. Ideas frequently mentioned across the conversations included continuing to invest in people; speeding the upward trajectory of faculty research, scholarship, and creative achievement; and advancing interdisciplinary research and program development. These areas would receive further attention in the development of UMBC's new strategic plan.

3.1 Progress on the priorities

Actions supporting the four University priorities have led, in many cases, to new or reallocated faculty and staff positions. From FY 2012 to the beginning of FY 2017, for example, 49 new tenure-track and tenured positions were filled. In addition, 18 new lecturer positions were established from 2008 to 2011 using new funds and funds reallocated from those originally earmarked for part-time faculty members. While staff hiring freezes were in place for much of the period between 2006 and 2015, a hiring-exception process allowed 1,607 positions serving vital needs or generating revenues to be filled.

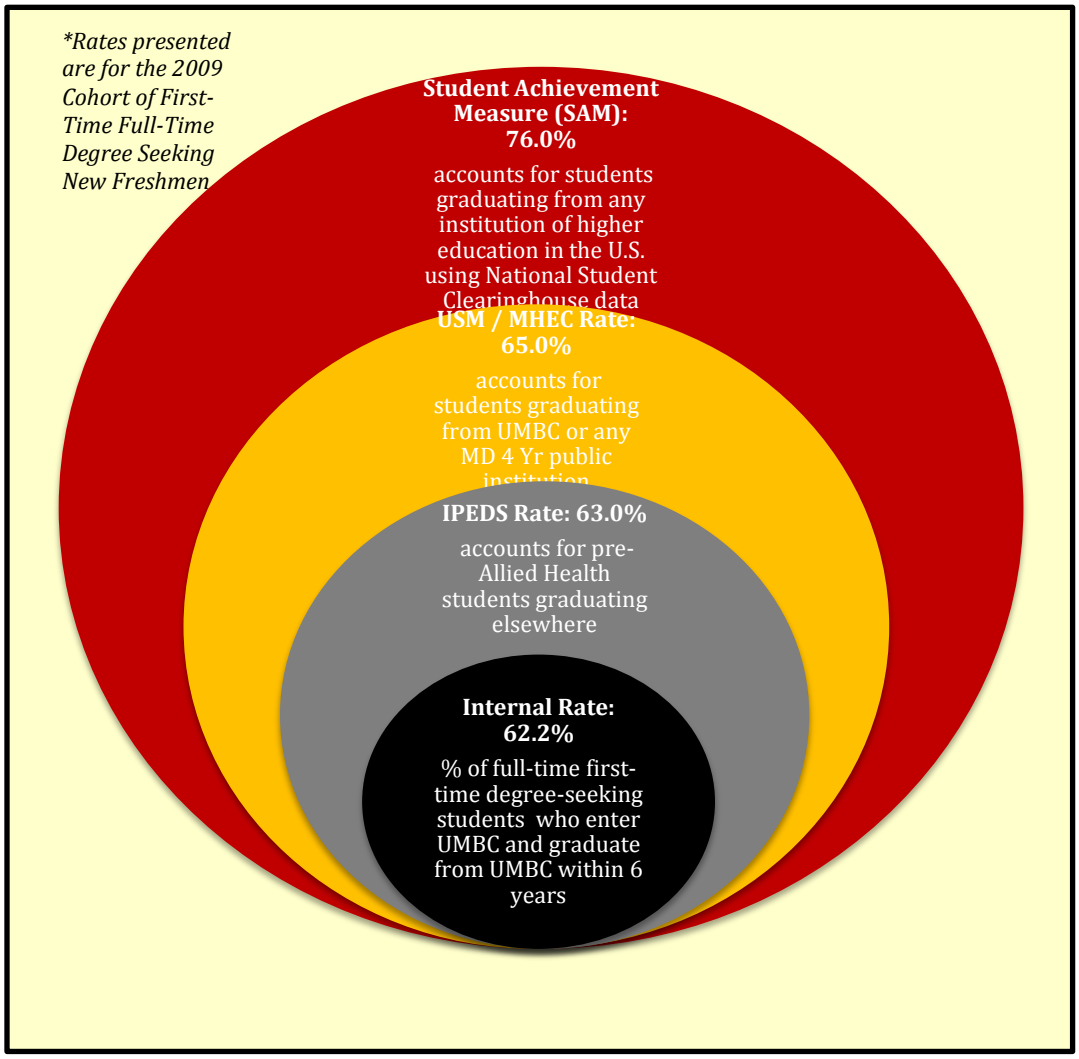
The four priorities of the plan and the resulting progress of UMBC follow.

3.1.1 Student retention and graduation rates

UMBC is committed to student success and to continued improvement in retention, four-year and six-year graduation rates, and PhD completion.

The proportion of our fall 2009 cohort of full-time freshmen who graduated from UMBC or another Maryland public institution within six years is 65 percent, up from 62 percent for the cohort that entered in fall 2000, as calculated by the USM. The most recent data from the National Student Clearinghouse shows that 76 percent of our students completed their undergraduate degrees within six years at any institution in the U.S. while an additional 9 percent remain enrolled. (The different ways we have of measuring our six-year graduation rate are shown in figure 5.)

Figure 5: Different ways we measure six-year graduation rates

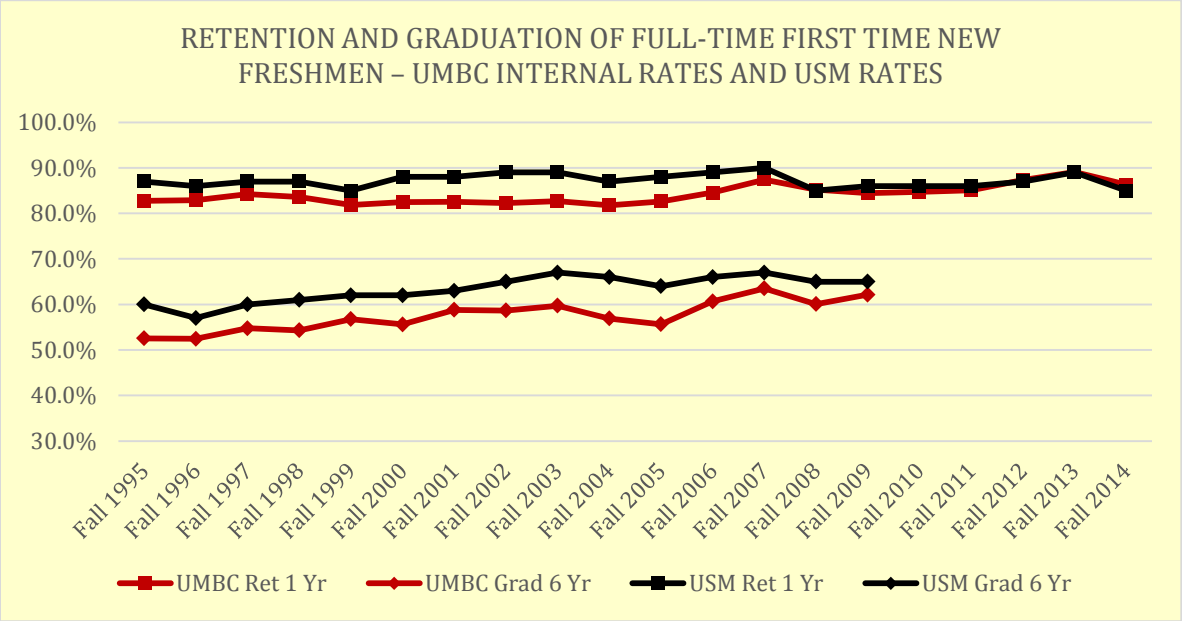


UMBC's success at graduating African American students stands out: again as calculated by the USM, in the 2009 cohort of African American students, the graduation rate was 67 percent, higher than for all UMBC students.

Our first-year retention rate for new freshmen has shown fairly steady improvement, achieving a high of 89 percent with the fall 2013 cohort of full-time new freshmen, compared with 82 percent for the cohort entering in fall 2000. And we are improving our first-year retention compared with the USM as a whole, as shown by the UMBC internal rate and the USM rate that includes students graduating from UMBC and other Maryland public four-year institutions. The USM rate for the fall 2000 cohort was 88 percent, almost six percentage points higher than the

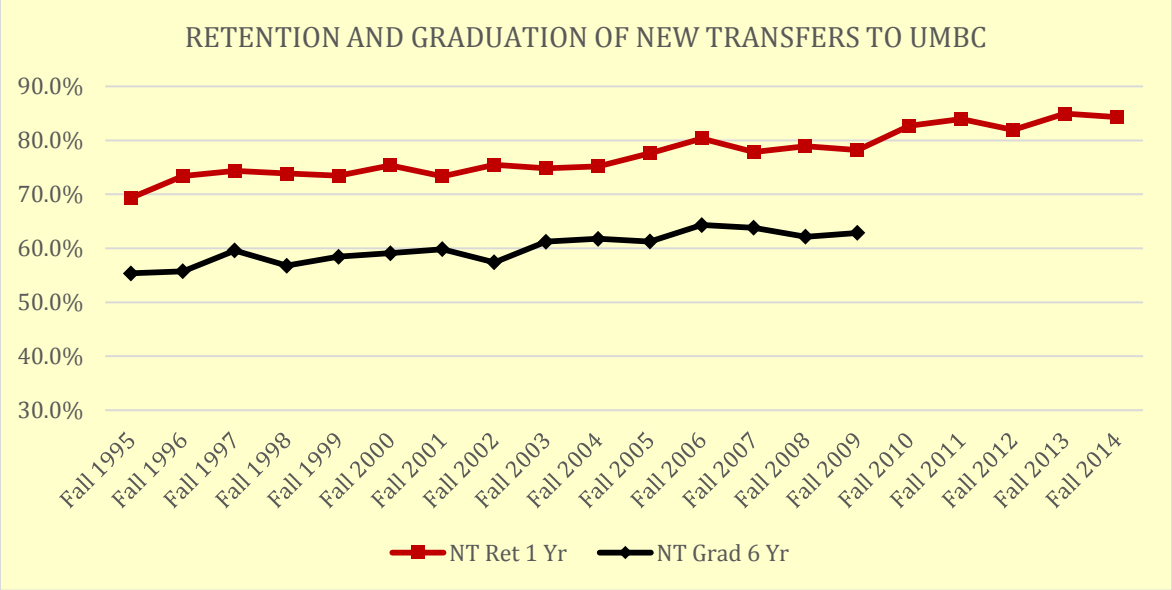
UMBC internal rate. Beginning in fall 2008, the UMBC rates and USM rates are almost equal. These trends are shown in figure 6.

Figure 6: Retention and graduation of full-time, first-time freshmen—UMBC internal rates and USM rates



Retention rates for new transfer students entering UMBC have also steadily improved, with an increase from just over 75 percent for the fall 2000 cohort to just over 84 percent for fall 2014. This trend is shown in figure 7.

Figure 7: Retention and graduation of new transfers to UMBC—UMBC internal rates



At the graduate level, the University has almost tripled the number of degrees awarded since 2001 (see figure 3, p. 6). In FY 2014-15 UMBC awarded 100 PhD degrees—a record high—and 695 master's degrees, also a record.

To support increased graduation and retention rates, the University has focused on improved pedagogy and process. We have expanded and continued student-success initiatives, including pedagogy that draws on cognitive science, analytics, course redesign, co-curricular learning, and interventions and support for first-year students and for graduate students. We have stepped up our efforts to assess these initiatives, as detailed in chapters 4 and 5. As noted above, we have also redirected funding for part-time faculty to 20 full-time lecturer positions focused on teaching and assessment. We have allocated funding for PhD completion. We have also invested in infrastructure such as the creation of dedicated active-learning classrooms and expansion of the Faculty Development Center for supporting and encouraging faculty engagement with issues of teaching and learning. Additional critical support has come from the development of UMBC's data warehouse and the REX (Report Exchange) system and our ability to attract institutional research grants focused on increasing the success of our students. These include the National Science Foundation I-cubed (see this chapter, p. 21), the Howard Hughes Medical Institute NEXUS (see this chapter, p. 21), the Gates t-STEM[5], and the National Institutes of Health (NIH) BUILD initiatives to foster broader STEM success (see this chapter, p. 27 and chapter 5, p. 125) and the PROMISE Alliance for more effective graduate education (see this chapter, p. 21).

In more detail:

- To increase the number of full-time instructional personnel and limit UMBC's reliance on adjunct faculty, new funding was made available through both the strategic-budget and the enrollment-pressure processes that allowed for funds earmarked for part-time, adjunct faculty to support full-time lecturers. The College of Arts, Humanities, and Social Sciences (CAHSS) and the College of Natural and Mathematical Sciences (CNMS) piloted the change, hiring additional lecturers who are involved in such retention activities as advising, linking with an Introduction to an Honors University course, teaching in a Collegiate Summer Institute or a first-year seminar, or mentoring in a living-learning community. As a result of the support for this objective, CAHSS not only strengthened its support of student success, it reduced the percentage of student credit hours taught by part-time faculty from 47 percent to 38 percent in all of its lower-level courses. Student credit hours taught by adjunct faculty in lower-level English courses dropped from 77 percent to 58 percent.

[5] The STEM Transfer Student Success Initiative, known as t-STEM, is an innovative multi-institutional collaboration funded by the Bill & Melinda Gates Foundation to support successful transition to UMBC by students from four local community colleges who wish to pursue STEM bachelor's degrees. A complementary goal of the initiative is the development of a national model for collaboration between two-year institutions seeking to enhance the success of transfer students in STEM fields.

- In the College of Engineering and Information Technology (COEIT), three active learning classrooms have been created in the past three years. In addition, the Center for Women in Technology (CWIT, originally the Center for Women in Information Technology but now with a mission that includes women in engineering) has been institutionalized by using state funds for staff and programming.

- The College of Natural and Mathematical Sciences Teaching and Learning Environment (CASTLE) was opened in fall 2010 to facilitate the redesign of many foundational math, physics, and biology courses essential to undergraduate success in STEM majors. CASTLE builds on the successes of the Chemistry Discovery Center in improving student learning outcomes. The 93-seat, active-learning classroom supports innovative pedagogy in ten introductory science and math courses, and reached 1,454 distinct students in AY 2011-12, the first year it was fully functional. In addition, the CASTLE has hosted discussion sessions for chemistry and hybrid statistics courses and walk-in tutorial sessions for calculus and 200-level math courses.

- Through external grants and foundation support totaling more than $22 million, UMBC has conducted research studies on improving the academic success of freshmen and transfer students. These awards include the first NSF Innovation through Institutional Integration (I-cubed) grant that tests and compares different intervention techniques to improve student outcomes in STEM; NEXUS, a Howard Hughes Medical Institute-funded collaborative experiment to develop inquiry-based learning modules centered on the application of mathematical and statistical modeling in introductory biology courses; and the STEM Transfer Student Initiative, funded by the Bill and Melinda Gates Foundation to create a national model of how community colleges and four-year institutions can collaborate in meaningful ways to improve the success of transfer students and the NIH-funded BUILD program.

- Graduate student progress toward degrees is better supported. A graduate matriculation fee was instituted to support a PhD completion coordinator, the Dissertation House program and graduate orientation. Fee funds have established base-budget support of the PROMISE Program and the PhD Completion Project, graduate student success initiatives formerly funded by external grants.[6]

  UMBC provides leadership to the PROMISE Alliance, which consists of all 14 colleges, universities, and regional education centers in the University System of Maryland, four community colleges, and a former NSF Model Institution of Excellence Hispanic Serving Institution in Puerto Rico. PROMISE has been a critical catalyst for increasing enrollment, retention, and graduation rates of underrepresented minorities. PROMISE now boasts alumni from underrepresented groups who are tenured STEM professors, and

[6] PROMISE: Maryland's Alliance for Graduate Education and the Professoriate (AGEP) is an NSF-funded program that was launched in the fall of 2013, building upon earlier versions of the PROMISE AGEP program that was established in 2002. PROMISE: Maryland's AGEP is a university system-wide effort for the state of Maryland to facilitate underrepresented STEM graduate student and postdoctoral professional development and pathways to careers.

principal investigators of their own grant funding from NSF and NIH.

In addition, the Summer Success Institute provides tiered professional development programming for new and continuing graduate students, postdoctoral fellows, and early-career faculty of color. Between 2007 and 2015, 132 students from a variety of backgrounds availed themselves of the Dissertation House to complete their doctoral degrees. The Summer Success Institute and the Dissertation House have impressed several other universities, where they are being replicated.

Proven student success initiatives have been expanded and continued. Approximately $200,000 from UMBC's Exceptional By Example annual fund campaign was directed to programs that support student success and retention,[7] including the Introduction to an Honors University Program and math supplemental-instruction sections, living-learning communities, the Writing in the Disciplines program, the undergraduate research awards, and the dissertation-completion awards. These additional funds also helped expand the work-study program for students with demonstrated financial need, and supported a student-investment lab in the Department of Economics.

Among the results of this and subsequent investments were these:

- Thirty-six sections of Introduction to an Honors University (IHU) enrolled 900 new freshmen and transfer students in academic development related to their class assignments as well as co-curricular activities.

- The IHU model was used to design a transfer student seminar to provide more specific support for this group beginning in fall 2011.

- Grants to continue expansion of Writing in the Disciplines (WID) courses were awarded in 2010-11 to the health administration and policy and the social work programs and the modern languages, linguistics and intercultural communications, and education departments. Since the WID initiative began in 2006, 112 courses have been approved as writing-intensive courses in 36 majors.

- The CAHSS established new undergraduate programs and tracks to meet student demand in Asian studies, gender and women's studies, public health, media and communications studies, and global studies.

- The Retriever Learning Center, a collaboration between the administration and the Student Government Association, opened in the Albin O. Kuhn Library in 2011, providing expanded, enhanced, always-open group-study space as part of our plan to improve the ability of the library to offer educational services to students.

- Two Dissertation Fellowships, which improve completion rates for PhD students, are awarded annually at a cost of about $20,000.

[7] Expansion of First Year Experience (FYE) Initiatives - Poster from 2011 University Retreat

3.1.2 Infrastructure for research and creative achievement

UMBC is committed to providing the infrastructure—physical, technological, financial, organizational, and cultural—that will advance research, scholarship, and creative achievement by faculty and students. During this accreditation cycle, which has been marked by federal-budget uncertainties, a major goal has been to continue to build the capacity for faculty to compete for contract and grant awards from diverse sources. Also in response to the difficult economic climate, the campus established a research initiative venture fund providing seed money across all disciplines, developed core research facilities supporting a wide range of faculty, and initiated new research centers that leverage state or federal funding.

UMBC's commitment to innovative approaches to student success has enabled the University to build a substantial institutional-level research program in STEM education that is externally supported through grants totaling approximately $22 million since 2010. In FY 2016 UMBC's external funding for research totaled more than $80 million, up from $58.5 in FY 2005. Figures 8 and 9 chart the trends in, respectively, UMBC's federal and overall research awards.

Figure 8: UMBC federal research expenditures 2006-2014

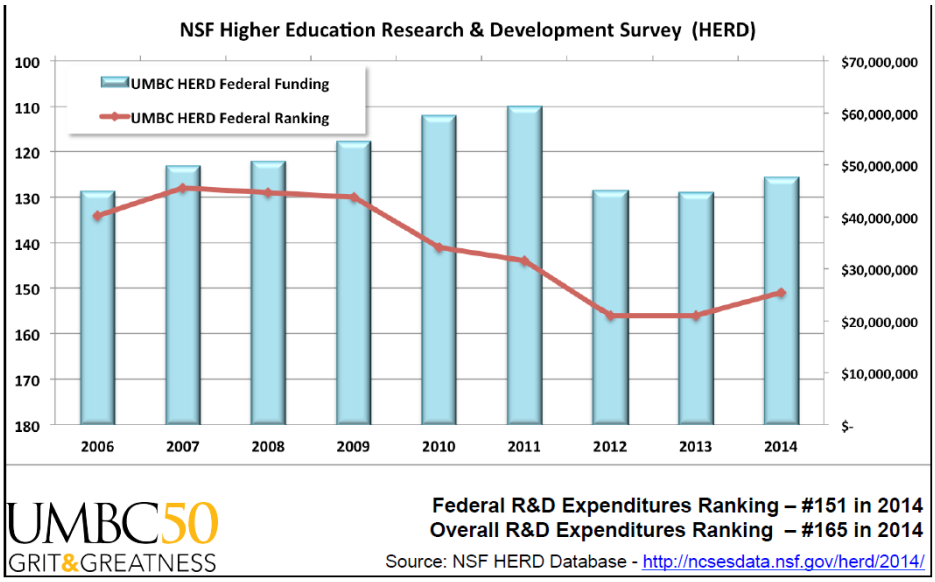
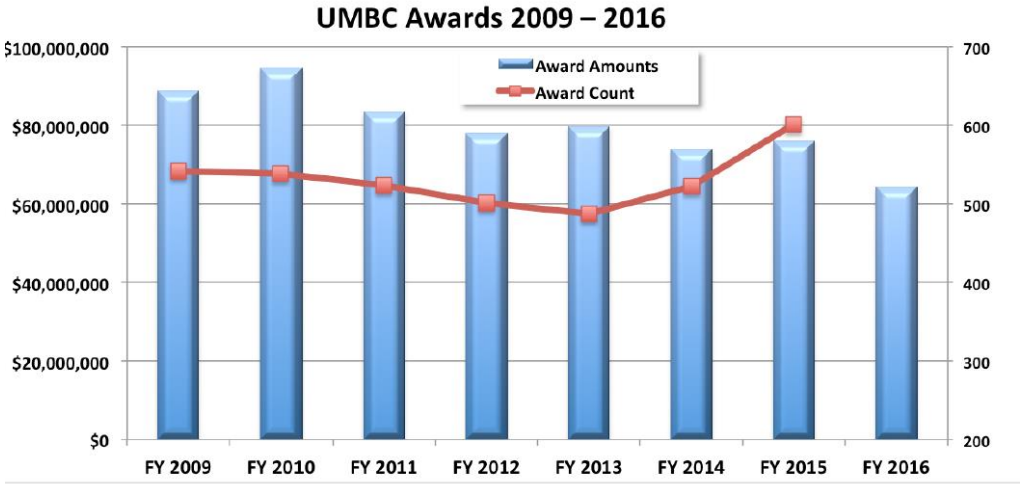


Figure 9: Total research awards to UMBC FY 2009-2016



The Office of the Vice President for Research (OVPR), which develops, oversees, and heightens the impact of UMBC's research, employs 23 staff members. It has grown to meet the demands of an expanding campus research community and new compliance and technology commercialization requirements. The Provost, the deans and the OVPR work together to provide financial incentives and administrative support to pursue external funding opportunities. The University has recently begun implementing Kuali Research, a web-based suite of software tools to simplify the grant administration process from proposals through award and compliance.

Advances in securing infrastructure for research at UMBC are detailed below:

- Since 2006, UMBC faculty have competitively secured a total of 12 National Science Foundation (NSF) Major Research Instrumentation awards, with $3.85 million from NSF plus an institutional match of $1.78 million. This research instrumentation provides significant research capabilities on our campus.

  For each of the past two years, for example, UMBC has received such grants that leverage partnerships between the artists and engineers in our faculty. In 2014, we received a $175,195 award to build a 100-camera photogrammetry room for making 3D images. In 2015, we received a $360,000 award to build a room-sized immersive virtual reality environment. The photogrammetry room is now operational, and the virtual reality room will go live in August 2016.

  In recent years, matching funds for external grant activities have transitioned from sole support by the Provost and the OVPR to a more participatory formula, which requires colleges and departments to contribute to the institutional matching, increasing buy-in.

- In late 2013 UMBC received a gift from the NASA Goddard Space Flight Center consisting of six racks of 84 computer nodes. Each node has two quad-core CPUs and a high-performance quad-data rate InfiniBand interconnect. Four of the six racks are used by the Department of Computer Science and Electrical Engineering and the other two racks are located within the University's High Performance Computing Facility (HPCF).

  NASA's contributions to the UMBC HPCF augment the existing capacity, which was developed with support from two MRI awards–$200,000 in 2011 and $300,000 in 2012. The first of these awards established the facility and the second added significant capacity in the form of hybrid CPU/GPU nodes. Both proposals included co-investigators from a wide range of departments in both the College of Natural and Mathematical Sciences and the College of Engineering and Information Technology.

- A UMBC professor of chemistry and biochemistry collaborated with colleagues from the University of Maryland, Baltimore (UMB) and the University of Maryland, College Park (UMCP) and 32 additional users from the three institutions on a successful proposal to the National Institutes of Health for a 950 megahertz nuclear magnetic resonance spectrometer. This $7.9 million federal grant was issued in late 2010, and the instrument was installed in late 2011.

- UMBC partnered with UMB on a successful proposal for the acquisition of a research-designated functional magnetic resonance imaging facility located at UMB's Maryland Psychiatric Research Center across the street from UMBC. The powerful Magnetom Trio Tim System provides high-quality images for cutting-edge research. The facility is actively used by faculty and students from both institutions and at all levels. The facility went online in 2012 and the first year included several seed-funded projects, with support from both universities, to allow faculty to get initial results and become competitive for extramural funding.

- A UMBC team led by the Vice President of Information Technology is in the third year of a $500,000 cyber-infrastructure grant from the NSF to improve the University's research computing infrastructure and bandwidth.

- UMBC has made important progress toward expanding and improving the campus's physical facilities in support of research, scholarship, and creative activity, including the opening of the Performing Arts and Humanities Building in phases in 2012 and 2014. Planning for the new Interdisciplinary Life Sciences Building is under way with opening scheduled for fall 2019. The building will provide 70,000 net assignable square feet of flexible and adaptable research and education space to support ongoing and future interdisciplinary-life-science programs. Newly leased and renovated space in UMB's BioPark district in downtown Baltimore will house the studios for UMBC's intermedia and digital arts MFA program as well as a classroom. Occupancy is expected in early 2017.

- A new Research and Innovation Partnership Seed Program was established to catalyze collaborative teams of investigators from faculty at UMB, a long-term institutional partner, and UMBC. Since 2013, UMBC has provided $550,000 in institutional support for 13 partnership grants, supporting 36 faculty members, including 18 at UMBC. A similar amount is provided by UMB, for a total of $1.1 million over four years. The teams are required to submit at least one major proposal for federal support as a condition of the award.

  These collaborative grants have been very successful in establishing meaningful and strategic research collaborations between UMBC faculty in such fields as engineering, math, biology, chemistry, and information sciences and UMB colleagues in medicine, pharmacy, dentistry, and nursing.

- The University also offers three specific internal funding opportunities:

  1) The Summer Faculty Fellowships (SFF) Program supports non-tenured but tenure-track UMBC faculty pursuing research and scholarly projects during the summer. The University has provided $540,000 for this initiative over the past six years alone. In some cases, colleges have elected to provide additional funds for faculty in their units, such that the total amount available for this program exceeds $100,000 per year over the past six years.

  2) The Strategic Awards for Research Transitions (START) Program (formerly called

SRAIS) supports UMBC faculty to advance their scholarly and research endeavors, to compete more effectively for external support, and to pursue new areas of inquiry. The University has provided $1.1 million for this initiative. Competition for this internal award is strong. Over the past six years 64 faculty members have been selected from 160 applications.

3) A new Technology Catalyst Fund (TCF) was established in 2013 to advance innovations originating from UMBC research to commercially viable technologies through such means as proof-of-concept studies, extending data collection, and prototype development). Under the TCF, a total of $300,000 has been distributed to support 15 individual projects. Since the funding was first provided in 2014, UMBC's success in launching startup companies has grown from one startup every other year to six in 2016, with another six currently in the planning stages. Several of the faculty with TCF support have successfully applied for the Maryland Innovation Initiative (MII), a statewide program to support faculty with scientific ideas for commercial applications. Since the establishment of the MII program in 2013, UMBC faculty have been highly successful in competing, with 18 awards totaling over $1.5 million secured. UMBC has invested a total of $400,000 during this time, with funds provided by the Provost, OVPR, and the Office of Institutional Advancement (OIA).

UMBC has been successful in winning major programs and assuring continued success in existing partnerships. Some recent research achievements include the following:

- UMBC received one of only ten awards under the Building Undergraduate Innovations in Leadership and Diversity (BUILD) program, launched by NIH in 2014. The $18 million BUILD@UMBC program supports the design and implementation of innovative programs, strategies, and approaches to transform undergraduate research training and mentorship. The program includes an institutional development core, a research enrichment core, a student-training core, and an administrative core. In a March 2016 site visit, NIH reviewers lauded UMBC for its leadership within the NIH-BUILD community.
- UMBC's commitment to innovative approaches to student success has enabled the university to build a substantial externally supported research program in STEM education. The university continues to make very significant progress on several institutional research studies to test models designed to support student retention and success. These projects include a large-scale random controlled trial of freshmen interventions funded by the National Science Foundation (NSF) and based upon UMBC's successful Meyerhoff Scholars Program, the Gates-funded t-STEM Partnerships at UMBC: A National Model for STEM Transfer Success, and the NEXUS project funded by the Howard Hughes Medical Institute.
- In 2016 the Goddard Planetary Heliophysics Institute, created in 2011 by UMBC under a cooperative agreement with NASA's Goddard Space Flight Center, renewed the agreement for five years and $20 million. The GPHI fosters collaborative research in solar-planetary sciences between Goddard; UMBC; the University of Maryland, College Park (UMCP); and American University.

- In 2016 the Center for Research and Exploration in Space Science and Technology, a partnership with the UMCP, submitted its proposal for a competitive, ten-year renewal of its $150 million program with NASA's Goddard Space Flight Center.
- In 2015 UMBC's Joint Center for Earth Systems Technology renewed its program with NASA's Goddard Space Flight Center for another five years at a ceiling level of $46.3 million.
- In 2014 a partnership between UMBC, UMCP, and the MITRE Corp. successfully competed for the nation's first Federally Funded Research and Development Center (FFRDC) in cybersecurity in partnership with the National Institute of Standards and Technology's National Cybersecurity Center of Excellence. This 25-year agreement has a potential ceiling funding of $5 billion, and is the first and only federal center focused on cybersecurity issues in the private sector.
- In 2013 UMBC's Center for Advanced Sensor Technologies was awarded a $15 million award from the Defense Advanced Research Projects Agency, for the development of a program entitled "Biologically-derived Medicines on Demand." The goal of this four-year program is to disrupt the current manufacturing paradigm by producing therapeutic biologics by means of a small device at the point-of-care–at the bedside or on the battlefield.
- With strong support from the Office of Naval Research, UMBC has launched a partnership with the U.S. Naval Academy (USNA) in Annapolis focused on cybersecurity research. The initial cyber-collaborative projects between the USNA and UMBC will involve areas from tactile authentication for mobile devices to detecting anomalies in cyber-physical systems to securing cloud services using policy-based approaches. Eleven UMBC faculty members are working with the USNA colleagues on $2 million in research projects.
- Research efforts in social sciences benefit from the long-time success of the Maryland Institute for Policy Analysis and Research (MIPAR), which serves as the principal campus center for scholarly research on policy and policy-related issues in the social sciences and related disciplines. MIPAR administers projects and conducts research for seven sections of the Maryland Department of Health and Mental Hygiene. MIPAR also administers millions of dollars in federal grants, notably from the National Institutes of Health and the National Institute on Aging.
- Several well-coordinated initiatives in the arts and humanities are producing unique and highly visible work in digital humanities and intercultural communications. Campus leadership in this space is provided by the Center for Innovation, Research and Creativity in the Arts (CIRCA), which supports innovative project-based research in the arts and promotes the development of interdisciplinary and collaborative projects that advance the arts in an environment of emerging technologies.
- The Dresher Center for the Humanities promotes and supports research into the historical, cultural, and social dimensions of the human experience at UMBC, in the Baltimore-Washington region, and beyond. It sponsors a humanities forum that brings high-profile speakers to campus for well-publicized, free public lectures deepened by videotaped conversations. The center is also a major partner in a National Endowment

for the Humanities grant to transform narratives on race in Baltimore. Under the aegis of the center's faculty working group on civic engagement, many of the faculty and students involved in the fall 2015 Imagining America Conference continue to work on civic-engagement projects that emerged from the conference.

3.1.3 Environment and sustainability

UMBC is committed to protecting the natural environment and promoting environmental sustainability. Our mission embraces social responsibility, which includes responsibility to the natural environment on which our local, national, and global communities depend.

The priority includes both incorporating environmental concerns into the academic enterprise and moving the campus toward greater environmental stewardship and climate neutrality. Within the academic enterprise, objectives we have achieved include continuing to develop the PhD program in the Department of Geography and Environmental Systems, initiating an engineering track focused on environmental engineering, and producing or promoting more high-quality environmental research. Contributors to UMBC-linked environmental research growth include our Center for Urban Environmental Research and Education (CUERE) and the U.S. Geological Survey Regional Water Science Center at the bwtech@UMBC Research and Technology Park, among others.

Administrative objectives we have achieved include developing of a campus Climate Action Plan in response to the American College and University Presidents Climate Commitment; conducting a comprehensive energy audit and entering into an energy performance contract to finance and complete energy conservation initiatives; identifying and pursuing strategies to improve public transportation and car- and van-pool options for students, faculty, and staff; and attracting new companies with a focus on environment and sustainability to bwtech@UMBC. That last objective also addresses our mission to contribute to the economic development of Maryland.

Some notable ways we have addressed the environmental priority are detailed below:

- UMBC was one of three USM partners in the creation in 2010 of the Institute of Marine and Environmental Technology (IMET) in Baltimore. The existing marine biotechnology research faculty in the predecessor institution formed the new Department of Marine Biotechnology in UMBC's College of Natural and Mathematical Sciences. Located on the Inner Harbor in Baltimore, IMET uses the research, training, and technology-transfer capabilities of its partner institutions--the University of Maryland, Baltimore and the University of Maryland Center for Environmental Science. It conducts marine and environmental research that supports development of technologies to address protection and restoration of coastal marine systems and watersheds, sustainable use of their resources, and improvement of human health.

- The Geography and Environmental Systems Department has expanded. Undergraduate majors have grown from 163 in 2008 to 314 in 2015, and a new graduate program begun in 2008 has maintained enrollment of approximately 16 PhD and 35 master's students. Tenure-track faculty positions have increased from eight to 12. External funding has grown.

- Undergraduate majors have grown from 168 to 291 in six years, a new graduate program enrolled 13 PhD and 40 master's students, tenure-track faculty positions have increased from eight to 12, and external funding is growing.

- UMBC is attracting new businesses to its research park with a focus on environment and sustainability. Through a partnership with the Maryland Clean Energy Center and Baltimore County, bwtech@UMBC Research and Technology Park has established an incubator for clean energy start-up businesses.

- We are implementing the Climate Action Plan. The Climate Change Task Force submitted the plan in September 2009, as required by the American College and University Presidents Climate Commitment signed by President Hrabowski in 2007. This document describes the campus' plans to reduce its carbon footprint over time. The FY 2015 greenhouse gas inventory showed a decline of 15.5 percent from our FY 2007 baseline. The decline is attributable to lower electricity usage, an increase in renewable energy credits, and a reduction in air travel.

- After a comprehensive energy audit, UMBC entered into an energy performance contract with the state to finance $13 million in major energy conservation projects on campus, with the debt to be repaid through energy cost savings over ten years.

- An environmental sustainability coordinator to promote and track conservation, recycling and other environmentally beneficial activities was hired in 2012.

- The new Performing Arts and Humanities Building and the Patapsco Hall addition were built to Gold LEED (Leadership in Energy and Environmental Design) specifications.

3.1.4 Campus safety and security

Campus safety and security are linked to the University's educational mission. This priority encompasses concerns from cyber security and lab safety to crime prevention and the social and cultural climate for women and members of minority groups. A broad aim stemming from this priority was to implement best policies and practices for creating environments that promote learning and personal and professional development by eliminating or minimizing physical or psychological disruption to normal University activity and operations. Specific initiatives successfully undertaken included completion of a comprehensive emergency response plan; upgrades to public-safety communications systems; outreach to faculty, staff, and students for crisis- and emergency-response training as well as for mental health and behavioral intervention; expansion and improvement of counseling services on campus; and the institution and enhancement of educational programs related to alcohol, drugs, sexual assault, and misconduct.

Specific examples of this work in recent years include:

- Whereas best practice demanded emergency plans be put in place to react quickly to crises, lessons learned from campus shootings suggest that the only way to truly stop interpersonal violence is early intervention. Therefore, UMBC has trained more than 300 people from across campus in a mental health first aid certificate program, a collaborative

program with the Maryland Mental Health Association. The program is a comprehensive eight-hour training designed to help participants recognize behaviors of concern, intervene appropriately, and make referrals. UMBC was the first campus in Maryland to implement this training.

- The Division of Administration and Finance and the Division of Student Affairs funded a quick-reference, desktop guide to emergency response, which has been distributed across the campus. The Division of Student Affairs created a referral guide to responding to behaviors of concern that is annually updated and distributed at faculty and staff orientations.

- Counseling Center capacity was expanded through development of a supervised counseling internship program and additional counselor positions.

- An interdisciplinary group of UMBC personnel trained in behavioral-risk and threat assessment was established. Since the 2010-11 academic year team members have consulted on 625 cases.

- University Health Services employs a coordinator to respond to victims of sexual misconduct. Reporting of sexual misconduct has increased over the past four years.

- Since the Relationship Violence Prevention Program was launched in 2011, it has reached an estimated 8,000 community members with educational messages and training to encourage positive-relationship behaviors. The program includes a web site, student advocates, a speaker series, a poster campaign, relationship-skills training, and the Green Dot Bystander Intervention Program.

- Emergency preparedness and pandemic response plans have been updated to meet state and federal guidelines and now guide the work of the University Emergency Preparedness Executive Committee. Senior campus leaders have been trained to administer these plans, and more than 200 staff members have been trained in emergency response.

- An Emergency Response Center has been established, campus radio communications have been upgraded, and executive leadership has been trained in crisis management.

3.2 Progress on diversity

In accord with *Focusing Our Resources for Results* recommendations, hiring at UMBC in recent years has taken place in the context of increased commitment to demographic and other kinds of diversity. Commitment to ethnic and cultural diversity is part of our mission statement. In 2009 the commitment was made more formal when the campus adopted a diversity plan, which coincided with the adoption of the four priorities. Diversity is defined at UMBC in its fullest sense, addressing not only racial and ethnic groups and individuals who have been underrepresented in higher education, but also religious affiliation, sexual orientation and gender identity, disability, foreign nationality, non-traditional student status, and other characteristics.

UMBC has won national recognition for its diversity initiatives for undergraduate and graduate students.[8] These include the undergraduate and graduate Meyerhoff Scholars and Fellows Programs (see chapter 4, p. 74), the UMBC ADVANCE Program (see chapter 4, p. 80), the PROMISE Alliance (see this chapter, p. 21), the Center for Women in Technology, the MARC U*STAR Scholars Program[9], the ACTiVATE Entrepreneurship Program,[10] and, most recently, the NIH BUILD Program (see chapter 5, p. 125). All of these programs recognize the particular challenges facing groups of students in being academically successful and seek to address them.

UMBC also places a high priority on continuing to raise the proportion of underrepresented minority faculty–particularly those of African American and Latino or Hispanic background–across all disciplines, and on advancing the success of women faculty in STEM areas. Research has shown that such diversity is positively associated with student success since students are more likely to persist and achieve on a campus when they are taught by people with similar backgrounds. We are also conscious of a growing body of research that shows additional benefits of a diverse faculty, including the introduction of new perspectives, greater community awareness, and higher departmental rankings. To reap those benefits, UMBC has significantly increased underrepresented minority group members in faculty positions and women in STEM faculty positions (see chapter 4, p. 80 on the UMBC ADVANCE Program).

UMBC's 2009 diversity plan advanced four recommendations:

- Establish a diversity council to review and shape inclusion initiatives on campus
- Address the minority achievement gap through increased support for transfer students
- Continue to increase the diversity of UMBC's faculty and staff

[8] UMBC faculty and staff have published numerous articles on building and assessing inclusive excellence. Some by Janet Rutledge and Renetta Tull of the Graduate School can be found at PROMISE - Maryland's AGEP - Publications and Media. Other recent articles include Mack, K. & McDermott, P. (2014). "The Twenty-first Century Case for Inclusive Excellence in STEM." Peer Review 16, 2 and Summers, M.F. & Hrabowski, F.A.III (2006). "Preparing Minority Scientists and Engineers." Science 311: 1870-1871. Also see footnotes 56 and 58.

[9] The UMBC MARC U*STAR (Maximizing Access to Research Careers Undergraduate Student Training in Academic Research) Program is a preeminent undergraduate scholarship opportunity with the goal of increasing the number of students from underrepresented groups who pursue PhD degrees and research careers in the biomedical, behavioral or mathematical sciences. The program is funded by the National Institute of General and Medical Sciences of the National Institutes of Health.

[10] Started by UMBC in 2005 initially with NSF grant funding, ACTiVATE is an award-winning entrepreneurship program for mid-career women with significant business and technical expertise that has helped to launch and grow more than 30 technology-related companies.

- Enhance support for faculty and staff recruited to UMBC under various diversity initiatives.[11]

Since then UMBC has made significant progress on these objectives:

- The Diversity Council has focused on inclusion, student achievement gaps, and the physical and psychological safety for all members of the UMBC community. For example, recently the council has focused attention on the climate for LGBTQ (lesbian, gay, bisexual, transgender, and queer) and Muslim students. The council develops an annual report that summarizes institutional progress on the diversity plan, efforts to increase the representation of historically underrepresented groups, and closing achievement gaps.

- African American freshmen at UMBC now graduate at a higher rate than the overall freshman population and a higher rate than the USM average. Over recent years the graduation rate for UMBC's relatively small cohort of Hispanic freshmen has varied without trend around the overall freshmen rate. UMBC was recognized in 2016 by the U.S. Department of Education for our efforts to support low-income students: the percentage of students receiving Pell grants increased 27 percent from 2008 to 2013 and more than 60 percent of the UMBC Pell recipients graduated in six years.

- The diversity plan identified an achievement gap between white and African American transfer students manifested by a 12 percentage point difference in graduation rates in 2009. Through increased support for transfer students, this gap narrowed to 2.1 percentage points.

- The new strategic plan identifies raising the proportion of underrepresented minority faculty as a critical priority. In 2010 the Provost created the Executive Committee on Recruitment and Retention of Underrepresented Minority Faculty to bring together faculty and the Provost to work collaboratively to develop, implement, and assess initiatives to increase the recruitment and retention of underrepresented minority faculty. Through this effective collaboration, UMBC has launched several new initiatives over the past five years including incentive hires; a Postdoctoral Fellows for Faculty Diversity program; implementation of Interfolio, an online platform built for the academic-decision process, for all faculty searches; a pro-diversity faculty committee called STRIDE;[12] the Emerging Scholars Program; and enhanced marketing and outreach.

- Similarly, the ADVANCE Executive Committee provides advice and counsel to the Provost regarding initiatives designed to advance the success of women faculty in STEM areas, including the institutionalization of components of the ADVANCE program that

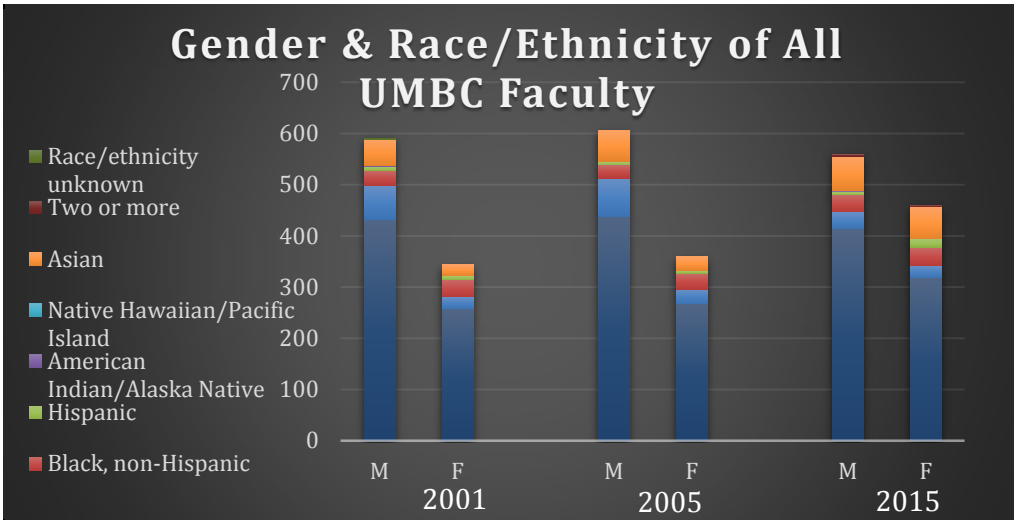
[11] UMBC Diversity Plan (March 2009).

[12] Committee on Strategies and Tactics for Recruiting to Improve Diversity and Excellence (STRIDE) is a faculty-led group that provides guidance on best practices that will maximize the likelihood that diverse candidates for faculty positions will be identified, recruited, and hired at UMBC.

were originally supported through grant funding (examples include the ADVANCE Leadership Cohort, the faculty ADVANCEment workshops and the Eminent Mentors Program that is now provided for all new faculty). The proportion of female STEM faculty is now 23 percent (43 of 183) and the representation of women faculty in the College of Engineering and Information Technology is 27 percent. According to a 2010 report by the American Society of Engineering Education, the college ranked 15th nationally in the percentage of female faculty in tenured or tenure-track positions.

UMBC has made progress, as indicated in figure 10, especially in raising the proportion of women faculty. Nonetheless, we recognize that there is still much to do. For example, between fall 2012 and fall 2015, the percentage of new tenure-track or tenured underrepresented minority faculty joining UMBC showed a modest increase from 17 percent to 23 percent.

Figure 10: Demographic characteristics of UMBC faculty 2001-2015



4 *Our UMBC--A Strategic Framework for Advancing Excellence* (2016)

The recently completed strategic planning process began in fall 2012 with the establishment of the Strategic Planning Steering Committee (SPSC). Participants included representatives from shared governance bodies, faculty members from a diverse set of departments and programs, four vice presidents, two additional administrators, and to better integrate the strategic plan with the Self-Study, the co-chairs of the Middle States Accreditation Steering Committee.

The SPSC conducted two retreats on how to develop, implement, and evaluate an effective strategic planning process. The steering committee reviewed the history of strategic planning at UMBC and constructed a timeline for developing the new plan. It also created a set of guiding principles for the planning process that were consistent with UMBC's core values. These Guiding Principles for Planning established standards for the process addressing such areas as

analysis, campus engagement, alignment with UMBC's mission and vision, and fit with University System of Maryland and state goals.[13] Those principles and the planning process were shared with and reviewed by the campus leadership at the 2013 University Leadership Retreat. Also in 2013, a survey solicited feedback from student, faculty, staff and alumni about their views on UMBC's vision statement.

A goal of the 2013 university retreat, attended by approximately 200 campus leaders, was to evaluate how well UMBC met the goals of its previous strategic plan: *Strategic Framework for 2016.* A significant part of the retreat was devoted to an interactive data gallery where participants reviewed posters and provided feedback. The gallery had 36 posters broken into five sections for the five topic areas of the *Strategic Framework*: student body size and composition; faculty size and composition; program and curriculum development; management, organization and staffing; and external relations with the Baltimore region and beyond.[14] The gallery conveyed the data and analysis needed for an evidence-based discussion of how well UMBC did in accomplishing each goal of the *Framework.*

Members of the SPSC facilitated discussions about vision language and planning focus areas under consideration with a variety of faculty, staff, student, and alumni groups in fall 2013. Thirty-five sessions were held, involving nearly 800 members of the campus community. This highly consultative framework characterized the entire life of the strategic planning process. By its end there were more than 70 opportunities for members of the campus community, including representatives of each of the shared governance groups, to provide feedback. More than 5,000 community engagement interactions occurred through the process, with feedback from the interactions shared with the steering committee.

Feedback from these meetings helped the SPSC develop a draft vision statement that was shared with the campus in spring 2014. It also guided the steering committee in selecting areas that would constitute the focus of work for strategy groups.

To support these efforts, the Office of Institutional Research, Analysis, and Decision Support (IRADS) coordinated the development of an environment scan that included documents and data relevant to the planning process. A work group led by the Vice President for Administration and Finance and staffed by campus subject-matter experts was established to review five key foundational areas required to support a successful strategic plan: people, resources, facilities, technology and business practices, and environmental sustainability. A review assessed history, strengths, "pain points," and opportunities.

The 2014 University Leadership Retreat provided campus leaders the opportunity to review the progress of each strategy group and to provide feedback. An interactive gallery included posters for each of the four strategy groups.[15] Breakout sessions with strategy group co-chairs allowed participants ample opportunity to engage more intensely with the work of the groups.

[13] Strategic Planning - Guiding Principles
[14] 2013 Data Gallery Subfolder
[15] 2014 Data Gallery Subfolder

Strategy groups and subgroups met with multiple campus constituents and offices in fall 2014 to solicit feedback and assistance with their research. The groups delivered their recommendations to the steering committee in spring 2015. The reports included a narrative that explained how the committee came to each recommendation, including which stakeholders they engaged during deliberations. Recommended objectives included measures of success. The reports were shared with the campus on the Provost's web site. The SPSC met to review the reports and make recommendations about how to best align goals, objectives, and measures of success.

During the 2015 campus retreat in August, again attended by approximately 200 campus leaders, the Chancellor of the University System of Maryland, and a representative of the USM Board of Regents, feedback was solicited for the draft strategic plan. The retreat also included presentation of the draft reports of the Middle States accreditation study groups, and a data gallery that displayed evidence related to the five standards included in the Self-Study. The data gallery was designed to acquaint the campus with the Self-Study and to solicit feedback and additional evidence.[16] The data prompted conversations, and several retreat participants responded to the displays with written questions or suggestions. The final draft of the strategic plan was delivered to the campus in December 2015,[17] as the first draft of the Self-Study was being prepared.

The strategic plan, adopted in January 2016, honors our founding commitment to serve the citizens of Maryland and to welcome people of all backgrounds into the life of the University. It builds on our achievements as a selective, public research university strongly connected to the economic and civic life of the Baltimore region and the state. It provides a focused, complementary set of goals, strategies, and recommendations to guide faculty, staff, students, and alumni as we further UMBC's evolution as a nationally and internationally recognized public research university and addresses four focus areas and primary goals selected by the UMBC community as fundamental elements of academic excellence. Those primary focus areas and goals are:[18]

1. **Collective Impact in Research, Scholarship, and Creative Achievement:** Elevate UMBC as a nationally and internationally recognized research university strongly connected to the economic and civic life of the Baltimore region and the state of Maryland. The key drivers in achieving this goal are: creating an inclusive environment for faculty, students, and staff; developing excellence at new intellectual frontiers; and fostering multidisciplinary and inter-institutional approaches that build research across the campus.

[16] 2015 Data Gallery Subfolder
[17] Strategic Planning Steering Committee Final Report - December 18, 2015
[18] The strategy group reports contain full narratives that discuss the research and reasoning that informed each group's conclusions.

2. **The Student Experience:** Create vibrant, exceptional, and comprehensive undergraduate and graduate student experiences that integrate in- and out-of-classroom learning to prepare graduates for meaningful careers and civic and personal lives.

3. **Innovative Curriculum and Pedagogy:** Develop innovative curricula and academic programs that support and enhance the success of our undergraduate and graduate students and prepare them for meaningful careers, lifelong learning, and engaged citizenship; and thereby enhance our position as a national leader in undergraduate and graduate education.

4. **Community and Extended Connections:** Build, nurture, and extend connections with diverse internal and external partners to enrich campus life, local neighborhoods, the state, and the surrounding region and foster innovative problem-solving and responsible entrepreneurship through strategic partnerships with alumni, government agencies, businesses, and community-based organizations to create a sustainable and prosperous future for all.

The plan makes clear that implementation will require us to invest in faculty and staff and the facilities and technology infrastructure they need for their work, including more extensive assessments and analytics. The plan is also realistic in that it recognizes that some of our goals will require us to generate new resources.

The plan's implementation is the responsibility of the Council of Vice Presidents and Deans, reporting to the Provost and the President, and working in consultation with the campus community and shared governance groups. The council will develop multiyear operational plans, link planning to budget, and provide a transparent process for periodic progress reports and tracking. The plan includes many measures of success to monitor progress toward objectives.

Though we did not let current or anticipated resources constrain our aspirations, those who worked on the plan were mindful that funding as well as well-supported people are critical to achieving the goals. Momentum in the focus areas depends upon strong enrollments, continued improvement in student success, and growth in research funding, strategic partnerships, and alumni engagement.

The outcome of the strategic planning process left UMBC's mission statement unchanged, but we adopted a new vision statement:

Our UMBC community redefines excellence in higher education through an inclusive culture that connects innovative teaching and learning, research across disciplines, and civic engagement. We will advance knowledge, economic prosperity, and social justice by welcoming and inspiring inquisitive minds from all backgrounds.

The revised vision statement maintains our commitment to innovative teaching, learning, and research, and recognizes the benefits of inclusive, engaged, and cross-disciplinary research. The new vision statement also makes clear our commitment to the important role that public universities play in advancing economic prosperity and social justice.

Break-out box **Strategies to expand research at UMBC**

While the implementation of the new strategic plan is in its initial stages, important progress has already been made on elements of it. In particular, the Office of the Vice President of Research has prepared a detailed position paper, excerpted below, which outlines research initiatives and strategies for growth in accordance with the goals and objectives of the plan.

UMBC's growing research efforts are well aligned with regional and national priorities regarding environment, health, and national security. Table 1 provides an overview of these research initiatives, which fit within a recommendation made in the new strategic plan under "Collective Impact of Research, Scholarship and Creative Achievement." The strategic plan goal is to:

> *"Increase national prominence in selected multidisciplinary areas spanning the natural sciences and mathematics, engineering, information technology, social sciences, arts, and humanities. Potential focus areas for the development of multidisciplinary research excellence include, but are not limited to, health, national security, environmental studies, data science, civically engaged scholarship, and global/transnational areas."*[19]

Each of the multidisciplinary research areas that appear in the research plan was selected through multiyear campus-wide strategic planning processes, and are based on existing strengths and perceived future growth opportunities for the campus. For example, the focus on environmental sciences and engineering is driven by UMBC's existing cooperative agreements with NASA Goddard Space Flight Center and on the substantial interdisciplinary efforts coordinated by the Center for Urban Environmental Research and Education (CUERE), whose mission is to advance the understanding of the environmental, social and economic consequences of changes to the urban landscape. In 2015 CUERE teamed with 14 other academic institutions and was awarded one of six highly integrated regional urban water sustainability hubs by the National Science Foundation.

[19] Strategic Planning Steering Committee Final Report - December 18, 2015

Table 1: UMBC's focus areas for research

Environmental Sciences & Engineering	Computer Information Sciences & Engineering	Life Sciences	Social Sciences	Arts & Humanities
Atmospheric Physics & Remote Sensing	Cybersecurity	Bio Sciences & Engineering	Policy Studies	Public Humanities
Ecology & Remediation	Big Data	Marine Biotechnology	Health Equity	Digital Arts and Humanities
	Health IT			Intercultural Communications

[Caption:] UMBC's Strategic Research Initiatives are well aligned with regional and national priorities and build upon the inherent interdisciplinary strength of the faculty.

The overall strategies to further grow UMBC's research portfolio include:

- Raising UMBC's research profile through research positioning initiatives**,** which focus on both internal and external audiences. While UMBC has been successful in developing a national leadership position in undergraduate education and inclusive excellence, many of our potential research partners, possible future faculty members and students, and even alumni are not aware of the existing strength of UMBC's sizable research portfolio. We have a vibrant, interdisciplinary, and collaborative research environment with significant efforts supported by federal, state, and private sources. As UMBC evolves, we need to ensure that our profile and plans are known. We want potential partners to come to UMBC and expect excellence in both teaching and research from our faculty and students. We have therefore launched a comprehensive research-positioning initiative to ensure that both internal and external stakeholders are fully aware of UMBC as a research institution. On the UMBC side, the goal is to grow and foster a culture that consistently supports and recognizes research, scholarship, and creative achievement. On the external side, we will focus on increasing the national and international visibility and recognition among peers, partners, the public, prospective graduate students, and potential new faculty hires.

- Creating an ecosystem that fosters excellence by establishing "communities of excellence." Such communities bring together groups of faculty from a variety of disciplines around a common goal. In this framework, faculty and staff can be hired in clusters and shared facilities can be created to encourage interdisciplinary collaboration. Recognition of faculty activities and achievements that bridge traditional disciplinary boundaries becomes important.

- Securing access to resources, including space, personnel, policies, and incentives. Within this framework, the Office of the Vice President for Research provides support for seed grants and works with campus leaders to establish shared core instrumentation centers.

- Developing sustainable partnerships with academic partners on the national and international stage, with federal and state agencies, and with the private sector to position UMBC to grow its research capabilities.

- Establishing a new model to enhance extramural federal funding through a partnership that was created with the NIH. NIH has recognized UMBC's extraordinary success in graduating underrepresented students in STEM research areas and the potential that creates to place our highly qualified students in NIH intramural research laboratories. A senior extramural program staff member at the NIH is working full-time on the campus to build UMBC's NIH research portfolio, while creating linkages to enhance diversity at the NIH. If successful, this model might be adapted at other campuses.

Break-out box **Assessing the role of interdisciplinary activities at UMBC and their role in our mission, vision, and goals** [20]

The Strategic Framework for 2016 *called for us to work beyond department boundaries based on a long tradition of interdisciplinary work. Our new strategic plan seeks to increase UMBC's research prominence "in selected multidisciplinary areas spanning the arts, engineering, humanities, information technology, natural sciences and mathematics, and social sciences." Our new vision statement presents UMBC's "research across disciplines" as a defining characteristic of the University.*
In light of this centrality, the Provost directed a task force to explore ways to overcome barriers to and expand opportunities for interdisciplinary cooperation at UMBC. Highlights of the task force's 2015 report are below.

Through conversations with campus leaders and faculty across campus and research into national best practices, the Interdisciplinary Activities Task Force gained substantial insights into interdisciplinary work. Three observations frame their findings:

1. The wealth and diversity of our interdisciplinary activities are not always visible.
2. The term *interdisciplinary,* used by faculty and academic staff to identify the activities within their own units, actually covers a great variety of activities.
3. While the term *interdisciplinary* is often understood to require collaborative research, it often refers to the single researcher who combines multiple areas of methodological expertise to investigate a topic.

The task force recommendations seek to strengthen campus support for interdisciplinary work and to strengthen the incentives, rewards, and recognition for the many forms of that work in which our faculty are engaged:

- Consider revising current policies based on a conflation of academic discipline and administrative department. For example, adopt clearer policies regarding how degrees and other credentials are represented on diplomas and transcripts and how credit is assigned to units for interdisciplinary and collaborative teaching.

- Raise the visibility of interdisciplinary teaching and curriculum in campus marketing, both internally across campus and to current and potential students.

- Reward interdisciplinarity by allocating resources for the incubation of these activities and for training faculty to work within interdisciplinary structures.

[20] Report of the Provost's Task Force on Interdisciplinary Activities - March 2015

5 Conclusion and recommendations

UMBC has a strong and sustained culture of building consensus around a set of strategic goals rooted in our mission. The University Leadership Retreat and the shared governance process, in addition to broad participation by a wide array of stakeholders, ensures that UMBC's mission, vision, and goals are clearly defined and well understood by the campus community. UMBC has documented the strategic investments made to support its goals, and periodically updates the campus on those investments.

UMBC's mission, vision, and goals are regularly reviewed and formally updated to reflect changes in the environment. They were substantially simplified and focused in the face of deteriorating state fiscal conditions in 2008. The campus has also always been mindful of how funding and resources will need to be carefully monitored to ensure sustained progress towards our goals.

During the period in which our strategic plan evolved from the *Strategic Framework for 2016* through *Focusing Our Resources for Results* to our current plan, UMBC has become a markedly more complex institution, dividing, for example, the College of Arts and Sciences into two separate colleges and growing awards for research from under $60 million in 2005 to nearly $80 million in 2015. Our mission, however, has remained the same. We are committed to our students, their learning, and efforts to improve their performance and success. We are committed to advancing the body of knowledge through engaged scholarly research. We are committed to strengthening the community our members live and work in by, first, providing our students with the knowledge that they need to be productive members of society and to promote positive social change and, second, by using our research to advance the human condition.

Our decisions will continue to be guided by our mission as interpreted through our strategic plan. The plan adopted in 2016 contains four primary objectives, supported by 13 strategic goals, 42 supporting objectives, and numerous measures of success. The following recommendations will aid in the success of the strategic plan:

- Achieving the strategic plan's goals will depend on efficient allocation of our existing resources, strong enrollments, continued improvement in student success, and growth in research funding, strategic partnerships, and alumni engagement. To these ends, UMBC must strengthen its commitment to a culture of continuous improvement.

- The new strategic plan contains numerous measures of success and makes a major commitment to analytics and assessment to increase student learning and student success, improve resource allocation, and aid our ability to make decisions in an environment where resources are likely to grow slowly. UMBC will need to build its analytics and assessment capabilities and put an organizational structure into place that allows University leaders to use analytics proactively with efforts coordinated across divisions and offices. We need to develop the ability to make evidence-based decisions that advance our goals. This ability is currently at an early stage of development at UMBC and in higher education generally.

- UMBC's assessment of its strategic plan has been less periodic and formal than the development of the plan itself. The new strategic plan provides us with an excellent opportunity to benchmark our efforts. We should commit to periodically review progress toward success through such measures as an expanded use of the data galleries presented previously at annual retreats.

- Important steps have already been made in our ability to use data and analytics to measure progress toward our goals with the development of the REX data warehouse. Further important steps to use data and technology to support our goals of reducing time to degree have been made with UMBC's recent development of Course Scheduler software, which improves students' abilities to plan their coursework. Our acquisition of the Education Advisory Board's Academic Performance System helps us to better understand potential constraints on our ability to educate students, identify courses that might be impediments to graduation, and pinpoint ways that we might make our academic operations more efficient. Our participation (as part of a USM effort) in the Performance Analytic Reporting's Student Success Matrix project helps us to track the interventions we have made in support of student success and whether these interventions are effective. We need to take advantage, however, of developments in data science and modeling that allow us to identify the impact of policies and interventions in order to better assist at-risk students.

CHAPTER 3
PROVIDING A FOUNDATION FOR EFFECTIVE RESULTS: ASSESSING OUR PLANNING AND BUDGETING PROCESS

1 Introduction and overview

UMBC has established a strong culture and system of planning and priority setting, connecting these to resource allocations and assessment of success. In this chapter we show how UMBC's mission and goals guide expenditures of resources, how we steward resources provided by the state of Maryland and develop additional ones, and how we analyze the efficiency and effectiveness of our business and financial activities. This chapter necessarily overlaps with chapter 2 on mission and goals and chapter 4 on institutional effectiveness, but the focus here is particularly on the financial and resource-planning aspects of our activities.

This chapter is organized as follows: Section 2 discusses the campus and University System of Maryland (USM) strategic plans and the way in which strategic plan goals have been translated into budget items with the participation of the campus community. Section 3 addresses the improved budget process introduced in 2006 as well as the benefits of multiyear budgeting, also an innovation since the last accreditation cycle. Section 4 lays out the increases in administrative discipline and documentation that have characterized planning and budgeting over the past decade. Section 5 considers the use of the following in ensuring the adequacy and wise stewardship of resources: financial ratios, widely available financial data, financial forecasting, fundraising, tighter management of grants, business-services sharing across divisions and departments, and the USM's Efficiency and Effectiveness Initiative. Section 5 also describes a long-term effort to improve all operations provided by the Division of Administration and Finance as measured by periodic surveys of students, faculty and staff. Section 6 describes the annual operating budget cycle; section 7 touches on planning for facilities, space, and equipment; and section 8 describes the variety of financial controls and audits to which UMBC is subject. In the final section we draw conclusions and make several recommendations for improvement.

As a whole, we feel confident that we meet standards 2 and 3. We also recognize the need for continued improvement.

2 Strategic planning and priority setting

Until the recent adoption of a new strategic plan, the *Strategic Framework for 2016* guided UMBC's academic enterprise. The *Framework* provided broad directions. Specific initiatives and steps to implementation came from a second phase of planning, in which departments and programs clustered together to give focused attention to and plan for different aspects of the work. Each of these eight "cluster" work groups[21] developed recommendations. In the area of

[21] Framing the Future - 2005 Update to the Strategic Plan Including Cluster Reports.
The clusters were natural science, humanities, arts, social sciences, engineering and information

research, for example, the cluster groups identified types of scholarship that transcended disciplinary boundaries and had the potential for significant impact. In the years immediately following the finalization of the *Framework*, all faculty hires required specific association with a *Framework* objective prior to approval.

Following that early attention to the broader goals in the *Framework*, and with the backdrop of the economic downturn beginning in late 2008, University leaders decided to focus their efforts on a narrower set of strategic priorities. The leaders saw that resources would be very constrained for the foreseeable future. They thus wanted to target the most important short-term priorities with what little was available. As described more fully in chapters 1 and 2, the Council of Vice Presidents and Deans identified four strategic priorities: retention and graduation rates, research infrastructure, environment and sustainability, and campus safety and security.[22] These priorities, which have remained consistent for more than six years, have helped direct investments of time, attention, and funding where they would do the most toward achieving the University's goals despite budget challenges.

At the same time that these priorities were developed to guide resource-allocation decisions for the near term, we understood that we would be facing budget reductions on a scale and with a frequency that we had not experienced in quite some time. To help inform budget reduction decisions, and to engage the campus in thinking through how cuts would be made, in 2008 the President's Council reaffirmed and disseminated "Principles to Govern Discussions about Cost Containment and Reallocation Measures."[23] This document gave primacy to protecting and enhancing the academic program and supporting the members of our community. In the period from FY 2008 to FY 2012, state appropriations for UMBC were cut by $14 million, an additional $12 million in fund balance was transferred to the state, and millions in non-discretionary cost increases were absorbed by the University. As UMBC's leaders worked through cost-containment and reallocation decisions in those years, academic program and members of the campus community were their foremost concerns.

In 2012 the USM Board of Regents approved a system-wide strategic plan that further honed UMBC's priorities and strategic goals. UMBC's four strategic priorities were closely aligned with the system strategic plan. Through the USM plan, our strategies in the area of student success were expanded to more aggressively target academic transformation, need-based financial aid, new academic programs, and student support services. We developed research infrastructure in accordance with the USM plan by establishing a collaborative research initiative with the University of Maryland, Baltimore; new research centers like the High Performance

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technology, undergraduate education, graduate education and professional education and training.

[22] 2009 Environment and Sustainability Sub-Committee Report; 2009 Research, Scholarship and Creative Activity Infrastructure Sub-committee; 2009 Retention Sub-Committee Report 2; 2009 Safety and Security Sub-Committee Report

[23] Principles to Govern Discussions about Cost Containment and Reallocation Measures

Computing Center; and a research "venture fund" for early-stage commercialization efforts.[24] (For more on these efforts, see chapter 2, p. 23.)

UMBC works to ensure that the strategic plan informs its goals and objectives year by year through a process that begins with the President's Council setting goals and outlining actions in a document known as "The President's Annual Goals and Objectives." The process continues with a mid-year report to the USM Chancellor on progress, a mid-year status report to the President's Council by each member, and a year-end assessment for both internal and system purposes. The annual goals and objectives document is submitted to the Chancellor and Board of Regents as part of the President's yearly performance review, and it also provides campus leaders with a way to track progress and maintain a broader view of campus-improvement efforts.

As discussed in chapter 2, the annual University Leadership Retreat plays an important role in UMBC's strategic planning. Attended by as many as 200 campus leaders, the retreat provides an opportunity to have deep discussion about priorities and planning for UMBC in an environment where diverse campus perspectives are heard and considered by all. The retreats help leaders to gain insight into issues facing the campus, and they keep the campus informed about and aligned with strategic goals.

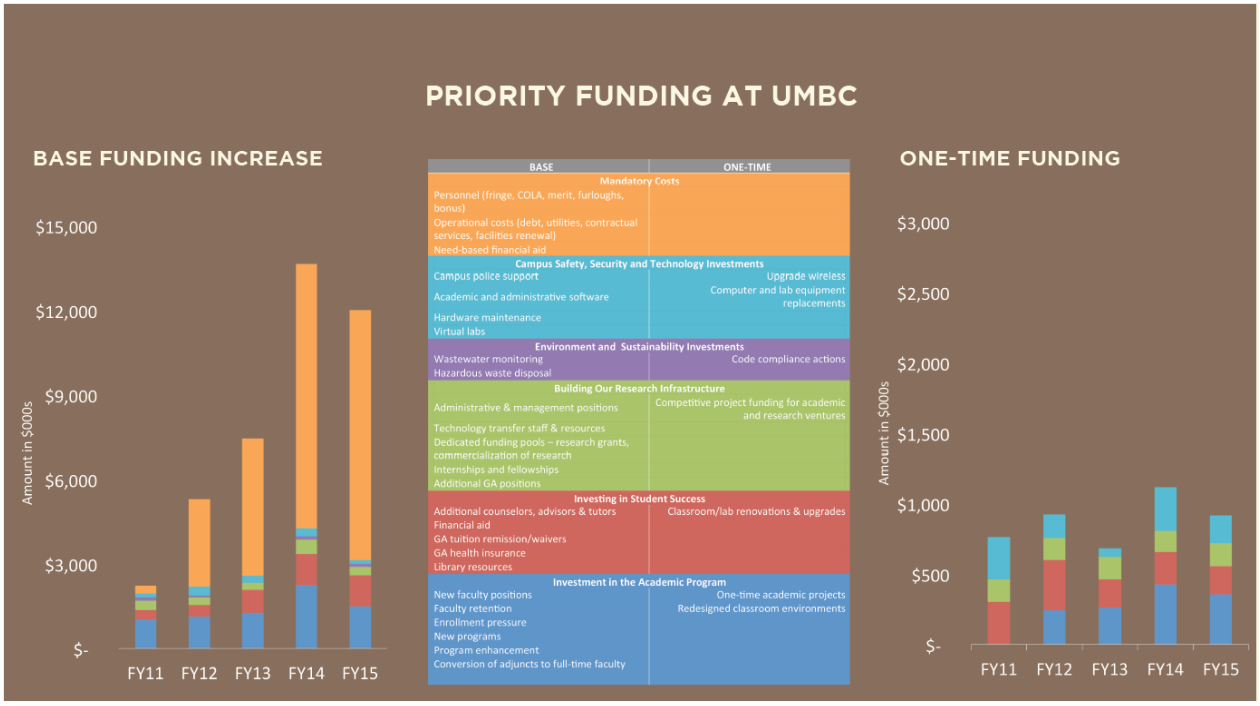
3 Budget process and resource allocations to strategic priorities

UMBC implemented a new budget process in 2006 to provide for broader participation in decision making, to better align resource allocations with strategic priorities, and to give greater transparency to resource-allocation decisions. In light of ongoing resource limitations, the essential operating concept of "multiyear processes" also began to take hold at UMBC. This idea allowed the campus to make progress on priorities on a specific timetable, while accepting the fact that we lacked the resources to achieve them on an aggressive schedule. The new budget process called for the shared development of resource priorities tied to strategic goals as well as early planning for anticipated revenues and mandatory cost increases. Over time, the process has also given campus-wide attention to revenue and expense challenges.

The multiyear-planning process has resulted in investment of new or reallocated funds into the University's key priorities, as shown in figure 11. Since the implementation of the process, over $19 million in base funding and $5.5 million in one-time funding have been earmarked for strategies that support the *Strategic Framework* priority areas.

[24] UMBC Implementation Plan for the USM Strategic Plan

Figure 11: How base and one-time funding connect to strategic priorities



Annual budget instructions issued by the Provost to vice presidents and deans have served as a mechanism for transparency and aligning priorities with resource allocations. The annual budget process includes a presentation of individual college and division goals to the President and to the Council of Vice Presidents and Deans, as well as a discussion of top-priority resource requests and an explanation of how any potential reduction targets would be met. Beginning in FY 2010, the multiyear priority planning spreadsheet emerged as an important tool for establishing a record of all new budget allocations and their relationship to the strategic priorities.[25]

Another important tool for planning and budgeting is the new program budget template. Instituted in FY 2009 at the request of the Academic Planning and Budget Committee and the Provost, the template requires the detailing of the full-cost, revenue, and expense implications of proposed new undergraduate and graduate programs. It reinforces the institutional viewpoint that net-positive-enrollment and revenue-contributing programs are important for pursuing our strategic goals. The plan based on the template must be approved by the Vice President of Administration and Finance before being given final approval.[26]

[25] Multi-year priority planning spreadsheet
[26] New Program Budget Template

4 Keeping a record of planning, implementation, and assessment

Over the past decade, UMBC has added administrative discipline to our long-standing organizational culture of collaboration. The University's organizational plan ensures that many campus decisions are made through a well-understood system of shared governance. Further clarification of the responsibilities of the President, Provost, vice presidents and the deans for strategic planning, resource allocations, and policy has helped to ensure accountability in these processes. The important advisory roles of the Academic Planning and Budgeting Committee and the President's Budget Committee have also been clarified.

In addition, we have increased our documentation of organizational structures and decision making. The President's annual goals and objectives document provides a comprehensive record of significant initiatives and institutional improvements. The Provost's web site details UMBC's shared-governance structures and the decision making for such matters as the addition of new programs, Academic Program Review of existing programs, and how a department becomes a school, offering the UMBC community additional opportunities for input and review.[27] Other public sites archive additional information of this kind.

In the development of the new strategic plan, the establishment of a planning web site (planning.umbc.edu) enabled the campus community and our partners and other constituencies to actively engage with the planning process. The site provided extensive information on our planning principles, timelines, and focus areas and who is responsible for implementing different parts of the plan. There have also been more than 70 opportunities for members of the campus community, including representatives of each of the shared-governance groups, to provide feedback via surveys, face-to-face gatherings large and small, and online comment. More than 5,000 community-engagement interactions occurred through the three-year process. The Provost also maintains an historical record of planning and assessment efforts.[28]

These sites, committee minutes, and reports in many cases spell out specific ways UMBC can improve, reflecting the University's "success is never final" ethic. Much of the material contains periodic assessments of outcomes leading to recommendations for further action.

5 Assessing adequacy and effective use of resources

UMBC engages in a number of strategies to assess the adequacy of its resources as well as their efficient and effective use. This includes assessments at multiple levels: state of Maryland,

[27] See the Provost's web site listing policies and planning documents, Provost Website: Policies & Guidelines. Shared governance processes and policies are noted at Provost Website: Reports & Additional Resources.

[28] Provost's Website: Strategic Planning

USM, campus, divisional, and departmental. We have also made concerted efforts to generate additional resources when inadequacies have been identified.

UMBC has made major strides over the past 10 years in strengthening the University's financial position. Improvements in financial practices include creating greater transparency and focusing on key areas, as detailed in the next three sub-sections.

5.1 Financial ratios

In 2006 we began conducting periodic reviews of the four major financial ratios in the National Association of College and University Business Officers (NACUBO)'s Composite Finance Index (CFI), including comparisons with peers, national averages, and other USM institutions. Implementation of plans to improve those ratios for UMBC has resulted in significant gains over this time period. All four major ratios have at least doubled from 2005 to 2014. Three of the four now meet or exceed the NACUBO recommended standard with the only exception (the primary reserve ratio) falling just short of the standard. In 2005 none met the standard. It is of particular note that through these efforts our unrestricted net assets have grown from $13 million at the end of FY 2006 to almost $87 million at the end of FY 2015. Progress on two of the ratios is displayed in table 2.

Table 2: Key financial ratios
comparison to peers/industry 2005-2014

	UMBC 2005	UMBC 2010	UMBC 2012	UMBC 2013	NACUBO Standard (*)	USM	UMCP	Towson	NC State-Raleigh	Virginia Tech	Umass - Lowell
Primary Reserve Ratio - Resource Sufficiency and Flexibility	0.13	0.13	0.25	0.32	0.40	0.47	0.41	0.56	0.45	0.56	0.53
Viability Ratio Management of Resources, including Debt	0.35	0.45	0.43	1.08	1.00 or higher	1.49	1.93	0.76	0.89	0.96	0.60

5.2 Making financial data more accessible

Numerous efforts were made to provide more detailed, accurate, and readily accessible financial information to campus users in the early years following implementation of the PeopleSoft Financials software system. It was not until the implementation of our data warehouse for financial data (T-REX) in 2010, however, that campus users reported higher levels of satisfaction with accessibility and transparency. Allowing for faster, more accurate, and more detailed reporting on state and auxiliary funds, T-REX has made financial data more accessible to managers who were not comfortable accessing PeopleSoft's complex and technical reports. The Enterprise Resource Planning (ERP) software committee recently completed recommendations that include making transfer of the remaining fund data (self-support and restricted funds) into T-REX a priority in the next year to enable the same improved access and reporting for those funds.

5.3 Financial forecasting

As the campus moved to the implementation phase of the strategic plan adopted in early 2016, UMBC leadership gave serious consideration to how decisions about resource allocation will be made, as well as the consequences of those decisions. We procured a sophisticated, multiyear financial forecasting program with the capacity to translate financial projections into visual graphics that make the information accessible and understandable to professionals, regardless of their financial knowledge and training. The software will help develop long-range financial forecasts through base-budget projections, scenarios, and "what if" add-ons. UMBC intends to use this forecasting tool to guide the implementation of the strategic plan as we choose priorities for resource allocation and the timing of specific strategies.

5.4 Creating a service orientation

The Administration and Finance Division in 2006 undertook an initiative that over time has transformed business services to the campus for the better. The initiative was intended to improve, modernize, and expand the division's activities in support of the University's mission. Staff first agreed on a vision for operations that included three directives: embrace the division's role as an expert resource to the campus; surpass the expectation of students, staff, and faculty, who are the division's customers; and leverage technology for better service. Since 2007 well over 150 distinct changes have been implemented as part of the initiative.

After a number of early attempts to measure progress were less than successful, the division's leadership team of about 30 first- and second-level leaders developed a customer-feedback survey designed to determine how important 25 to 30 of the division's key services were to customers and how satisfied the customers were with the services. This survey has now been administered three times, in 2011, 2013, and 2015. After the results were compiled in each of those years, the same leadership group targeted four to six of the services that customers said they found important but not very satisfactory. Cross-functional teams and staff within the applicable unit then developed and implemented plans to improve the services. With each successive survey administration, leaders tracked performance on the targeted items as well as the others to see if the efforts were working. In most cases, campus feedback indicated clear improvement. The survey, results, and action plans can be found in the document road map.[29]

5.5 Fundraising and advancement

UMBC successfully completed its second comprehensive fundraising campaign in 2011. In anticipation of the next campaign and UMBC's 50th anniversary in 2016, the Office of Institutional Advancement (OIA) has made significant efforts to use data to provide strategic- and management-support for advancement efforts. These efforts have helped lay the groundwork for additional investments in the division that will help the University meet future fundraising and advancement goals. Examples include the following:

[29] Administration and Finance Customer Satisfaction Surveys 2011, 2013, 2015

- The division created a quarterly dashboard to demonstrate progress towards goals. The dashboard features qualitative and quantitative indicators for areas ranging from fundraising and alumni engagement to marketing and communications to the economic development undertaken by bwtech@UMBC, the University's research park.

- The division has also used survey data to understand alumni satisfaction, needs, and interests in an effort to provide programming to increase engagement. For example, survey instruments indicated strong alumni interests in career networking and mentoring. As a result, Alumni Relations has increasingly partnered with the Career Center (formerly the Career Services Center) to engage alumni in volunteer activities to improve student employment outcomes and created career networking events for alumni affinity groups, including IT professionals.

- The division used environmental scanning and survey data to understand staffing levels in front-line and back-office fundraising at peer and aspirational-peer institutions. The data provided compelling evidence for investment in UMBC's fundraising enterprise, and the University has responded favorably over several budget cycles.

There is still progress to be made. Further reporting efforts are necessary to help campus leadership and stakeholders understand progress towards OIA's goals, which in the campaign keyed to our 50th anniversary should demonstrate close alignment with the goals and objectives of the new strategic plan.

5.6 Grants management

The post award grants infrastructure was vastly improved due in large part to the work of the Post Award Steering Committee, formed in January 2009 and active until October 2015. Principal investigators had expressed frustration with the system before 2009 both because it was not user-friendly and because it did not always provide timely, accurate data. The system was also encumbered by contracts and grants that were completed but not closed out and by inadequate compliance with its requirements.

Several technical improvements were made to PeopleSoft to enhance functionality in such areas as grant and contract invoicing and effort reporting. Major work to close out inactive grants and scrub the grant-fund data took place in fiscal years 2011-2013. This resulted in better information about active grants and significant audit improvements as well as improved service to principal investigators. To address compliance, additional training was provided to principal investigators and others. Enough progress was made to sunset the committee in October 2015 and transfer the few remaining improvements needed to existing campus groups to implement.

5.7 Business processes and shared services centers

Improved business processes and the establishment of centers for sharing business services across divisions and departments have made us more efficient, which in turn maximizes the use of our resources to reach strategic goals. In September 2012 the Shared Services Centers Task Force was convened with the charge to research and develop a plan for such centers at UMBC. The task force conceived of multiple centers that would meet the needs of UMBC, as illustrated in figure 12. As outlined by the task force, business-process improvements were implemented with campus input to pave the way for the centers. The Provost and the Dean of the College of Natural and Mathematical Sciences (CNMS) prioritized these improvements and established shared service centers for their areas. Examples of improvements include e-timesheets, purchasing notifications, and e-travel workflow. To date, both shared service centers (SSCs) have achieved observable efficiencies. For instance, the Department of Mathematics and Statistics has been able to eliminate its business manager without cutting back on services, and the payroll and hiring duties of all departments in the CNMS have been centralized. For the first time, there is backup for key personnel. .Two more centers, for the College of Engineering and Information Technology and for the Division of Student Affairs, are now in the planning stages and expected to open soon.

Figure 12: Shared Services Centers design and progress

5.8 Efficiency and Effectiveness Initiative

UMBC has actively participated in the USM Board of Regents Effectiveness and Efficiency Initiative (E&E), which encourages each USM institution to demonstrate good stewardship of its resources through cost avoidance, cost savings, new revenues, and strategic reallocation of resources. System-wide initiatives, including energy procurement and ERP implementation, have benefited UMBC in both the sharing of expertise and cost savings. In addition, many campus-based initiatives have reduced costs and improved efficiency. Between FY 2009 and FY 2015, UMBC documented a total of $24.8 million in E&E improvements, with cost savings representing two thirds of those efficiencies, cost avoidance about one quarter, and the remaining efficiencies from new revenue streams and reallocation.

6 Annual budget cycle

UMBC's budget process is guided by the priorities of the strategic plan and reflects consistent involvement by campus constituencies. Two key mechanisms govern resource allocation during the annual budget cycle: budget-planning scenarios and the multiyear priority planning process.

The Council of Vice Presidents and Deans is responsible for developing the principal annual operating budget, which is funded primarily from state funds and tuition dollars, with final approval of all decisions resting with the President. The President's Budget Committee is informed and consulted regularly about the current and prior annual budgets and throughout the budget development process for the next fiscal year. The committee reviews the budgets with particular focus on strategic goals. Other governance bodies (campus senates for faculty, exempt, and nonexempt staff; Academic Budget and Planning Committee, etc.) are regularly briefed and invited to provide input. Information is disseminated to and input sought from the campus through regular campus updates and events such as the annual University Leadership Retreat, which typically includes a gallery of graphic displays of UMBC performance data.

September – December The budget process begins in the fall when each USM institution's budget is submitted (via the system office) to the Governor and his or her staff for review.[30] The USM participates in internal hearings on the budget for the system, negotiates with the executive branch, and is allocated an amount in the Governor's annual budget proposal to the legislature. The first system budget scenario is developed, projecting anticipated general operating revenues and expenditures, including nondiscretionary and mandatory costs such as fringe benefits, utilities, facilities renewal, and debt service, as well as multiyear strategic allocations identified during the prior budget cycle. This scenario forms the basis upon which the campus budget development begins.

January – March The Provost provides instructions to the vice presidents and deans regarding budget development, including strategic resource allocation priorities, and frequently, needed budget reductions or reallocations. The vice presidents and deans present their priorities and budget requests to the entire group, including the President. Final budget scenarios are discussed with the vice presidents and deans, followed by recommendation to the President for final determination of the allocations.

April – July At the end of the General Assembly session, final state appropriations decisions guide the development of UMBC's operating budget. Colleges and divisions submit their itemized budgets, including personnel and operating expenses, as directed by the Budget and Resource Analysis Office. A high-level budget is published on the University's web site with a fully detailed copy available in print in the Albin O. Kuhn Library. Campus leadership actively informs different constituencies about the final budget through campus communications, presentations at key meetings, and on request.

August – September The preliminary campus budget request for the next fiscal year is developed, building on the current working budget, multiyear strategies previously approved, and projected revenues and expenditures. The request is submitted to the system office for inclusion in a single budget request to the state.

[30] Maryland has a very strong executive budget process. The legislature may not add funding to the state budget but can only cut funds.

Once the University's budget is set, it is monitored through periodic review at the campus, division, and departmental levels. Those reviews allow the campus to frequently assess the adequacy and effective management of annually allocated institutional resources.

7 Adequate facilities and master planning

The UMBC 2003 Facilities Master Plan, updated in 2009, presents a comprehensive vision for UMBC's development. The plan reflects the University's academic mission; its institutional values; and its impact on the landscape, environment, and surrounding community, all in accord with requirements and guidelines provided by the USM. More recently, UMBC has adopted a policy for space management and guidelines for space allocation and added to its capacity to track and assign different types of spaces. These measures ensure not only the best possible use of available space on a space-strapped campus but transparency about the management process.

7.1 Facilities

The master plan guides facility additions and renovations to UMBC's buildings, grounds, and infrastructure both short-term and long-term. The 2009 update was the result of a comprehensive and inclusive process that brought more than 120 stakeholders into the planning exercise. A number of projects referenced in the plan have now been completed, including the new campus entrance, the Performing Arts and Humanities Building, the Patapsco Residence Hall addition, the Community Center, the Library Pond storm water management and beautification project, and the Fine Arts Building renovation. On a smaller scale, additional green spaces on campus and places for students to gather have been created. These projects have enhanced the appearance and general atmosphere of the campus while meeting space needs critical to fulfilling the University's mission.

The Facilities Master Plan is closely connected to the campus strategic planning process. Both are also integrated with the budget process in which the effective and efficient use of all resources, including facilities, is considered. For example, the annual operating funding for facilities renewal has grown from $1.27 million allocated in FY 2009 to $3.86 million allocated in FY 2016, an increase of more than 200 percent. This has resulted in our increased ability to renovate and renew aging facilities and building systems, most notably the $16 million renovation of the Fine Arts building completed in March 2016.

Several recent projects have stemmed directly from the *Strategic Framework for 2016*'s mandate for high-quality education. The Chemistry Discovery Center (CDC) was established in 2010 in renovated space to increase the success of entering STEM majors. The success of the CDC led to the allocation of funds for the construction of the College of Natural and Mathematical Science's Active Science Teaching Learning Environment (CASTLE), another active learning space that opened in 2010 to promote student achievement in foundational science and mathematics. Similarly, in 2014, the ACTIVE center was established to facilitate active student learning and laptop-based laboratory activities in computer science. An unexpected opportunity to promote effective learning through a new facility presented itself when the undergraduate Student Government Association requested a 21st century, open-anytime learning space. In

response, University leaders worked with students to establish the Retriever Learning Center in 2011.

7.2 Managing space and equipment

As part of the Facilities Master Plan process, and in light of efforts to examine all aspects of University resources for greater efficiency, leadership has given much attention to better utilization of all space on campus, including classrooms, offices and research labs. In July 2012 UMBC formally adopted a space-management policy "to provide the basis for equitable allocation and efficient utilization of all space … to maintain a proper balance between teaching, learning, research, innovation, and administration" as activities expand and contract. The policy created a Space Management Committee, comprised of campus leaders and shared-governance representatives, to make space-allocation recommendations.

We are able to more effectively manage space because of improved data and analytic capacity. Facilities Management (FM) now maintains a detailed space database within PeopleSoft that includes the amount, type, capacity, and assignment of each room, as well as the occupant's name and indirect cost-recovery categories of use, room features, classroom-seat type, and audiovisual equipment. The document *Guidelines for Office Space Allocation at UMBC* has been developed, establishing principles and guidelines for assignment of office space. Facilities Management applies these guidelines when assessing efficient utilization of office space, developing what-if scenarios, planning for new facilities, and designing new or renovated buildings. A work group is developing a set of guidelines for the allocation of space dedicated to research activities.

UMBC's Institutional Research, Analysis, & Decision Support (IRADS) and FM assess classroom utilization based on compliance with the campus's scheduling guidelines and the room- and seat-utilization targets established as part of the Facilities Master Plan. UMBC's Division of Information Technology, IRADS, and Facilities Management are partnering to advance analytics in this area by using space- and campus-activity data, including staffing and research expenditures.

The University also pursues several strategies to ensure that the equipment needed to fulfill our mission is available and fully functional. These include a computer-replacement-initiative with central subsidy, an equipment loan program offered by the USM at low interest rates, upgrades and new purchases made during renovation and new construction, and federal support for equipping core research facilities, such as grants for acquiring magnetic resonance imaging machines.

8 Internal controls and audit

UMBC is subject to a variety of internal and external controls and audit processes to ensure compliance with all relevant state and federal laws, and all internal, state, and USM-specific

policies and guidelines. [31] Internally, UMBC ensures compliance with these regulations through staff training, up-to-date documentation, the campus performance-management system, and support from the Management Advisory Services (MAS) unit. The MAS mission is to foster more informed managerial decisions and efficient operations by advising, assisting, and educating the campus on business policies, procedures, and practices, including internal controls. MAS provides support to guide the campus through the various internal and external audits.

As required by the USM policy on external audits, an annual independent audit is conducted by an outside audit firm that reports to the Board of Regents' Audit Committee. While the official financial statements for the USM are in consolidated form, including all the USM institutions, separate detailed financial statements for each institution are also prepared, and those statements are also subject to the external audit. The Maryland Office of Legislative Audits (OLA) also audits all state agencies, including the USM institutions, on a two- to four-year cycle, as directed by statute. OLA audits typically cover areas such as fiscal compliance and information-technology controls. UMBC is subject to additional audits by the USM's internal auditors and federal agency auditors, the latter as required by the Federal Office of Management and Budget, Circular A-133. To review and address audit findings, UMBC's President holds regular meetings of the Audit Update Committee involving senior leadership. Meetings of the committee also help ensure that leaders are provided with training and guidance on such topics as fraud detection and prevention and internal controls.

9 Conclusion and recommendations

UMBC has a well-established track record of planning, resource allocation, and institutional renewal in pursuit of our mission and goals, as described above and demonstrated in the documents included in the document road map for standards 2 and 3. The campus has worked hard to cultivate a collaborative culture and a planning and resource-allocation process that is aligned with our mission and goals, inclusive of all stakeholders, and transparent. We have developed and continue to refine our tools for conducting comprehensive, consistent, valid, and reliable assessments, which enable the University to demonstrate the effective use of resources and the impact of additional resources in meeting the priorities of the University.

Our annual operating budget process is inclusive throughout the entire cycle. Campus leadership from all major areas both make budget presentations for their respective areas and listen to each other's presentations. This provides an opportunity for the leadership team to understand and value the overall needs and priorities of the University. The budget process is also reflective of shared governance. The process is clearly set forth to ensure interested and affected individuals and constituencies are aware of decision points and opportunities for input. The final budget is shared through presentations at key meetings and on request; in addition, the annual operating budget is available online as well as in the campus library.

Our capital budget plan is annually reviewed and guided by the Council of Vice Presidents and Deans to reflect University priorities. The Council is informed by input from major

[31] UMBC Policies Website

stakeholders, including the UMBC Space Management Committee, the Landscape and Stewardship Committee, and the Classroom Committee. The process supports standardization of technology, effective life-cycle management, and reduction in the total cost of computing technology on campus. Broad communication also ensures that the costs associated with new facilities and facilities being retired are taken into account during the annual operating budget process.

The University has institutional controls governing financial, administrative, and auxiliary operations that ensure all university expenditures are properly recorded and comply with the applicable regulations. These controls are continually scrutinized through our strong and comprehensive annual audit. Additional audits are conducted by the USM's internal auditors, our own internal auditors (MAS), and various granting agencies reviewing individual grants or contracts.

Building on these substantial strengths, we will be focusing on the following three additions to our fiscal infrastructure, the first two aimed at increasing our ability to assess the impact of our expenditures and respond accordingly.

1. A formal, documented, and shared **process to monitor and assess the impact of resource allocations made to priority initiatives**. Such a process would help us know when to stay the course and when to change it. Under the direction of the Provost and the Vice President for Administration and Finance, a process to accomplish this was initiated as part of planning for the FY 2017 budget. All vice presidents and deans reported on their budget priority allocations from 2010 to 2016 focusing on expenditures, success, and metrics.

2. A **requirement for clear and specific metrics for all new funding** requested through the multiyear planning priority process, as well as a process to review results and take appropriate action.

3. A **"rainy day" fund** or central pooled funds to address renovations, equipment and furniture replacement, and other periodic or unanticipated expenditures. It is difficult for colleges and divisions to set aside funds when regular operations demand current resources; a central fund could help administrators respond as needs arise and on a priority basis.

We also recommend identifying and implementing next steps in achieving more efficient space use, including class scheduling, recapturing unused space, and long-term plans for renovating spaces for better alignment with standards.

CHAPTER 4
IMPROVING OUR INSTITUTIONAL EFFECTIVENESS BY ENHANCING OUR ASSESSMENT CAPABILITIES

1 Introduction and overview

This chapter documents UMBC's extensive and thoughtful efforts to assess its programs and activities and then apply the results to continuous improvement in all aspects of fulfilling UMBC's mission. On a campus where the President often reminds us that "success is never final," administrators, faculty, and staff view assessment as that which challenges us to improve.

UMBC's efforts to increase the quantity, quality, and usefulness of assessment is not new, but since our last Middle States review, the campus community has paid increasing attention to assessment. This is exemplified by our newly adopted strategic plan. The plan not only identifies assessment as the primary engine driving University improvement but also embeds the assessment process into the plan and its implementation by matching every objective with measures of success. The vision for the full cycle of assessment from developing the mission framework through gathering information to modifying programs is widely shared on campus, forming a critical foundation of our endeavor. In this assessment cycle, we have made significant investment in assessment infrastructure by expanding UMBC's capacity to collect, store, analyze, and report data through our data warehouse and Reporting Exchange (REX) operations, discussed in section 1.2 below. We look forward to further developing the University's data and organizational infrastructure, which will help us to close more assessment loops efficiently and fully realize the benefits of our commitment to assessment.

This chapter is organized as follows: the remainder of section 1 outlines the various levels at which institutional assessment is conducted and the development of data resources and analytical capabilities that have been employed to support institutional assessment across the campus. Section 2 focuses on the assessment of academic programs and units through UMBC's Academic Program Review (APR) process. Examples in this section show how this process meets the fundamental elements of standard 7 and how this assessment process is tied into our shared-governance system and budget planning. Section 3 examines the assessment of academic-support units, programs, and initiatives within academic affairs. Section 4 describes the ways the rest of the University, including its central administrative divisions, has used assessment to support institutional planning and our mission. Finally, in section 5 we discuss overall findings for this chapter and describe opportunities for improvement linked to the implementation of the University's new strategic plan. In particular, we focus on opportunities for better use of institutional data resources, the development of better reporting tools, and building and expanding upon our current data and analytics infrastructure.

1.1 Levels of assessment

As a public research university and part of the University System of Maryland (USM), Maryland's 14-unit system of public higher education, UMBC is committed to high standards of assessment that are conducted at four levels and are described in this section. Institutional assessment is conducted through the Maryland Higher Education Commission (MHEC), the USM and its Board of Regents, and at both the institutional and unit levels (such as academic departments and administrative divisions).

USM and its Board of Regents, together with MHEC, assess UMBC on behalf of the state and its public higher education system. Assessment at this level includes the Managing for Results Program,[32] the USM Dashboard,[33] approval for the development of new academic programs, and APR.[34] Meeting the requirements of performance accountability, UMBC delivers 10 to 12 reports annually to the MHEC and the USM on topics ranging from addressing our achievement gaps to faculty workload. State analysts review the reports in preparation for our budget hearings before the legislature. The dashboard tracks approximately 30 indicators relating to student success, faculty characteristics, economic and workforce development, stewardship, and efficiency and effectiveness. In addition, UMBC participates in MHEC's Maryland Annual Collection data-collection system via the USM, submitting individual record-level data on a semester basis for student applications and degree completion, for example, as well as financial aid and human resources data.

Both the USM and the Board of Regents annually review such performance data and the dashboard indicators, discussing progress with each university president. More detailed ongoing reviews are conducted by the appropriate committees of the board. For example, the Board of Regents Committee on Educational Policy and Student Life reviews annual changes in enrollment, retention, and graduation rates for every USM institution. These programs complement the work of institutional assessment at UMBC by providing high-level information that state higher education leaders can use to compare Maryland public institutions. Both the Regents and the MHEC conduct reviews of proposed new academic programs and substantive modifications to existing programs prior to approval.

As was described in UMBC's response to the 2006 Middle States review, UMBC has implemented a comprehensive plan for assessment that focuses extensively on learning outcomes and requires all administrative and academic-support offices of the University to develop assessment plans for aligning the unit to the mission and goals of the University.[35] These plans were reviewed and approved by the President and the Council of Vice Presidents and Deans in 2007, and can be found in our document road map.

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[32] UMBC (2012, 2013, 2014, 2015) Managing for Results Report & Related Documents
[33] USM Dashboard Indicators for Board of Regents - 2014 Report and 2012 Report
[34] Academic Program Review (APR) Guidelines (April 2015); Academic Program Review (APR) Master Schedule.
[35] 2008 Progress Report on Assessment to Middle States

Departments and programs are assessed by the APR process, a periodic, formal assessment of academic units that was put into place in the 1980s and has been continuously improved ever since. A hallmark of the process is broad participation through UMBC's strong shared-governance system. The reviews are conducted through the department, college, and institutional levels and through the shared-governance system, including the Undergraduate Council, the Graduate Council, the Academic Planning and Budget Committee, and the Faculty Senate. The primary purpose of the APR is to ensure that all academic programs have "academic quality and value to the University," adequate resources, and an action plan in place that supports continuous improvement. These reviews incorporate the perspective and recommendations of outside evaluators who take into account the program's self-study and make a site visit. A critical component of the APR process and the corresponding assessment cycle is a follow-up review conducted three years after completion of the primary periodic review. The main purpose of this three-year review is to assess progress and outcomes of the implementation of the action plan developed from the previous APR. Section 2.1 of this chapter will discuss the APR process in more detail and sample APRs are available in the document road map.[36]

Proposals for new programs or modifications to existing programs originate from departments or from collaboration between several departments, with the support of the relevant Dean. The review of proposals for new programs and substantial modification of existing programs is described in section 2.1. At an early stage, the concept for each new program is presented and discussed at the Program Concept Group that is convened by the Provost and includes all college deans, representatives from the academic affairs administration and from the shared-governance system, including the Faculty Senate president and the chair of the Academic Planning and Budget Committee. This review determines whether or not the concept should be fully developed into a formal proposal and identifies issues that would need to be more fully addressed as the full proposal is developed.

The annual budget cycle provides an opportunity for assessment of the institution as well as of its units. Early in the process, division heads make requests for additional resources and present justifications for how they align with the strategic priorities. This process is also used by the division heads to update their peers on key initiatives undertaken in the last year and how new resources allocated in the previous cycle have been employed.

The annual University Leadership Retreat is also used to share planning and assessment updates with the community. For example, in 2011 and 2012, the Division of Information Technology (DoIT) and the library presented data galleries on major planning efforts undertaken by the campus, the IT Restructuring Task Force[37] and the Library Blue Ribbon Committee.[38] Data-rich posters presented information on the implementation status of recommendations and allowed

[36] Academic Program Reviews
[37] IT Restructuring Report Update - One Year Later. Poster presented at the 2011 University Retreat
[38] Albin O. Kuhn Library & Gallery - Blue Ribbon Committee Report on Progress. Poster presented at the 2012 University Retreat

attendees to discuss what they saw with presenters. In addition, leaders of divisions and departments give periodic updates associated with their assessment plans to the Council of Vice Presidents and Deans.

1.2 Development of assessment, analytics, and decision support infrastructure

In the last accreditation cycle, UMBC's leadership recognized that its business intelligence systems would need to be improved to keep pace with the growing size of the University and the demands of assessment. In response DoIT provided the technical infrastructure and expertise for the UMBC REX data warehouse that was in turn supported and curated by Institutional Research, Analysis and Decision Support (IRADS). The two units have a strong collaboration. Starting in 2007 we began replacing our aging student-information system with a PeopleSoft software module and acquired a data-warehouse product from the company iStrategy, later taken over by Blackboard. By many accounts we are now a national leader in the use of actionable intelligence in higher education.[39]

IRADS was created in 2013 from the reorganization of the former Office of Institutional Research. The reorganization recognized a fundamental shift in the way that the University was using our increased data and analytics capacity: researchers would be working not just at internal and external reporting but contributing in a fundamental way to institutional assessment and continuous improvement. The reorganization also signaled a strengthened institutional commitment to the widespread and dispersed availability of data for decision making by providing much-improved access to the data warehouse and its tools across campus. UMBC's new data warehouse and business intelligence infrastructure have resulted in increased operational efficiencies and greater effectiveness in student-success and college-completion efforts. Better access to data has shortened the time between insight and decision. Access to data is democratized and joined into a single view, though originating from multiple offices. The infrastructure allows quicker access to more data to improve the quality of analysis.

A key component of our business-intelligence infrastructure is our data warehouse containing organized data from the University's administrative systems for analysis and reporting. It was dubbed REX for "report exchange" to emphasize the goal of report development being shared between centralized and decentralized resources and units. REX supports reporting and analysis on student, finance, and human resources data, as well as data from our learning management system (Blackboard), our problem-resolution ticketing (RT) system, and other ancillary systems. The warehouse contains student statistics and operational data that is consistent across time and comparable between institutions.

REX currently houses more than 700 distinct reports, with 200 reports added in 2015. Roughly 500 distinct people across the campus used REX during 2015. This usage includes 115,000 executions of pre-written guided reports and does not include the activity of ad hoc analysis,

[39] See Division of Information Technology: Analytics website for numerous articles about our analytics use.

which is used heavily by approximately 20 users deployed across campus. REX reports, both guided and ad hoc, are employed by campus leaders, department chairs, faculty, analysts, and other staff involved in the assessment of, and decisions about, student success and progression. Some examples include:

- Reports with grade distributions, including Ds, Fs, and withdrawals and repeat rates; correlations between student outcomes in a course sequence; and Blackboard usage are used to identify challenges and promote effective teaching practices and course redesign.

- Trend reporting and comparisons of grades are used to assess the effects of course redesign. Courses with high proportions of Ds, Fs, and withdrawals are also identified as priorities for potential redesign.

- The Office of Enrollment Management, working with the Course Demand Committee, analyzes course enrollment, utilization, and trends to manage course demand, predicting courses that will be facing enrollment pressures and providing the evidence for decisions about allocating resources to open new course sections.

- "Smart" room-usage reporting optimizes the placement of instructors and classes in appropriate rooms to reduce the number of audiovisual classroom equipment deliveries and to better use the available classroom stock. Analysis of this data is also used to assess current and future demand for classrooms and how they are equipped, including recommendations for future capital projects and renovations.

- Departments, faculty, and advising staff analyze registration patterns to identify students who are at academic risk, including potential non-completers, in order to provide interventions.

- Feeder-school reports compare the UMBC performance of students from area high schools and community colleges. Sharing this information with the feeder school systems and the recent execution of a data-sharing agreement with community colleges has led to greater collaboration to improve college readiness.

- Specific analysis has led to improvements in admissions yield and financial-aid distributions and the management of current and future financial-aid resources.

The system for annual faculty reporting on achievements and workload has also been upgraded with the launch of the commercial software package Digital Measures. Digital Measures was piloted by nine departments in 2013 and fully implemented in 2015. One objective of this initiative was to improve the efficiency and effectiveness of the existing academic-workload tracking system--the Faculty Annual Report--that had been in place since the early 1990s. The primary goal of the initiative was to better assess faculty productivity and leverage interdisciplinary research activities.

Reporting and analytics are primed for future growth as UMBC's commitment to assessment and analysis continues to increase. Such growth is already part of our new strategic plan in which the

need for data analysis was identified in each of the four focus areas. Our data warehouse is being modified to meet the requirements of the plan. A major effort will be made soon to address Student Affairs data, such as from Residential Life, student groups, and athletics, with an emphasis on identifying student engagement and gauging its impact on student success.

Assessing performance at the university, college, department, and course level as well as resource-allocation decisions will soon be improved by using the Education Advisory Board's Academic Performance System (APS), a vendor-provided tool that will be fully implemented in fall 2016. APS will give administrators, deans, and department chairs enhanced, user-friendly, web-based tools to identify growth in demand for programs and courses, faculty productivity, and potential obstacles and bottlenecks faced by students. APS will help us see areas where additional resources are needed or where changes in practice might result in efficiencies.

Our predictive analytics capabilities will be bolstered through the use of new software from the USM for tracking academic interventions, Predictive Analytics Reporting's Student Success Matrix (PAR SSMx). To better identify at-risk students and the impact of our efforts to assist them, we are in the early stages of implementing Civitas Learning's Illume predictive-software package. Illume's pilot will take place during the spring of 2017 and will be used to improve student success and speed time to degree, both components of the strategic plan.

Coordinating analytics and institutional effectiveness efforts within Academic Affairs and inter-divisional analytical projects will be the responsibility of the newly created position of associate provost for analytics and institutional assessment. Advancing the strategic plan and UMBC's mission and goals, the Associate Provost will advise the Provost and the campus community on the effective use of data-gathering and institutional analytics.

2 Assessment of academic programs

Several assessment processes are employed by UMBC to meet the complementary strategic goals of an effective curriculum and effective pedagogy on the one hand and an engaging student experience on the other. These assessments are discussed in this section. The core of UMBC's academic program assessment is the periodic APR, supported and complemented by course evaluation surveys and digital learning management system analytics.

Formal assessment of academic programs is organized to be consistent with the academic structure of UMBC, which includes three academic colleges, the Graduate School, the School of Public Policy, the Erikson School of Aging Studies, the Division of Undergraduate Academic Affairs, and a baccalaureate social work program that is part of the University of Maryland's School of Social Work. The social work program, the Erickson School, the Interdisciplinary Studies program, and the entrepreneurship minor program report to the Provost. All academic programs, including those offered at the Shady Grove campus and through the Division of Professional Studies are subject to a common approval process and a common academic assessment process called the Academic Program Review (APR). Since the last Middle States review, the College of Arts and Sciences was reorganized to create two separate colleges: the College of Arts, Humanities, and Social Sciences and the College of Natural and Mathematical Sciences, in part to allow the deans to work more closely on departments' plans for growth and improvement.

Student course evaluation surveys are required to be used by all academic departments and programs except the Information Systems Department, which surveys students on courses through an online system. The course evaluation process uses a common form, called the Student Course Evaluation Questionnaire (SCEQ) that was developed at UMBC. Results are summarized by instructor and aggregated for departments and the University. They are made available on the IRADS web site for review by all members of the UMBC community, including our students and the public.[40] SCEQs are used to assess teaching performance in annual reviews of all full- and part-time instructional faculty and in reviews for tenure and promotion. The Faculty Senate recommended to the administration that a new survey instrument be developed because the SCEQ was not keeping pace with current pedagogical practices and an updated survey could help faculty better assess student learning outcomes. Consequent to the recommendation, the Provost convened a course evaluation implementation committee charged with researching, selecting, piloting, and assessing a new course evaluation tool to replace the SCEQ. The new survey was piloted in fall 2015, and the recommendations of this committee, including an assessment and analysis of the new tool, were presented to and approved by the Faculty Senate in April 2016. [41]

UMBC has also been a pioneer in the use of analytics for data from our student learning management system, Blackboard. UMBC worked with Blackboard Learn, Inc., to help create Analytics for Learn, and was among the first institutions to implement the program. Working with the UMBC Faculty Development Center, leaders use the data from courses to give faculty insight into course designs, including what parts of their Blackboard course are most used by students, the relationship between how active students are on Blackboard and how well they do on assignments, and who in a department is using technology in innovative ways, as measured by student activity in the course.

2.1 Review and assessment of existing academic programs and new academic programs

As noted above, all academic programs of the University are subject to a common assessment process called the Academic Program Review and any new academic program must undergo a common approval process. Both of these processes are discussed below.

2.1.1 Academic Program Review

The APR[42] has five general purposes, as recognized by the USM and the Council of Graduate Schools: quality assurance, quality improvement, accountability, identification of strategies for improvement, and providing the institution with information for prioritization of resources. A successful APR answers the following questions: To what extent is the program advancing the state of the discipline or inter-discipline? How effectively do pedagogical practices and program

[40] Student Course Evaluation Questionnaire Profiles (SCEQ)
[41] Faculty Senate Meeting Minutes - April 2016 - Approval of piloted online student course evaluation results - pp.12-13.
[42] Academic Program Review (APR) Guidelines (April 2015)

design meet the student learning outcomes? How does the program contribute to UMBC's mission? How do experts in the field assess the program's quality and resources? What are the vision and future goals for the program and what is the strategy for achieving these? What specific aspects of the program can be improved and how?

As mandated by USM, an APR is conducted for each academic program at UMBC every seven years.[43] The year-long assessment process begins with a comprehensive self-study and ends with recommendations and approval of the program review by the Faculty Senate. Guidelines for preparing the self-study and for the subsequent action plan as well as for a follow-up report in the third year of the review cycle are detailed and clear. Many academic programs on campus are accredited by national professional organizations and must undergo additional program reviews periodically to maintain their accreditation. To the extent possible, the internal APR process is coordinated with the external process to reduce the burden on faculty and administrative time.

The self-study addresses a common core set of research questions by drawing on data provided by IRADS (e.g., the number of degrees awarded, courses offered by full-time and part-time faculty, faculty demographics, student demographics). The self-study document includes a section related to the assessment of student learning outcomes (SLOs) based on the SLO assessment plans developed by the departments. (This aspect of assessment is addressed fully in chapter 5.) The APR process is coordinated through the Provost's office and led by the Vice Provost for Academic Affairs. External reviewers respond to a standard set of questions developed by UMBC, and the program is provided with an opportunity to ask additional questions of the reviewers. The external reviewers conduct a site visit during which they meet with administrators (chair or program director, college Dean and Dean of the Graduate School, and Provost) and faculty and students of the program. Based on their review of the self-study and their site visit, the evaluators submit a final report that is shared with the department, the Provost, the college Dean and faculty governance.

The college Dean writes a response to the report, generally with the participation of the departmental chair. In consultation with the Provost's office, the Dean and department chair develop an action plan that draws on the self-study and the reviewers' report. The plan is reviewed at a formal meeting between the Provost, the Vice Provost for Academic Affairs, the Vice Provost for Faculty Affairs, the department or program chair, the college Dean and the Vice Provost and the Dean of Undergraduate Education and/or the Dean of the Graduate School as appropriate. The plan identifies the agreed-upon priorities for improvement of the department, program, and curriculum[44] and specifies who will be responsible for advancing each of the priorities (the unit and/or the College and/or the Provost's Office). Although the action plan is discussed in detail at this meeting, the final action plan is developed after the meeting in consultation between the department, the Dean, and the Provost's office. When priorities and actions have base-budget implications, the Dean may decide to reallocate funding within the college for that purpose or prioritize it as a request for funding that is addressed during the

[43] Academic Program Review (APR) Master Schedule
[44] Post APR Process & Action Plan (July 2013).

annual campus budget cycle. A similar process is used to respond to needs for one-time, non-recurring funding, which may be allocated by the Dean, the Provost's office or through the annual budget process. The APR process is designed in such a way that program faculty and administration collaborate to respond to the assessment's results and use them for planning and resource allocation at the institutional, college, and departmental levels.

The self-study, the reviewers' report, the Dean's response, and the final version of the action plan goes for review and approval by the University's shared-governance system. The review documents and the reports of the Undergraduate Council, Graduate Council, and Academic Planning and Budget Committee are presented to the Faculty Senate. The Faculty Senate provides final, on-campus approval of the program review and the action plan. A report of the outcome of the review is then submitted to the USM.[45]

An important part of the academic program assessment process, which is not required by USM, is an internal campus follow-up review that occurs in the third year after the primary APR.[46] The goal of this three-year review is to assess the outcomes and overall progress on the action plan midway through the seven-year review cycle, including programmatic and curricular improvements and the allocation of resources. A report on the assessment of progress on the action plan is incorporated into an updated action plan, which is prepared by the department and college Dean and reviewed at a meeting of the same senior personnel that participated in the original APR. These documents then undergo further discussion and review through the shared-governance system in the same manner as the primary APR, ending with a recommendation to the Faculty Senate.

A number of actions have resulted from the APR process. Examples are detailed below and APR reports are in the document road map.

American Studies. Following the retirement of two senior-level professors, the external review committee recommended strengthening and refocusing the program. In response to this recommendation, two new courses were developed: a seminar on the topic of the development of mixed-race identities in the United States and an additional course on Asian-American literatures and cultural studies.

Biological Sciences. The 2010 biological sciences APR called for additional research infrastructure, noting that departmental laboratory space and aging support facilities were becoming inadequate to support a first-class research faculty. The vivarium was of particular concern. A strategic, multiyear plan was developed to maintain and keep compliant the existing vivarium while the University worked toward the development of a new facility. The University subsequently planned and received capital funding to build a new Interdisciplinary Life Sciences Building that includes a modern vivarium. Biology faculty were involved in its design along with the design of associated laboratories. Construction on the building is expected to start in spring 2017.

[45] Academic Program Reviews and Year Three Reports
[46] Year Three Reports

Combined Program in Biochemistry and Molecular Biology. The external review committee recommended increasing the number of faculty with externally funded programs. In response, four new tenure-track faculty were recruited (prior to 2008): three biochemists (including a structural biochemist and an analytical biochemist) and a computational biologist.

Dance. The external review committee recommended offering a dance appreciation course for non-majors as a regular offering in the fall and spring semesters, to increase enrollment. Following this recommendation, the department gained approval for Dance Appreciation as a General Education Program course with Arts and Humanities and Culture designations.

Engineering management. Following a program review (and prior to the third-year review), eight new management courses were added: Competition and Strategy, Leading Virtual/Global Teams, Quality Engineering and Management, Project and Systems Engineering Management, Innovation and Technology Entrepreneurship, Engineering Management Project, Organizational Learning, and Advanced Project Management.

Political science. The external review committee recommended providing more courses focusing on areas outside of the United States. Several new courses were created: International Relations, Latin American Politics, International Law, Democratization, Political Philosophy of War and Peace, and Globalization.

Sociology and Anthropology. The external review committee recommended that the impact of the new Health Administration and Policy Program (HAPP) be carefully assessed in light of low staffing. The Dean subsequently increased the level of staff support for the program by fully funding and hiring for an administrative assistant position and a half-time student advisor position. The department further subsidized program growth by funding part-time faculty, staff salaries, operating costs, and student assistants. Since these changes were made, the HAPP program has experienced dramatic growth. Overall enrollment grew from 84 in fall 2005 to 298 in spring 2016; 75 of these majors or double majors are pursuing the public-health track.

Theatre. The external review committee recommended that additional faculty and staff be hired to assist the department in meeting its teaching and training mission. Addressing these needs in FY 2011, 2012, and 2013, the University provided the department with a replacement for the retiring, full-time lighting and sound staff member, converted a half-time costume shop assistant position to a full-time one, and funded the hire of a full-time technical director in the scene shop.

2.1.2 Review of New Academic Programs

Proposals for new programs or modifications to existing programs originate from departments or from collaboration between several departments, with the support of the college Dean. At an early stage, the concept for each new program is presented and discussed at the Program Concept Group that is convened by the Provost and includes all college deans, representatives from the academic affairs administration, and representative from the shared-governance system, including the Faculty Senate president and the chair of the Academic Planning and Budget Committee. This review determines whether or not the concept should be fully developed into a

formal proposal and proceed through the approval process, and it identifies issues that need to be more fully addressed if the proposal is to go forward.

Following the development of the full program proposal, the program-approval process follows closely the approval path used for the APR. New courses and the curriculum are reviewed by the Graduate Council or the Undergraduate Council with final approval by the Faculty Senate. The Academic Planning and Budget Committee reviews the programmatic resources and budget necessary to launch the program, including an assessment of enrollment projections and tuition revenue and also reports to Faculty Senate for approval.

2.1.3 Continuous improvement of the reviews

The APR and new program proposal processes currently in place have undergone continuous improvement during the period covered by this Self-Study. The new program process has been substantially revised to require a budget template to detail fiscal impacts, including overhead to the institution as well as academic costs. The APR process now must include an action plan spelling out responsibilities. These changes have made the APR and new program processes more effective.

3 Assessment of academic-support units and institutional programs

In addition to departments and academic programs, academic-support units and institutional programs or initiatives also undergo assessment. In this section we describe the assessment of several academic-support units and institutional programs. Examples included are undergraduate admissions, academic and pre-professional advising, the Albin O. Kuhn Library, the Honors College, the Learning Resources Center, and the Graduate School.

In addition to unit-level assessment plans and processes, activities and initiatives within academic affairs that are not directly linked to an academic program are also assessed. Many institutional academic affairs initiatives are supported initially through grant funding as pilots or research studies. In these cases, the assessment serves not only to determine the effectiveness of the initiative and generate research results, but most important, provides information about the impact of the program to determine how and why the initiative should be sustained and institutionalized. Examples of the latter are the ADVANCE Program, the Meyerhoff Scholars Program, and the Sherman STEM Teacher Scholars Program.

3.1 Academic-support units

3.1.1 Office of Enrollment Management

Undergraduate Admissions

Undergraduate Admissions uses several assessments to ensure its efficacy in recruiting successful students. One important tool, commissioned from the College Board, is the Admitted Student Questionnaire. This detailed survey is administered every two to three years. The data from it is continually monitored and used to focus recruiting efforts on schools and areas that

have tended to yield successful UMBC students. The "segment analysis" portion of the assessment is also cross-matched with Ds, Fs, and withdrawals and retention data to identify schools and programs that yield UMBC students who are *not* successful in certain classes and subjects. This has allowed admissions staff to reach out to these schools and programs to help better prepare their incoming students. This assessment has contributed, in part, to the substantial increase in undergraduate applications for admission to UMBC.

We routinely compare our success in diversifying the demographic composition of our student body to that of our aspirational peers. Consistent with the commitment expressed in the University's mission statement to "cultural diversity and social responsibility," we strive for significant ethnic, racial, and family-income diversity. To this end, the offices of Undergraduate Admissions and Enrollment Management leverage several tools to evaluate how well we are attracting students in the relevant market. These tools include the College Board's enrollment-planning service and Descriptor Plus.

UMBC enrolls a significantly larger percentage of undergraduate African American students than our aspirational peers. On the other hand, women and Hispanic students are underrepresented at UMBC. Enrollment Management seeks to enroll women at the national average and increase UMBC's Hispanic enrollment to at least the proportion of Hispanics in Maryland, now over 8 percent. Hispanic students make up just under 6 percent of UMBC's student population. While this is similar to other Maryland public universities (University of Maryland, College Park, 8 percent; Towson, 4 percent) or to UMBC's aspirational peers (University of Connecticut, 7 percent; University of Georgia, Athens, 6.4 percent; Stony Brook University, 10 percent; University of Pittsburgh, 2.5 percent), we continue to focus on ways to better attract, enroll, and retain academically talented Hispanic students.

In attracting students, UMBC faces the difficulty that Maryland provides comparatively limited incentives for Maryland students to enroll in state. This is a challenge for other Maryland schools as well. Universities in other states are much more aggressive in this regard. Additionally, for potential out-of-state students, the cost of attending UMBC is greater than the cost of public universities in their home states.

Compared to its aspirational peers, UMBC in AY 2013-14 awarded officially designated need-based financial aid to a slightly lower percentage of those students who applied for it. A significant proportion of our minority scholars in STEM who were eligible for need-based aid did receive aid, however. They received merit-based aid from private fundraising and federal agencies.

A recent report and recognition from the U.S. Department of Education finds that UMBC has been making strides in meeting the needs of low-income students.[47] The report concluded that UMBC has substantially increased the proportion of its students receiving federal Pell Grants for college tuition, with the percentage of Pell recipients reaching 27 percent of enrollment in 2013,

[47] U.S. Department of Education, "Fulfilling the Promise, Serving the Need: Advancing College Opportunity for Low-Income Students" (March 2016).

according to the report. More than 60 percent of UMBC's Pell recipients graduated within six years while only about half of recipients nationally earn their degrees in that time period.

The University is making special efforts to meet the needs of more economically challenged students, especially in the Baltimore area. For example, we have attracted millions of dollars to focus on K-12 initiatives in Baltimore, including programs for Lakeland Elementary/Middle School and Ben Franklin High School in the southwest part of the city, our CHOICE program serving at-risk youth, and many hours of student volunteer effort coordinated through our Shriver Center. In addition, we prepare science teachers for underserved schools through the Sherman STEM Teachers Scholars Program. Other recent efforts to attract and recruit students from the Baltimore City Public Schools include the establishment of the UMBC/Baltimore City Public Schools CEO Award merit scholarship, outreach on the part of our various scholars programs, and two Upward Bound programs.

Academic and Pre-Professional Advising

To improve student advising during orientation for incoming undergraduates, Academic and Pre-Professional Advising surveys students about their experience. For about the past eight summers, the office has typically collected over 2,000 evaluations. The simple evaluation form includes Likert-scale questions addressing students' satisfaction with their advisors, their final schedules, and the overall advising experience as well as their knowledge of general education and major requirements.

The data collected from these evaluations over multiple cycles have led to a number of improvements:

- Relocation of the physical space for orientation advising from the Albin O. Kuhn Library's basement to its seventh floor

- Configuration of the PeopleSoft software used for scheduling all advising to meet the specific needs of orientation advisors, who must be particularly efficient

- Additional resources provided to academic departments to address present and predicted course shortages

- A system for identifying in advance of orientation anything that would block a student from registering, enabling administrators and others to take proactive measures

- Identification of advisors that students are finding unhelpful during the orientation program so these advisors can receive additional help and monitoring

- Significant reconfiguration of the scope and nature of orientation advising at our Shady Grove campus to more closely reflect the model used on the main campus.

These changes have resulted in more positive evaluation of the orientation advising process by our new students. Academic and Pre-Professional Advising continues to make enhancements annually based on assessment of the program.

3.1.2 Albin O. Kuhn Library

The Provost convened the Blue Ribbon Committee on the Library in 2010. The charge to the committee was to:

- Find new approaches for dealing with the budget challenges brought about by dramatic inflationary increases in the cost of library materials. The 2006 Middle States review found that library materials were significantly underfunded for the research and STEM missions of the University and recommended that priority be given to addressing deficiencies in library resources.

- Devise ways to enhance the library's role in all educational activities.

- Lay a road map for the library for the next five years that anticipated the information-resource needs of the campus; recommend changes in library functions and space.

The group, chaired by the Vice Provost of Academic Affairs, took into consideration the 2006 Middle States report, trends occurring in higher education libraries, and the needs of UMBC's academic departments. A major focus of this group was how to increase the library's collections while continuing to enhance the library's technologies and services.

After several campus surveys and input from a number of groups along with reviews of the research literature, best practices, and the practices of peer institutions, the committee issued a detailed report containing recommendations to guide the library through the next three to five years. The recommendations were shared with the UMBC community in a variety of ways, including discussions at the library policy committee and the annual University Leadership Retreat. The final report was posted on the Provost's web site.[48] Subsequent progress reports have also been posted on the web site.[49] The library policy committee reviews plans for the library annually and specifically reviewed the impact on library patrons of the Blue Ribbon Committee recommendations in 2011.[50]

Key results of this work were:

[48] Blue Ribbon Committee Report on the Library - March 24, 2010
[49] Progress Report on Library Blue Ribbon Committee Recommendations - June 15, 2010; Progress Report #2 on Library Blue Ribbon Committee Recommendations - November 23, 2010; Progress Report #3 on Library Blue Ribbon Committee Recommendations - March 7, 2011; Progress Report #4 on Library Blue Ribbon Committee Recommendations - January 4, 2012
[50] Library Policy Committee Report on the Impact of BRC Recommendations, May 2011

- The creation of the Retriever Learning Center, a 24-hour-a-day, seven-days-a-week facility designed to support collaboration, tutoring, and peer learning

- Increased collaboration with the Division of IT to expand technology and technology support in the Library

- An acceleration of the move from print to electronic format for journal literature and other cost-cutting measures

- Enhanced funding to expand access to more born-digital resources.

The Retriever Learning Center was opened in September 2011 and was an immediate success in terms of substantial use by students, especially for collaborative learning. In fact, expansion is currently being discussed. Additional spaces for group study have been developed, including a digital media lab to foster the use of digital media in student projects and campus research.

Another recommendation was to revise the process for selecting new resources. When the library receives funds for new resources, the campus community is polled for nominations and the full list of nominations is reviewed by the deans, who decide on the acquisitions. This ensures that campus teaching and research priorities are being supported.

The library has continued to work on the recommendation from the Blue Ribbon Committee to migrate to more contemporary services and resources. Online tutorials and additional enhancements to the library web site have allowed for more remote and point-of-need student assistance. The library's Special Collections Department continues to focus on digitization of unique materials. Our membership in the University System of Maryland and Affiliated Institutions library consortium for the sharing and acquisition of information resources has added to our purchasing power with major content vendors as well as provided the UMBC community with greater access to materials.

3.1.3 Division of Undergraduate Academic Affairs

Undergraduate education is a strategic priority for UMBC, and the Division of Undergraduate Academic Affairs oversees undergraduate experiences as well as academic support services for students via the Learning Resources Center. In addition to its annual assessment process, in 2013 the Division of Undergraduate Academic Affairs underwent an external review of its programs and goals.[51] Some of the findings and results of these reviews are summarized by program below.

[51] APR Office of Undergraduate Education 2012-2013.

Honors College

The Honors College is a vital part of the UMBC community, nurturing talented students through a challenging and interdisciplinary academic program within the larger University. For AY 2015-16, Honors College enrollment was 533. In recent years, 57 to 60 percent of the students who begin in the Honors College graduate in four years with a Certificate of General Honors, although the Honors curriculum extends well beyond general education and major requirements and requires a 3.25 GPA.

Guided by the APR of the Office of Undergraduate Education conducted in 2013, the Honors College established three main goals for program improvement and assessment. Below are the results of work toward those goals:[52]

- The Honors College has improved admission and retention practices for transfer students. The college examined the characteristics of incoming transfer students who went on to succeed in the Honors College, and adjusted criteria for automatic admission of transfer students to the program. These new criteria are increasingly being codified in articulation agreements between feeder community colleges and UMBC.

- The Honors College is investigating the impact of aspects of its curriculum and program on student success. Among the preliminary findings are: that students who entered UMBC with very good SAT scores and became members of the Honors College graduated sooner and with higher GPAs than students with similarly good SAT scores who did not become members of the Honors College; that Honors Forum, the mandatory introductory class for freshman, increased student identification with each other as Honors College members; and that graduating students generally expressed high levels of satisfaction with their Honors College experience.

- The Honors College intensified its efforts towards UMBC's goal of inclusive excellence. It was instrumental in negotiations with the CollegeBound Foundation, a Baltimore City education nonprofit, to establish dedicated scholarships for Baltimore City public high school students coming to UMBC; in conjunction with the College of Arts, Humanities, and Social Sciences and the Division of Undergraduate Academic Affairs, the Honors College pioneered a mentoring program for students at a Baltimore City public high school enrolled in an AP research class; and the College's targeted recruitment efforts over several years significantly increased the number of minority students enrolled in the program.

[52] Ibid.

Learning Resources Center

The Learning Resources Center (LRC) is UMBC's comprehensive undergraduate academic-support program for undergraduates. The program aims to help students reach their academic goals and become independent, lifelong learners.

As a result of the Office of Undergraduate Education's 2013 APR, the Learning Resources Center has focused on developing program outcomes for its three principal activities: tutoring, first-year intervention (which provides alerts about students in academic trouble), and LRC101A, a course aimed at supporting and motivating at-risk students while providing them with essential study and organizational skills.

For example, one of the outcomes the LRC sought in tutoring was to increase the number of student-tutor contact hours by 10 percent over a year. One strategy employed was increasing communication with our faculty about the availability of tutoring through the LRC web site and on myUMBC groups. From fall 2014 to spring 2015, there was a 25 percent increase in the number of contact hours, and by the following fall the increase had risen to 42 percent, well exceeding the goal. Table 3 shows the number of student-tutor contact hours over the 2013-2015 period in the different types of tutoring services (by appointment, in the math lab, or in the writing center).

Table 3: LRC tutor contact hours by semester and academic year 2013-2015

A contact hour is an hour a student spends with a tutor either individually or in a group.

Fall	Math Lab	Writ-ing Center	Appt Tutor-ing	Total	Sum-mer	Math Lab	Writ-ing Center	Spring	Math Lab	Writ-ing Center	Appt Tutoring	Total	AY Overall Total
2015	2366	1857	2350	6573	2015	238	58						
2014	1309	1730	1587	4626	2014	287	74	2015	2076	1196	1434	4706	9693
2013	1811	1534	1666	5011	2013	194	43	2014	1276	1170	1329	3775	9023

Meyerhoff Scholars Program

The Meyerhoff Scholars Program focuses on increasing diversity among future leaders in science, technology, engineering, and related fields, with the understanding that they will make significant contributions in their fields, leading to tenured positions in academia, research positions in industry, and prestigious honors. It does so by preparing and supporting undergraduate students–including significant numbers of underrepresented minorities--who are committed to earning a PhD in these fields.

For the 2015-2016 academic year, 270 students were enrolled in the program. Of this group, 57 percent are African-American, 15 percent Caucasian, 15 percent Asian, 12 percent Hispanic, and 1 percent Native American. Over 1,000 students have graduated from the program since its

beginning in 1989. Alumni from the program have earned more than 200 PhDs (which includes 43 MD/PhDs), more than 100 MD degrees, and almost 250 master's degrees. Over 300 graduates are currently pursuing graduate and professional degrees in STEM fields.

In 2001 a study of 1998-99 data by the American Society for Biochemistry and Molecular Biology noted that UMBC awarded 21 of the 66 chemistry and biochemistry undergraduate degrees to African American students that year in the nation--a phenomenal result that placed UMBC first nationally and well ahead of any other institution. Program assessments have indicated that Meyerhoff Scholars, compared with carefully selected and validated control groups, were nearly twice as likely to persist and graduate in science and engineering undergraduate majors, achieve significantly higher GPAs in science and engineering courses, and were more than five times more likely to complete science and engineering PhDs or MD-PhDs. Many Meyerhoff Scholars who have completed graduate school now hold faculty positions at prestigious universities.[53]

As a consequence of those achievements, the Meyerhoff Scholars Program has had a significant impact on undergraduate education both at UMBC and throughout the nation. On campus its focus on high achievement for African Americans and its innovative blend of academic, financial, social, and professional support signaled to the community that taking calculated risks to enhance undergraduate education and diversity is not only welcomed but encouraged. This has led to a range of additional successful innovations from course-redesign efforts in chemistry to the previously mentioned NSF ADVANCE effort to increase the participation and success of women as tenure-track faculty in the sciences. In addition, we have taken what we have learned through the Meyerhoff Scholars Program to develop similar scholars programs in the humanities, public affairs, the arts, STEM teaching, and cyber security. Like Meyerhoff, those programs are structured to provide students not only with significant financial support, but also with a community of peers and mature advisers who are invested in their academic success and help them connect to career-building research, internship, and service opportunities.

Nationally, the Meyerhoff Scholars Program has become a model for supporting diverse students in the sciences, particularly since it was highlighted in the National Academies report *Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads*.[54] With support from the Howard Hughes Medical Institute,, Pennsylvania State University and the University of North Carolina at Chapel Hill are now undertaking full-scale efforts to adapt the Meyerhoff Scholars Program to their campuses, and other institutions have adapted components of our program to diversity programs of their own.

Important to both program success and proof of concept for internal and external audiences, program assessment has been a central feature of the Meyerhoff program from its inception–a feature that also signaled the importance of program assessment, data analytics, and evidence-

[53] Maton, K.I. and Hrabowski, F.A. III, (2012). "The Meyerhoff Scholars Program." *Mt. Sinai Journal of Medicine* 79: 610-623.

[54] National Academies. (2011). Expanding Underrepresented Minority Participation: America's Science and Technology Talent at a Crossroads, Washington, DC: National Academies Press.

based decision making more generally to the campus community. The program's components, strengths and weaknesses, and results have been the focus of continuous, rigorous, and regularly published process and outcome evaluations combining qualitative and quantitative assessment.

One result has been three books authored by President Hrabowski (two with UMBC Professor Kenneth Maton and others) on raising academically successful African American and other underrepresented minority students[55], along with numerous book chapters and articles on the program's assessment. Analysis of data has shown six factors to be especially important:

1. Community: Students consistently rate being part of the Meyerhoff community as a key program component. African American students felt less isolated than their peers who are not in the program and valued how it provides ready-made opportunities to form study groups.

2. Financial support: The availability of scholarship support allows students to focus on academics, without the distraction of off-campus work. This ability to focus results in their enhanced academic performance, which then feeds into greater self-esteem.

3. Program staff: Meyerhoff scholars consistently identify the work of the staff as important to their success. Staff are available to provide both academic advising and personal encouragement. They conduct a summer bridge program, plan events throughout the year, and link students to research and service placements.

4. Research: Scholars consistently rate summer research experiences as important, as these provide them access to leading researchers, opportunities to learn, and a desire to pursue the PhD.

5. Campus academic environment: Scholars also speak positively about the campus academic culture, which they have, in a way, played a strong role in creating. Faculty report that the performance of Meyerhoff Scholars has greatly influenced faculty's perceptions of the capability of African American students. That improved perception, in turn, has helped to create the improved academic climate for African Americans at UMBC, and this goes on to benefit future Meyerhoff cohorts. Meyerhoff participants, compared with students who declined the scholarship and matriculated elsewhere, report lower levels of stress in their interactions with faculty.

6. Professional development: Scholars report significantly greater opportunities for networking than students not in the program, capitalizing on summer research and other experiences.

[55] *Beating the Odds: Raising Academically Successful African American Males* (1998), *Overcoming the Odds: Raising Academically Successful African American Young Women* (2001), and *Holding Fast to Dreams: Empowering Youth from the Civil Rights Crusade to STEM* (2015)

To ensure that we have met our goals of educating minority students who go on to earn the PhD, we have also compared our outcomes to those of other universities by analyzing data from the National Science Foundation that track students from their undergraduate programs through the doctorate. Based on this analysis, we have found that:

- UMBC was sixth among U.S. colleges and universities in producing black bachelor's degree recipients who went on to complete PhDs in the natural sciences or engineering from 2005 to 2014

- UMBC was first among predominately white institutions producing such graduates

- UMBC was the leader among U.S. colleges and universities in the number of black bachelor's degree recipients who completed MD-PhDs during the period from 2011-2015

The Division of Undergraduate Education 2013 APR generated the following priorities for the Meyerhoff Scholars Program: sharing successes both externally and internally and increasing current scholarship award levels. Specifically:

- Externally, a Meyerhoff Guidebook can help other institutions to apply the educational principles that have been considered and proven effective at UMBC. The AMGEN Foundation has committed to fund the guidebook that will illustrate the foundational tenets of the Meyerhoff model.

- Internally, Meyerhoff staff will continue to work with the Center for Women in Technology, the Department of Biological Sciences, the Honors College, the College of Natural and Mathematical Sciences, Sherman STEM Teachers Scholars Program, the Division of Student Affairs, and the UMBC High-Performance Computing Facility, among others. The goal is to share strategies for recruiting and retaining diverse students, coordinate programming, and combine outreach efforts. Some efforts so far have been effective (see this chapter, p. 73 on Honors College recruitment) and others have not. For instance, the Center for Women in Technology and Meyerhoff jointly hosted some recruiting events but found that attendees were largely male and interested in the natural sciences rather than computing or engineering. The joint events were discontinued.

- As other institutions have developed STEM scholar programs (similar to Meyerhoff in scope and nature), our most competitive student applicants may receive offers of admission with much higher levels of financial assistance than current levels within the current Meyerhoff model. Consequently, the Meyerhoff program staff are exploring methods, strategies, and sources to increase their awarding capacity.

Sherman STEM Teacher Scholars Program

The Sherman STEM Teacher Scholars Program, modeled after the Meyerhoff Program, was established in 2006 to reverse the growing shortage of highly qualified STEM teachers and to cultivate in those teachers a strong understanding of diverse student populations, high-needs

school environments, and urban communities. Graduates of the program teach in Baltimore and throughout Maryland.

As a result of the Office of Undergraduate Education 2013 Academic Program Review, the Sherman STEM Teacher Scholars Program is focused on the following priorities:

- Recruiting more students and supporting more alumni. By the start of 2016, the Sherman program had served 134 students, including 75 alumni and 59 students who were actively enrolled at UMBC. The average cohort size has grown since 2006 from 10 to 20 and the average graduating class from 4 to 12. In addition to graduating more STEM teachers, the program also has the goal of increasing the number of graduates retained in teaching at least three years. Of those who graduated in 2012 or earlier, 74 percent have taught for three-plus years; of those who graduated in 2013, 85 percent are in their third year of teaching; of those who graduated in 2014, 88 percent are in the second year of teaching; and of those who graduated in 2015, 100 percent are in the first year of teaching. Sherman staff have been unable to track 15 percent of alumni and do not know their employment status.

- Measuring student learning outcomes in the Sherman First-Year Experience course, applied learning experiences, and program events and meetings. The focus is on both functional and affective competencies. The student learning outcomes are currently being written.

- Developing and overseeing a partnership with Lakeland Elementary/Middle School, a Baltimore City public school that is receiving services of several kinds from different UMBC constituencies. The partnership with Lakeland has brought in about $1.1 million each from the Maryland State Department of Education and the Northrup Grumman Foundation to support teacher professional development, enrichment programming for students and families, community-based applied learning placements for undergraduate and graduate students, and AmeriCorps staff.

3.1.4 Graduate School

The Graduate School works with campus departments to continue to build research and graduate education at UMBC, one of the two overarching goals in the 2003 strategic plan. It oversees admission, orientation, graduate assistantships, professional development, research, and graduation for students at the graduate level. In AY 2015-2016 the graduate school enrolled 1,160 full-time and 1,436 part-time students

The graduate school evaluates each program to ensure high quality that meets the needs of our students. Some examples include:

- Orientation: The graduate school orientation program prior to fall 2013 provided information about the campus and policies, but an electronic survey of those who attended indicated it did not meet the immediate needs of incoming students, many of whom left feeling disconnected from the University. Graduate School staff members and

representatives from the Graduate Student Association held meetings to discuss how to make the orientation program more personal, welcoming, and relevant to students' needs. The newly designed orientation program was initiated in fall 2013 including more extensive and earlier communication with students, a more relaxed atmosphere, and extensive featuring of current graduate students to provide important advice. Since then, students surveyed have given more favorable evaluation of and made positive remarks about the orientation program.

- Professional development programs: Participants fill out evaluations of all professional development seminars and workshops, and the results are analyzed for process improvement.

- Dissertation House**:** Social isolation is common at the dissertation-writing stage and is a leading factor in advanced-stage attrition in PhD programs. For underrepresented students working in laboratories, social isolation might be the norm for their entire graduate career. To address this issue, the UMBC Graduate School developed and introduced a model of doctoral dissertation supervision that involves an external dissertation coach and multiple mentors. The Dissertation House Model (DHM), a multi-disciplinary approach to doctoral-dissertation supervision, preserves the traditional master-apprentice relationship between faculty and students within academic departments while providing an additional support mechanism through interdisciplinary cohort learning communities, especially for those from underrepresented groups.

  Dissertation House began as a weekend retreat for underrepresented STEM students at UMBC and other area universities. The DHM has been subsequently adopted by other USM institutions and by universities across the country, as well as received mention as an important innovation in doctoral retention and completion by the *Chronicle of Higher Education*. Dissertation House now includes a four-day, face-to-face writing workshop, other professional development activities, on-line blogging, and one-on-one coaching. At UMBC it serves graduate students four times per year with sessions during the winter, spring, summer, and fall.

  The effectiveness of the DHM has been assessed using a mixed-methods approach using more than a decade of data.[56] The assessment included quantitative analysis of retention and graduation data for entering cohorts of PhD students across all UMBC doctoral programs from 2000 to 2012, some of whom (154 students) participated in Dissertation House and others of whom (1,736 students) did not; and qualitative analysis of the written evaluations from 267 Dissertation House participants who were students enrolled in three PROMISE AGEP institutions from 2007 to 2013.

[56] W. Y. Carter-Veale, W.Y, Tull, R.G, Rutledge, J.C. & Joseph, L.N., "Doctoral Student Experiences Using The Dissertation House Model: Coping and Writing in a Shared Knowledge Community." *CBE-Life Sciences Education* (in press).

The quantitative data showed that 76 percent of the Dissertation House group graduated compared with 42 percent of the non-Dissertation House group. The relative risk ratio across the eight-year period included in this portion of the study (2006-2014) indicated that participants were 92 percent more likely to graduate than nonparticipants, and participants were 64 percent more likely to be retained than nonparticipants.
The attributable risk ratio suggested that the Dissertation House experience accounted for 47.9 percent of graduation success and 39.2 percent of retention success.

The qualitative results provide further support for the effectiveness of the DHM, the value that students place on the Dissertation House experience, and the impact it has on both their progression and satisfaction. Analysis of the written evaluations from 157 Dissertation House participants in graduate programs at UMBC, 87 at the University of Maryland College Park, and 19 at the University of Maryland, Baltimore showed that Dissertation House established a shared-learning community across disciplines, provided a collaborative writing environment, and reduced social isolation.

3.2 Institutional programs

3.2.1 UMBC ADVANCE

As a model for inclusive excellence dedicated to, as our mission states, cultural and ethnic diversity, UMBC continues to address the need for better representations of women and certain ethnic groups on our faculty. Nationally, and at UMBC, women and some minority groups are especially underrepresented in STEM departments.

In 2003 UMBC received a $3.2 million National Science Foundation (NSF) ADVANCE Institutional Transformation grant to recruit, retain, and advance women into tenure and tenure-track positions.[57] At the inception of the grant, women comprised only 18 percent of UMBC's STEM faculty, with some STEM departments having no women at all. Given the paucity of women who are tenured or on the tenure track in STEM at UMBC, the grant had the ambitious task of creating a culture that supports and promotes women STEM faculty members throughout all stages of their careers. To do so, UMBC ADVANCE developed a series of high-impact initiatives, policies, and interventions aimed at transforming the institution. In an effort to make progress in our hiring practices, we developed:

- A comprehensive family-support plan that allows faculty, female and male, to reduce or otherwise modify workload, especially teaching duties, to maintain work/life balance.[58] One feature of the plan is a one-year tenure clock extension for pre-tenure faculty. The plan proved so beneficial that in 2013 it was institutionalized for all the institutions in the USM.

[57] UMBC ADVANCE NSF Grant Proposal - 2003; UMBC ADVANCE NSF Grant Final Report - 2010
[58] ADVANCE at UMBC - Advancing women faculty in STEM.

- Diversity hiring plans in STEM departments that detail how the department intends to recruit a diverse and inclusive pool of candidates for faculty searches. The plans have led to more women candidates and ultimately yielded more women hires in STEM. Data related to this increase is presented later in this section.[59]

- The practice of including in the search process for STEM faculty members a meeting with representatives from the Women in Science and Engineering (WISE) faculty group. New STEM hires have cited these as a positive experience that informed their decision to accept position offers.

Retention and promotion initiatives include:

- The Eminent Scholar Mentoring Program that provides access to critical mentoring and research networks. This program facilitates a two-year formal mentoring relationship between a new UMBC female faculty member and a prominent researcher in her field, with advice provided on everything from opportunities to present research to letters of support for tenure.

- The Faculty Sponsorship Committee that each summer provides women faculty with informal mentoring and feedback on their dossier materials for third-year contract, tenure, and promotion review.

- Requirement for STEM departments to have clear written and disseminated policies for tenure and promotion.

- Every semester Faculty ADVANCEment Workshops on subjects important to advancing in academia, such as research development and a researcher's digital identity.[60]

- The development of the ADVANCE Leadership Cohort Program. Now in its fourth cohort, each group has focused on such areas as administrative leadership, leadership styles, departmental leadership, leadership in scientific research centers, the gendered dimensions of leadership, and career/life balance. This program has been highly effective with cohort members now in leadership positions such as dean, associate dean, vice provost, and center director at UMBC and other institutions.

UMBC ADVANCE has been evaluated by both internal and external reviewers. Evaluation strategies included tracking changes in policies and procedures involving faculty; surveys to assess, among other matters, gender climate and workload equity between male and female STEM faculty members; and UMBC's first faculty-recruitment and STEM-faculty salary studies. The evaluations noted the transformative impact of UMBC's policies and programmatic interventions on the culture in UMBC's STEM disciplines. During the six years of the grant, the number of women in tenure or tenure-track faculty positions increased by 56 percent, from 30 in

[59] ADVANCE - Diversity Hiring Plans
[60] Faculty ADVANCEment Workshops

2003 to 47 in 2008. Women now comprise 25 percent of the STEM faculty, up from 18 percent in 2003.

Only 2 percent of those faculty, however, are underrepresented minorities—a finding that has led to further work to make UMBC more inclusive. In 2011 UMBC institutionalized the ADVANCE program and simultaneously launched the Faculty Diversity Initiative in the Office of the Provost with the intent of adapting and extending the promising practices of ADVANCE to the goal of more underrepresented minorities on faculty. An executive committee comprised of tenured underrepresented minority faculty was convened to guide the work. UMBC began tracking the diversity of its interview pools. And after purchasing Interfolio, an online faculty search software tool, in 2013 UMBC began tracking the gender, race, ethnicity, ability, and veteran diversity of its initial applicant pools, long lists, and short lists. These assessment efforts were accompanied by additional measures to recruit and advance underrepresented minority candidates:

- Implicit bias awareness training is offered for all search committees,
- A diversity brochure and diversity web site were created for potential candidates,
- An annual recruiting visit to the Southern Regional Education Board conference, which has the largest gathering of underrepresented minority graduate students and postdoctoral fellows, in an effort to diversify our applicant pool,
- Extension of the Eminent Scholar Mentoring Program to all underrepresented minority faculty members, and
- Funding from the Office of the Provost for the Black Faculty Committee, the Latino/Hispanic Faculty Association, the LGBTQ Faculty/Staff Association, the WISE Faculty Group, and the Women's Faculty Network. Building on the WISE model, the three faculty groups now routinely meet with candidates for faculty positions and provide a community of support for faculty on campus.

Leadership also established a postdoctoral Fellowship for Faculty Diversity, a two-year program to support promising recent PhD recipients committed to diversity in the academy with the goal of preparing them for possible tenure-track appointments at UMBC. As of August 2016, three have converted to tenure-track faculty positions at UMBC. Of the eight fellows who have participated in the program thus far, however, only one fellow was from a STEM discipline. The deans of the College of Natural and Mathematical Sciences and the College of Engineering and Information Technology are currently developing pre-professoriate fellowships better tailored to the STEM disciplines.

The ADVANCE program at UMBC had a transformative impact on faculty diversity at UMBC. UMBC continues to assess and refine our approaches to faculty diversity, implementing and institutionalizing best practices.

4 Assessment of units outside of academic affairs

Major units of the University outside of academic affairs are also required to have assessment plans supporting UMBC's mission and goals. Assessment plans for the Division of Student Affairs, Division of Information Technology, Division of Administration and Finance, and the Office of Institutional Advancement are part of the document road map.[61] Below, we will highlight a few assessment projects from some of these areas.

4.1 Division of Student Affairs

Student Affairs has been a leader in formalizing the assessment of programs and units both to ensure its work is aligned with the University's mission and to monitor its own performance. The Student Affairs Assessment and Research Committee (SAARC), with a member of each of the division's departments, meets monthly to focus on the division's learning and service outcomes—devised in 2007,[62] revised in 2014—and to oversee assessment activities. Individual departments each fall submit an assessment plan that identifies a particular issue that the department seeks to understand better and explains how national best-practices data will inform the department's data collection. Assessment in the division was originally supported by a full-time position lost through a budget cut in 2010. A new full-time, director-level position will again oversee assessment and meeting strategic priorities beginning in August 2016.

The division has embraced assessment as essential to the success of all programs. Each year, Student Affairs has an internal retreat, and the units within the division present their assessment findings and learn about assessment topics through posters and presentations. A number of these posters have also been presented at the annual University Leadership Retreat.[63]

Two examples of how Student Affairs has identified problems, conducted assessment, and taken action follow in sections 4.1.1 and 4.1.2.

4.1.1 Residential Facilities Maintenance

Both national literature and internal studies at UMBC strongly suggest living on campus has a strong, positive correlation with retention outcomes even after controlling for the precollege characteristics of residents. While the peer-group relationships formed in residences are likely to contribute most to this effect, degree of satisfaction with the physical condition of spaces that students live in also influences the residential experience and thus impacts retention.[64]

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[61] Divisional Assessment Documents
[62] Student Affairs Learning and Service Outcomes
[63] Topics have been Learning by Leading, The Impact of Living in a Living Learning Community, Breaking Ground, Employer Engagement & Career Advisement, and Behavioral Risk Assessment and Consultation Team (BRACT).
[64] Aitken, N. (Jan. – Feb. 1982) College Student Performance, Satisfaction and Retention: Specification and Estimation of a Structural Model. The Journal of Higher Education, Vol. 53,

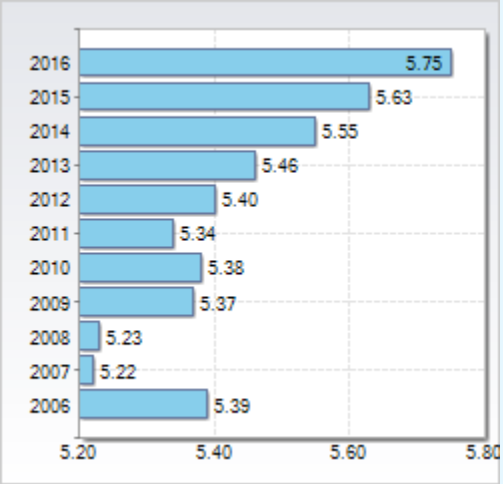
The Association of College and University Housing Officers' International Educational Benchmarking Instrument, now called SkyFactor, annually tracks student satisfaction and has allowed staff to monitor satisfaction with residential facilities over time. A significant drop in facility-satisfaction scores in 2007, following budget cuts, led to repeated efforts working across University departments but failed to improve satisfaction levels by 2010. In 2011 Facilities Management and Residential Life piloted new collaborative efforts to shorten repair times in the residence halls and apartments. The pilot included authorizing Residential Life staff to perform some of the work previously referred to Facilities Maintenance, thus eliminating referral time and increasing direct communication with residents. The success of these initial changes was documented by work-order statistics as well as surveys and led to the development of proposals for new business processes and the reassignment of facility-staff reporting lines from Facilities Maintenance to Residential Life. Residential Life and Facilities Maintenance staff made a joint presentation to leadership asking to permanently broad change organizational structure and practice. With direct supervision of trade staff now in Residential Life, the unit discontinued the transfer of funds for overhead and outsourcing to Facilities Maintenance and instead hired four additional trades staff members who oversee the 12 student maintenance assistants already on staff in an expense-neutral reallocation.

The total number of work orders processed by Residential Life each semester has not changed significantly since the 2011-2012 school year. Since fall 2010, for facilities overall, student satisfaction increased four years in a row from the 2011-2012 school year to the 2014-2015 school year. Currently, mean satisfaction with facilities is the highest it has been in the 15 years of using this assessment.

Improvements are documented by the data shown in figure 13 and were accomplished with minimal investment of new money by reducing the inefficiency of the referral and work order assignment process. Tighter coupling between the student workforce and the trades shops has also increased efficiency. The measurement and distribution of outcome data has inspired great pride in Residential Life staff and a desire "to beat last year's results." Increased resident satisfaction, minimal investment of funds, greater efficiency, and increased staff ownership of results make this a prime example of our assessment culture from data collection to closing the loop with action.

No. 1, pp. 32-50.

Figure 13: Student satisfaction levels with residential facilities 2006-2016



	N	Mean	Difference	Std Dev	Statistical Level
2016	2634	5.75	0.00	1.15	
2015	2498	5.63	**0.12**	1.22	***

	Mean	Difference
2014	5.55	**0.20**
2013	5.46	**0.29**
2012	5.40	**0.35**
2011	5.34	**0.41**
2010	5.38	**0.37**
2009	5.37	**0.38**
2008	5.23	**0.52**
2007	5.22	**0.53**
2006	5.39	**0.36**

Caption: Scale: (1) very dissatisfied, (2) moderately dissatisfied, (3) slightly dissatisfied, (4) neutral, (5) slightly satisfied, (6) moderately satisfied, (7) very satisfied, not applicable.

4.1.2 Alcohol interventions

High-risk drinking presents serious health, safety, and retention issues for students and the universities they attend. Nationwide, nearly 2,000 students between the ages of 18 and 24 die annually from alcohol-related injuries and 600,000 are injured annually while even more students are at risk from alcohol-related physical and sexual assaults. Important to university mission, 25 percent of college students report missing class, doing poorly on exams, missing assignments or earning poor grades due to alcohol use.[65] Student Affairs set out to reduce alcohol-related harms with both safety and retention priorities in mind.

While UMBC data from multiple sources (including the National College Health Assessment, SkyFactor/EBI, National Survey of Student Engagement and AlcoholEdu) suggested that our students drink at significantly lower rates and with lower percentages of high-risk drinking than at our peer institutions, Student Affairs decided to target specific, potentially very harmful drinking behaviors such as drinking alcohol before an event and driving under the influence. The data showed that of those UMBC students engaged in high-risk drinking, the percentage of students in the highest-risk group was similar to peers. Equally concerning, extant interventions were neither targeted to the specific issues the committee identified nor were they effective. When the Learning Collaborative on High-Risk Drinking, the inaugural initiative of the National

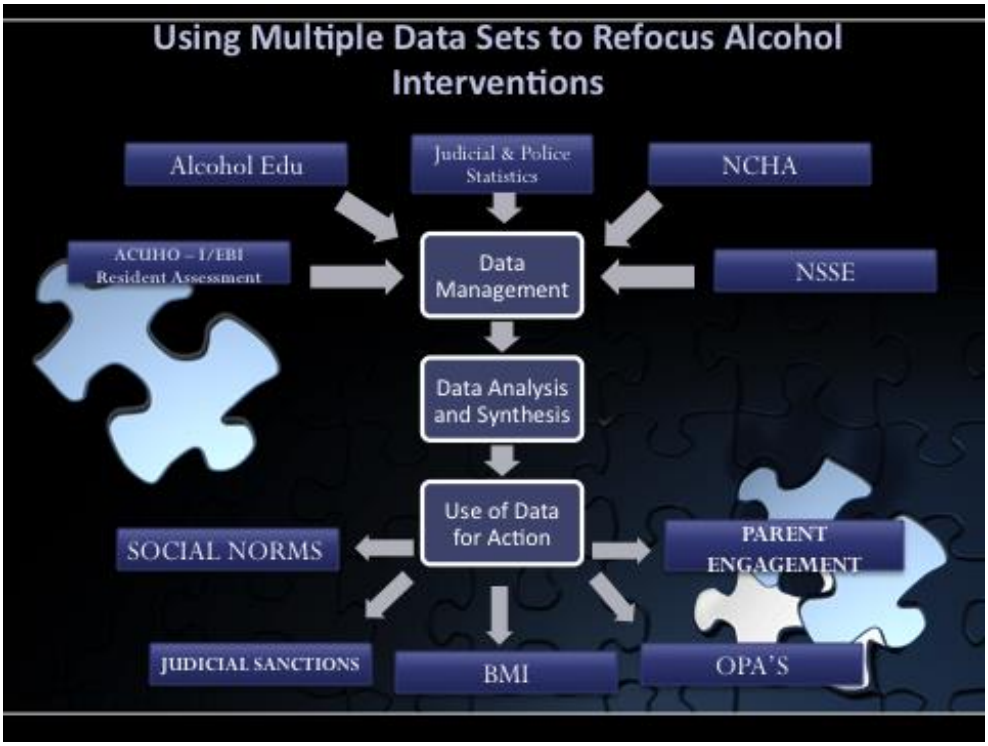
[65] For example, see Wechsler et al., (2002) "Underage College Students' Drinking Behavior, Access to Alcohol, and the Influence of Deterrence Policies." Journal of American College Health 50.5: 223-236.

College Health Improvement Program, formed in 2011 at Dartmouth University, UMBC eagerly became one of three Maryland universities to participate among a group of 30 colleges and universities.

As a participating institution, UMBC analyzed existing data, identified gaps in data, targeted specific areas for improvement, planned and implemented pilot interventions, and assessed outcomes repeatedly. UMBC staff focused efforts on areas such as off-campus locations and high-risk-drinker interventions. Staff members also pushed for legislation that would regulate high-proof-alcohol sales. Figure 14 illustrates the process used to design evidence-based interventions. Staff also widely shared assessment findings, including impact on retention and academic harms, with faculty and student senates as well as with the Student Affairs Council and President's Council. Findings were also the subject of focus at the Student Affairs Data Day.

Five years after joining the national high-risk drinking collaborative, our approach to high-risk drinking has been transformed. Fulfilling its mission to provide service to the citizens of the state, UMBC plays a key role in the development of Maryland's recently formed collaborative on high-risk drinking. USM institutions have created a survey now administered to all participating schools to track progress as we collectively work to influence legislation and share knowledge to improve institutional outcomes. Recent survey results continue to show lower-than-average rates of drinking but also lower rates of some targeted behaviors like driving under the influence.

Figure 14 Using multiple data sets to refocus alcohol interventions Recreate image simplifying to 3 boxes the inputs (Title them: Surveys, Alcohol Education, Judicial and Police Statistics) and 3 boxes for Use of Data for Action (title them: Judicial sanctions, Messaging for students and families, and Behavioral interventions)



4.1.3 Career Center

For at least a decade, the UMBC Career Center—which is under the purview of both the Division of Student Affairs and the Office of Institutional Advancement--has surveyed graduating students to gauge their post-college plans and success entering the workforce and graduate school. This survey has had many names and many forms. In the past, the results of this survey were primarily used by Career Services for internal assessment and program planning. Since the survey was voluntary, the number of respondents was historically less than half of the graduating class.

With the recent national focus on college outcomes, the National Association of Colleges and Employers (NACE) published a set of standard questions and expectations for what is now called "first destination" data collection. The term "first destination" refers to students' *immediate* post-graduation plans, whether that is employment or graduate school. NACE also set a goal for a 65 percent knowledge rate about graduates.

UMBC was among the first institutions to adopt the new survey questions, beginning with our December 2014 graduates. (While the NACE questions were written for undergraduates, we also administered the questions to our graduating masters and doctoral students.)

Following NACE guidelines for data collection, the Career Center administered the survey electronically to individual students and also mined the LinkedIn web site for employment and graduate school information. All of these data sources enabled UMBC to exceed the NACE target of 65 percent knowledge of our students' post-graduation plans. We further analyzed the characteristics of the students for whom we had data and found that this group was highly representative of the total pool of graduates.

In fall 2015, the Career Center was able to report our results and for the first time, compare our students' outcomes with other institutions using the NACE survey. We were pleased that our outcomes, some of which are displayed in figure 15, exceeded the national average:

- 83 percent of graduating students reported being employed and/or pursuing graduate school upon their graduation from UMBC (82 percent undergraduate students, 87 percent graduate students).

- Of those employed, 77 percent are in positions directly related to their career goals.

- Of those employed, 62 percent previously interned or worked for the organization employing them while at UMBC.

- Eighty-three percent of all undergraduate senior survey respondents engaged in applied learning during their time at UMBC.[66]

[66] First Destination Survey: Immediate Post Graduation Plans Class of 2014-2015

UMBC's 2014-2015 First Destination data was presented to the president's council and summaries were prepared for each college on their graduates, as shown in table 4.[67] This data is now being used by divisions across campus, from Advancement to Admissions.

Table 4: First-destination career plans by college/school of graduates AY 2014-2015

Undergraduates	CAHSS	CNMS	COEIT	SOWK	Erickson	INDS	ALL		
Total # of graduates (Dec 14 and May 15)	1173	478	540	117	14	19	2341	Overall Knowledge Rate	
# of graduates with known outcomes	775	308	381	76	10	13	1563	65.18%	
Knowledge Rate	66.07%	64.44%	70.56%	64.96%	71.43%	68.42%	66.77%		
% employed	65%	41%	73%	50%	70%	77%	62%		
# employed	504	127	277	38	7	10	963		
% grad school	15%	43%	9%	38%	10%	23%	20%		
# grad school	115	132	36	29	1	3	316		
Career Outcome Rate: Total % Employed or in Grad School	79.87%	84.09%	82.15%	88.16%	80.00%	100.00%	81.83%		
# employed or in grad school	619	259	313	67	8	13	1279		
% seeking	19.74%	15.58%	18.10%	9.21%	20.00%	0.00%	17.79%		
# seeking	153	48	68	7	2	0	278		
% applied learning	83.70%	86.90%	74.30%	98.30%	88.90%	100%	83%		
% previously interned or worked there	63.60%	65%	59.30%	78.20%	75%	75%	63%		
% related to career goals	65.50%	71%	87.30%	65.20%	75%	100%	73%		
Graduate Students	**CAHSS**	**CNMS**	**COEIT**	**SOWK**	**Erickson**	**INDS**	**ALL**		
Total # of graduates (Dec 14 and May 15)	393	100	392		8		893		
# of graduates with known outcomes	237	62	238		8		545		
Knowledge Rate	60.31%	62.00%	60.71%		100%		61.03%		
% employed	81%	77%	88%		88%		84%		
# employed	193	48	210		7		458		
% grad school	4%	7%	2%		0%		3%		
# grad school	9	4	4		0		17		
Career Outcome Rate: % Employed or in Further Studies	85.23%	83.87%	89.92%		87.50%		87.30%		
# employed or in further studies	202	52	214		7		475		
% seeking	14.35%	16.13%	10.08%		12.50%		12.66%		
# seeking	34	10	24		1		69		
% applied learning	78.60%	87.20%	64.10%		25%		71.70%		
% previously interned or worked there	68%	30%	58.90%		100%		60%		
% related to career goals	86.40%	96%	88.40%		100%		88%		

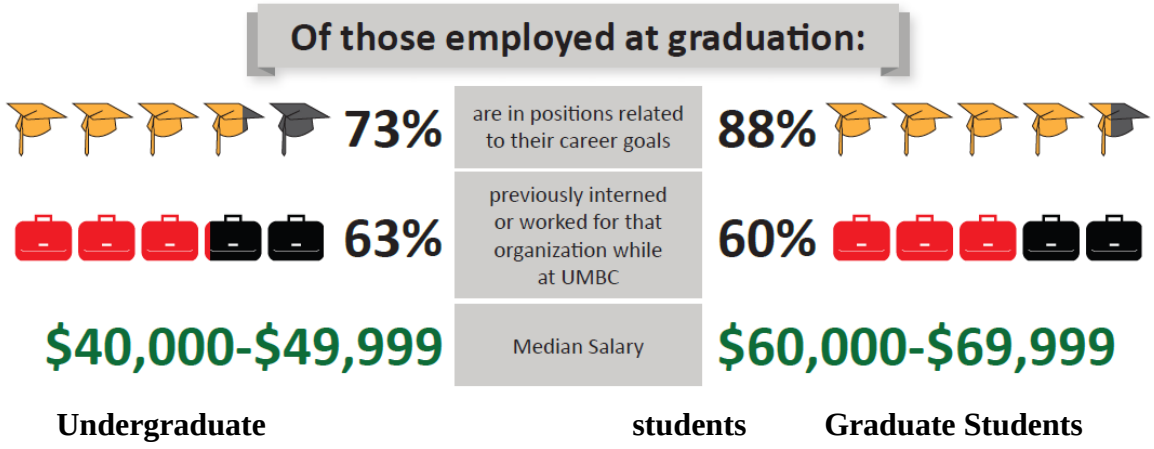
CAHSS=College of Arts, Humanities, and Social Sciences, CNMS=College of Natural and Mathematical Sciences, COEIT=College of Engineering and Information Technology, SOWK=School of Social Work, Erickson=School of Aging, INDS=interdisciplinary studies

Staff used this data internally to compare outcomes for students in different colleges and learned that students in some colleges are less likely to report having participated in an internship or experiential learning during their time at UMBC. The aim is to understand why so staff can tailor effective approaches for these students.

[67] First Destination Survey: Outcomes by College 2014-2015

Once the First Destination data is fully integrated into REX, the University broadly will be able to look for connections and correlations between successful career outcomes and a wide variety of academic and co-curricular factors.

Figure 15: First destination for UMBC graduates



In addition to routinely collecting data about graduates, Career Services also tracks its own performance before and after a major reorganization in 2013. The results suggest that the restructuring quickly produced positive outcomes. What at that time was called the Career Services Center and the Shriver Center's internship division integrated to increase staff efficiency and best serve students and employers seeking to hire UMBC talent. The newly formed Career Center with a new staff structure, mission, and re-branding initiative reported the following gains:

- Employer engagement increased by 51 percent over two years--from 423 employer visits that connected with students in FY 2014 to 637 such employer visits in FY 2016
- Student engagement increased by 12 percent over two years—from 5,738 students and alumni served by the center in FY 2014 to 6,413 served in FY 2016
- Internship engagement increased by over 7 percent over two years--from 1,772 practicum enrollments in applied learning coordinated by the center in FY 2014 to 1,836 practicum enrollments in FY 2016

4.2 Division of Information Technology

The Division of Information Technology's (DoIT's) 2007 assessment plan was revised in 2009 to take advantage of two national data collection services offered by EDUCAUSE, a membership

organization aimed at advancing higher education through the use of information technology (IT) One source of data is the Core Data Service[68] providing data on IT funding, staffing, and activities across institutions. The second is the annual survey on national student (and now faculty) use of technology.[69] DoIT also conducts its own an annual survey of UMBC users to identify the importance of different technologies and to assess how well DoIT is meeting users' expectations.[70]

The aim of both the assessment plan and the IT Restructuring Work Group created in 2009 by the Provost was to ensure continuous improvements in IT effectiveness and efficiency, which in turn boosts our capacity for teaching, research, and service to the citizens of Maryland. Given UMBC's mission, aspirations, and funding model, we want to ensure that we are making the most of our resources. The campus has invested in and realized the benefits of technology as a catalyst for innovation across nearly every domain. Being good stewards, however, also requires regular and rigorous assessment of our investments.

The IT Restructuring Work Group was specifically focused on the best ways to organize and provide IT support for the campus. It gathered information about existing arrangements for IT support on campus, identified alternative models for such service, and surveyed faculty and staff about their IT needs. The group made 13 recommendations ranging from introducing Google apps as part of campus communication to transforming the IT help desk into the Technology Support Center located next to the new all-day, everyday student study space in the library. Some of the recommendations, such as for the Technology Support Center, had direct impact on student-learning opportunities while others improved or made more cost-effective the digital environment for research and service.

DoIT integrated the 13 recommendations into its existing plans and its annual planning cycle. It reports data and progress each year to the campus IT Steering Committee and the Faculty Senate Computer Policy Committee and to the broader campus by means of a poster session at the annual University Leadership Retreat.[71]

4.3 Office of Institutional Advancement

The Office of Institutional Advancement (OIA) has been developing a dashboard approach to assessment of its work, selecting key indicators of progress toward its goals and compiling data for the indicators quarterly. In addition to this ongoing assessment, OIA has recently commissioned two studies linked to specific aspects of its operation, alumni relations, and UMBC's research and the technology park known as bwtech@UMBC.

[68] EDUCAUSE Core Data Service
[69] EDUCAUSE Undergraduates and IT Annual Survey
[70] Division of Information Technology User Survey Data Analysis: 2013-2015
[71] Report of the IT Restructuring Work Group, March 2010

4.3.1 Alumni Relations

External analysis of the alumni-relations function found that the unit is under resourced relative to other medium-sized public universities, in terms of staffing and annual expenditures (investment per alumnus). The analysis also demonstrated a connection between institutional investment in alumni and annual alumni-giving percentages. So while working to secure additional resources, OIA is also developing alumni-giving potential by integrating annual-giving strategies more closely with alumni-relations events and programming; developing student and young alumni philanthropy programming; and increasingly focusing programming on areas of interest identified in the alumni survey undertaken in spring 2015.

That online survey[72] of all alumni for whom email addresses could be found—31,328 of the roughly 70,000 students who have matriculated at UMBC--was conducted partly in preparation for UMBC's 50th anniversary, which will be celebrated during the 2016-2017 academic year. Just over 8 percent or 2,543 alumni responded, answering questions about their current employment, volunteer activities, perception of UMBC, and ideas about the upcoming anniversary. Career-related and affinity-based programming emerged as popular with alumni, and alumni-relations staff are pursuing those directions.

More generally, the information is helping OIA to create a more accurate profile of UMBC's alumni so staff can better tap this resource. The information provided by the survey has shaped plans for 50th anniversary activities as well as led to the engagement of alumni volunteers in the earliest stages of anniversary planning. Additionally, the survey is being used to connect alumni to the University's co-curricular and career-preparation activities for students, such as career-exploration workshops and internship opportunities. The new strategic plan has articulated a broad acknowledgement of the role that alumni can play in the University's efforts to achieve its long-term goals in teaching, research, and community engagement, and the survey provides direction for bringing that role to life. The 2015 survey will serve as a baseline for future surveys of alumni, possibly as soon as the 2017-2018 school year, following the anniversary.

4.3.2 bwtech @ UMBC Research and Technology Park

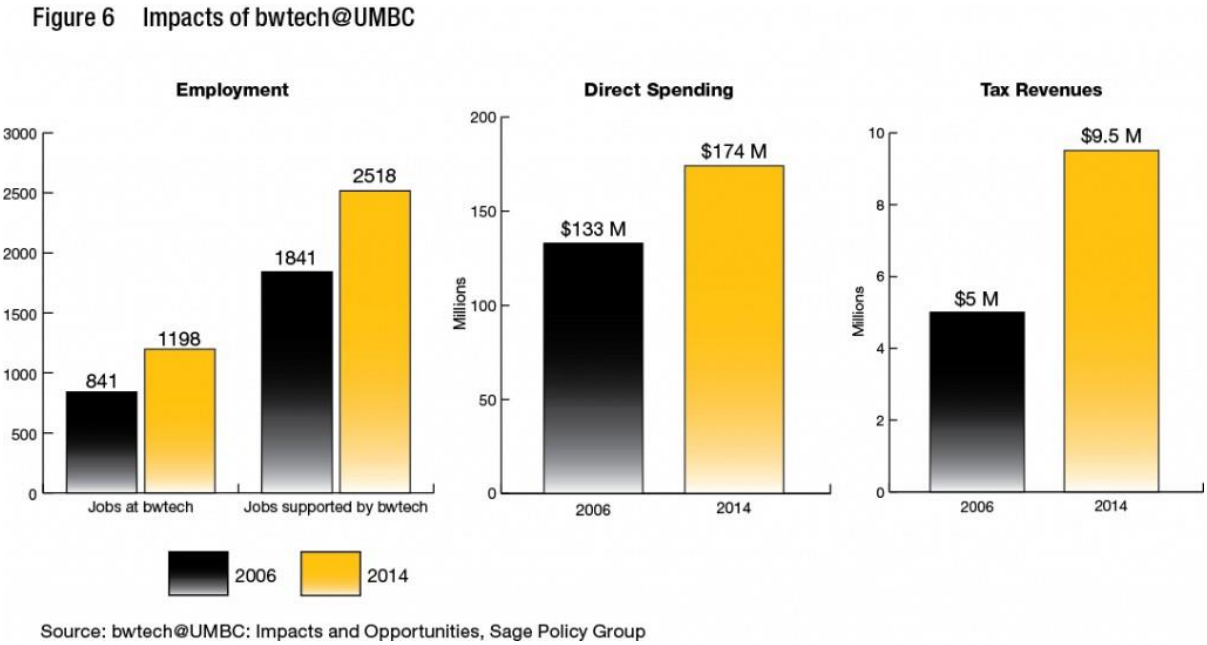
UMBC's research and technology park, bwtech@UMBC, currently includes 525,000 square feet that it leases to 120 companies in two locations. Founded in 1989, bwtech was the first university-affiliated research park in Maryland, and it operates the second largest technology business incubator operation in the state.

The park grew dramatically between 2000 and 2010 when bwtech North, adjacent to the main campus, was developed with the help of two private developers. Bwtech added 360,000 square feet during this period and attracted $115 million in private capital as well as more than doubled the number of its tenants. During the past five years, bwtech North opened its cybersecurity incubator. To the best of our knowledge, this is the largest cluster of early-stage cybersecurity companies at a university-affiliated park in the nation.

[72] Institutional Advancement Alumni Survey - 2015

In 2014 OIA commissioned a report on the park's economic and fiscal impact from the Baltimore-based Sage Policy Group, Inc., which had also studied the park's impact in 2006. Sage found that in 2014 bwtech companies generated nearly $500 million in income and business sales, up from close to $300 million in 2006. In 2014 the park was directly responsible for 1,200 jobs and indirectly for 2,500 jobs. Direct spending in 2014 was $174 million. Employment at companies in the park grew by nearly 30 percent and jobs supported by the park increased by just over 40 percent in the eight years from 2006 to 2014, even though that period included the Great Recession. In these years, income- and property-tax revenues going to the state rose by 90 percent to $9.5 million. Figure 16 depicts some of these impacts over the 2006-2014 period.

Figure 16: State and local impacts of bwtech@UMBC Research and Technology Park



The Sage Group assessment also found many connections between the campus and the park, including faculty researchers leading or contributing to the development of commercial goods or services and employment of students and alumni. Between the fall of 2005 and the fall of 2014, bwtech tenants hired 219 alumni and employed 375 UMBC interns, bolstering both the workforce and the educational benefits of the park. The park's intern positions not only help students financially, they provide them with valuable real-world experience in the growing technology sector and, often, jobs after graduation (see this chapter, p. 87). In this sense, UMBC's connection with bwtech is in direct fulfillment of its teaching mission.

Finally, the assessment confirmed the success of the park as an engine of economic development for the region and the nation, a University goal that stems directly from our mission to serve the people of Maryland. The report also endorsed the park's business strategy of focusing on and developing models of support for early-stage businesses, especially in cybersecurity and the life

sciences. In that way bwtech has created a distinctive marketplace brand and appeal. These findings are useful for planning as UMBC looks at the possibility of expanding the park a third time.

5 Conclusion and recommendations

We are confident that UMBC meets the requirements of Standard 7. At the same time, we can build on the progress we have made in this current review cycle with the following recommendations for improvement:

- The prior strategic plan, *The Strategic Framework for 2016*, focused on major themes but did not have the specificity necessary to directly tie assessment to all elements of the strategic plan. UMBC's new strategic plan recognizes the importance of connecting goals, strategies, and objectives to measures of success. As the implementation plan is developed there is an opportunity for each of the divisions and units to review their assessment plans so that they can be more closely integrated with the implementation and metrics articulated by the strategic plan.

- The development of UMBC's data warehouse and REX system provides UMBC with the opportunity to improve the efficiency and effectiveness of the collection of assessment data. There is an opportunity for UMBC to leverage what is now a data-rich environment to lessen the burden of collecting survey data each and every year. Divisions should be encouraged to review REX and national data-collection initiatives to lessen the effort that goes into collecting data for assessment and continuous improvement.

- While it will remain necessary to collect and analyze data each year, to better identify longer-term trends we should encourage units to make a formal presentation of the assessment data to the Council of Vice Presidents and Deans, the President's Council, and other governance groups periodically to encourage robust discussion and possible next steps.

- UMBC has a strong commitment to shared governance and regularly uses its mechanisms to share information. The annual University Leadership Retreat helps share information broadly. The campus is generally committed to sharing assessment results and should adjust the overall campus assessment plan to include a formal communication plan. In doing this, faculty and staff can document what has become best practice across the University and make certain that regular communication survives changes in personnel.

Within the academic units, the committee identified the following recommendations related to meeting the fundamental elements of standard 7:

- Each academic unit undertakes its own APR every seven years, and the reports that are generated are used to guide development of that particular unit. Evidence that these assessment results are used can be gleaned from the three-year reports of each individual unit, but there is not a college-wide or campus-wide process that compiles the results of the action plans across units. Higher-level synthesis will help with planning, budgeting,

and accountability for meaningful assessment.

- The APR process is mandated for every academic unit on campus, including the programs under the Division of Undergraduate Academic Affairs. Excluded from the APR process are centers, such as the Dresher Center for the Humanities and the Maryland Institute for Policy and Research (MIPAR), two units within the College of Arts, Humanities, and Social Sciences that serve an academic function as well as a research function. The Office of the Vice President for Research and the Research Council is charged with reviewing centers on campus, but that review process runs separately from the APR process, and its results are not widely shared. The review process for centers should be more closely aligned with the review process for academic departments and programs.

Creating a culture of continuous improvement that is built on a foundation of assessment and alignment with institutional goals is extremely difficult. For UMBC, where assessment processes were first introduced in the administrative units in 2007, assessment has clearly taken root. Divisions are actively performing regular assessments, collecting data on the performance of key activities and taking action based on that data. As a result, we are very confident that UMBC is meeting the fundamental elements associated with standard 7.

That UMBC has become a data-rich campus is testimony to the importance of data in decision making. The REX data warehouse system has the potential to greatly simplify the collection of data needed for assessment and provide an integrated view of data. For UMBC to fully utilize these data in decision making will require that many stakeholders be able to assemble and grasp the data that speaks to the identified problems and their possible solutions.

The development of our new strategic plan in conjunction with our Self-Study are helping us to make certain the overall campus assessment plan and the divisional assessment plans align and that they support the continuous improvement necessary to carry UMBC forward.

CHAPTER 5 ASSESSING LEARNING OUTCOMES AND STUDENT SUCCESS TO ENHANCE CURRICULUM, PEDAGOGY, AND IMPROVE THE STUDENT EXPERIENCE

1 Introduction and overview

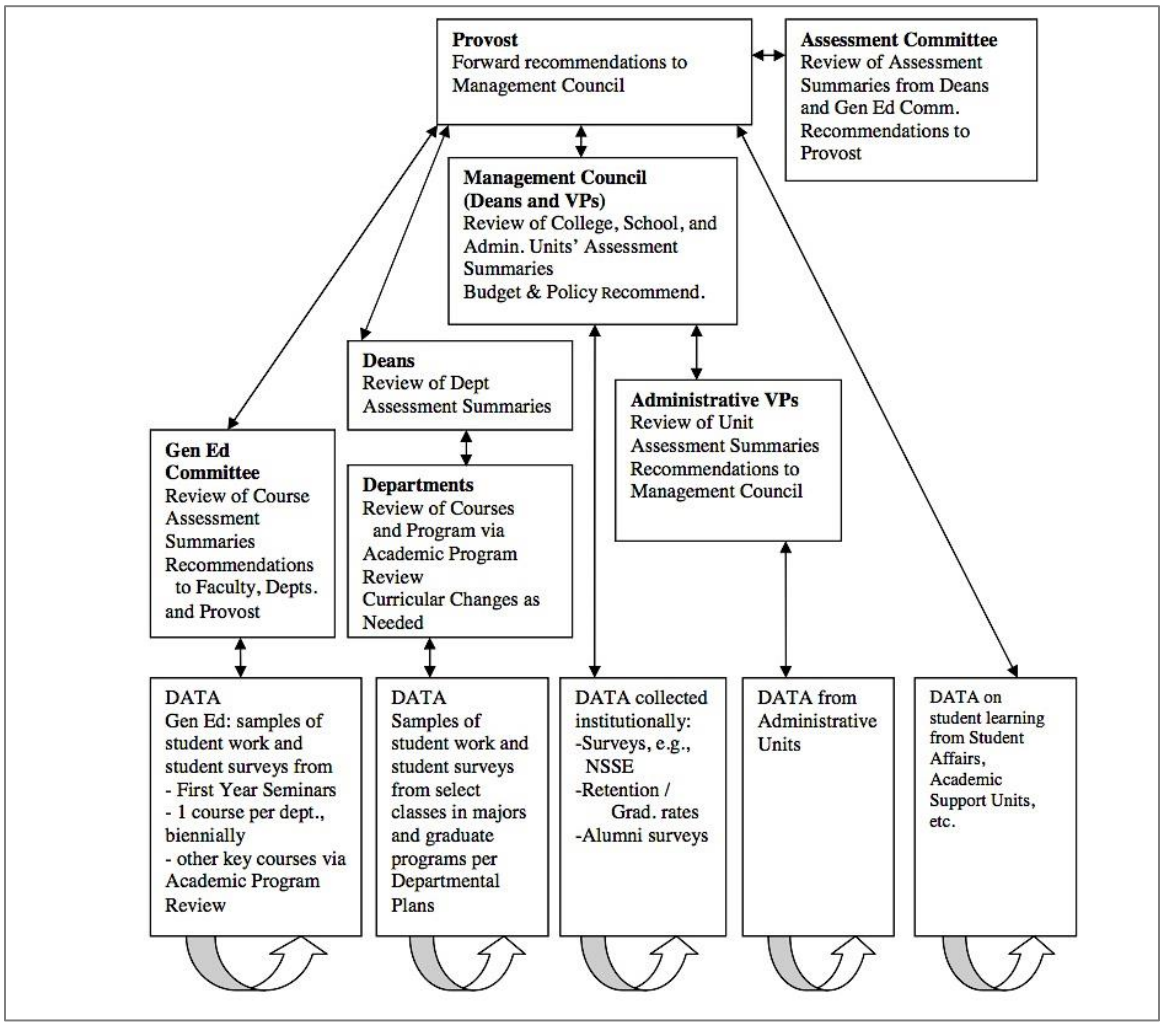
This chapter reviews the philosophy of assessment at UMBC, discusses how we identify and assess student learning outcomes (SLOs) across learning experiences and how we use what we find to improve learning and support student success. The assessment of student learning is crucial to fostering student success more broadly. We believe that when students acquire the skills and capacities associated with UMBC's SLOs, they are more likely to persist from year to year, to graduate, to find jobs and attend graduate and professional school, and to lead fulfilling and productive lives. Our student learning assessment philosophy and processes illustrate how UMBC fulfills our mission to provide students with "a strong undergraduate liberal arts foundation" and dynamic graduate programs, so that they can go on to the "lifelong learning" of our mission statement.

Section 1 provides an overview of student learning assessment at UMBC, including the formulation of the University's first comprehensive assessment plan in 2009. The next three sections examine program- and institutional-level learning outcomes, their interrelationships, and the ways we assess their attainment and use the resulting data for improvement in curriculum and pedagogy. Section 5 considers the progress we have made toward creating continuous-improvement iterations. Section 6 describes institutional initiatives to support students in meeting undergraduate general education learning objections (the functional competencies), both help for students who are falling behind and applied learning experiences for all students. Section 7 looks at initiatives to address gaps in student success, particularly our retention and graduation rates. Section 8 describes assessment of the pedagogical innovations that are a hallmark of our University. Section 9 concerns graduate student learning. Section 10 looks at evidence of student success from employer surveys. We conclude with recommendations for how to further strengthen UMBC's continuous improvement of teaching and learning through assessment.

The 2009 UMBC Assessment Plan[73] was developed to help ensure effective teaching and learning. This plan marked an important move from a relatively implicit, episodic, and inconsistent learning assessment process to one that is explicit, periodic, and documented. The plan lays out a process and an organizational structure for learning assessment that assigns responsibility for managing UMBC's assessment process to its senior leadership and circulates assessment results to and among departments, deans, senior leadership (especially the Provost), the General Education Committee, and a dedicated Assessment Committee. Under the plan, schematically depicted in figure 17, faculty and staff create and apply authentic assessments and share the results across the University.

[73] UMBC Assessment Plan

Figure 17: Organizational structure and process for student learning assessment



UMBC's approach to assessment ensures institutional accountability for assessment of student learning outcomes, but houses the process within courses and departments. In this way, assessment data inform faculty as they design, teach, and review courses and programs with the goal of continuous improvement of student learning. This ground-up approach poses the challenge of how to communicate assessment results beyond programs to the broader UMBC community to inform efforts in institutional effectiveness and guide planning. We addressed this challenge in the assessment plan, and we continue to explore ways to make this process more efficient and effective.

The plan systematizes a faculty-driven inquiry process into student learning that includes:

- Student-centered learning outcomes aligned across levels
- Innovative, challenging, research-tested learning opportunities that empower students to achieve our outcomes

- Assessments embedded where learning occurs to gain authentic measures of students' learning

- Evidence-driven interventions and systematic efforts to measure and refine student learning.

The plan identifies the University's five functional competencies (FCs) that guide our general education program[74] as approved by the Maryland Higher Education Commission. The FCs are our institutional-level SLOs:

1. Oral and written communication
2. Scientific and quantitative reasoning
3. Critical analysis and reasoning
4. Technological competence
5. Information literacy.

Students achieve functional competencies at the levels of their general education requirements, department and program majors, and, in many cases, broader extracurricular student learning opportunities. UMBC courses that carry general education credit are required to address at least one of the functional competencies. Program learning goals must also encompass one or more of the functional competencies. Thus, the University integrates course-level and institution-level SLOs, as the 2009 assessment plan requires.

Since the adoption of the plan, UMBC's commitment to an effective assessment process has deepened, as exemplified in actions taken at the institutional and college levels:

- In response to recommendations from the Academic Program Review for the Division of Undergraduate Academic Affairs in 2014, the University established an assistant director for assessment position within the Faculty Development Center beginning in January 2015. The assistant director works with faculty and staff to improve assessment practices and use of data. Since 2015, total faculty and staff consultations on assessment have increased by 50 percent from approximately 120 across 12 units to more than 180 consultations across 40 units or divisions.

- The Dean of the College of Natural and Mathematical Sciences (CNMS) instituted the college-wide CNMS Student Learning Assessment Advisory Committee to help all departments in the college implement effective assessment measures and common reporting templates for assessing SLOs. Additionally, the departments have established assessment committees to support faculty in assessing the learning of students in their classes.

[74] General Education Functional Competencies

- The leadership of the College of Arts, Humanities, and Social Sciences (CAHSS) revised the assessment reporting process within the college to refine the faculty's planning and measuring efforts by incorporating additional time to reflect on and apply results.

- In the College of Engineering and Information Technology (COEIT), the Department of Computer Science and Electrical Engineering established an Assessment Committee in response to feedback from the Accreditation Board for Engineering and Technology (ABET) in 2010.

UMBC uses multiple measures for assessment including rubrics, standardized exams, program-designed exams or clicker tests mapped to outcomes, employer surveys, national surveys, capstone reviews, pre- and post-tests, portfolios, student surveys, and classroom-based assessments designed to accommodate active-learning practices and the flipped classroom. Across the country institutions rate classroom-based assessment, rubrics, and national surveys as the three most valuable assessments to understand student learning,[75] and UMBC has used all three tools to gather student-learning data. Our focus on pedagogical innovations often requires being creative in designing direct measures, and faculty have risen to the challenge.

Although research from the National Institute for Learning Outcome Assessment (NILOA) suggests that U.S. doctoral institutions and public universities are more likely to use indirect measures such as national student surveys and less likely to use direct measures such as portfolios, rubrics, and classroom-based assessments, UMBC prioritizes the use of multiple direct measures.[76] By the 2015-2016 academic year among UMBC's undergraduate programs, 100 percent of CNMS and COEIT departments, the Erickson School, and the School of Social Work; and 90 percent of CAHSS departments were using direct measures. Additionally, in 2015, the Division of Undergraduate Academic Affairs piloted a range of direct measures in curricular and co-curricular learning in most of its programs. Thus, UMBC has created an assessment culture invested in direct measures but supported by strong indirect measures. Faculty and staff have systematically captured indirect-measure data like retention, graduation rates, student satisfaction, and grades, and created database-management tools to track student success across courses.

In the Division of Undergraduate Affairs' plan, staff and faculty made the decision not to rely on a top-down standardized testing approach that yields expensive and hard-to-use learning data. Data from classroom measures allowed for the design and implementation of evidence-based interventions to improve learning. Yet allowing for both disciplinary-specificity and experimentation creates challenges for aggregating learning results across the institution. The Provost's Office has responded to the challenges by investing resources into this work,

[75] Kuh, G. D., Jankowski, N., Ikenberry, S. 0., & Kinzie, J. (2014). Knowing What Students Know and Can Do: The Current State of Student Learning Outcomes Assessment in US Colleges and Universities . Urbana, IL: University of Illinois and Indiana University, National Institute for Learning Outcomes Assessment (NILOA). p. 12
[76] Ibid (p. 14)

including:

- In spring 2015, the Provost's Office requested Closing-the-Loop Reports from each program designed to help faculty quantify learning results in comparable terms using percentages and averages.

- In summer 2015, the Provost's Office authorized a pilot study of EAC Visual Data, learning assessment software that empowers Blackboard, to aggregate rubric and test data across courses.

The plan calls for reporting at multiple levels to ensure effective communication and encourage learning-assessment discussions both within and across programs. The plan also outlines collaboration across curricular and extracurricular student learning by linking academic programs to student life, library services, and student support services.

The years since 2009 have seen the development of an increasingly pervasive and sophisticated culture of student learning assessment at UMBC. University assessment activities have evolved from focusing on compliance and process issues to using data for proposals to improve teaching and learning.

Break out box: **Digital tools for collecting and analyzing student learning data**

UMBC's assessment leaders are well aware that digital tools can offer powerful assistance in gathering student learning data and understanding its implications. Such tools continue to be a focus of activity among faculty and staff concerned with teaching and learning.

Instructional technologists and Faculty Development Center staff, for instance, are collaborating to find ways to aggregate student learning data from our Blackboard Learn learning management system at the course, program, and institutional levels. The add-on to Blackboard that we are piloting allows either rubric criteria on a particular assignment or test items administered in Blackboard to be tagged according to the learning outcomes they measure, with results compiled across courses and departments.

Departments that answer to national accrediting bodies, such as Social Work and Education, have elected to use a more extensive (and expensive) software system called Tk20 for aggregating multiple kinds of student learning outcome data. With its help, the Education Department is able to integrate a variety of student data, including standards-based results from a sequenced series of assignments, data in the student-information system, data from the national teacher-certification exam used in Maryland, and survey data from employers, alumni, and student course evaluations. The technology allows for systematic, semester-by-semester and annual reviews of courses and programs as they align to national, state, and professional standards. Triangulating data becomes easier when leaders can call up certification test scores, key-assignment data, and other specific information about student performance. The periodic data reviews have resulted in changes. For instance, when faculty learned that students were not scoring well on the social studies part of a certification examination, they improved the content of the Education Department's social studies methods course.

The School of Social Work is also devising an integrated assessment tool using Tk20. Rubric data will soon be available, allowing faculty members to compare performance across sections of the same course.

More of our efforts to find, develop, and use software systems for assessment of student learning and success are detailed in chapter 4 starting on p. 63.

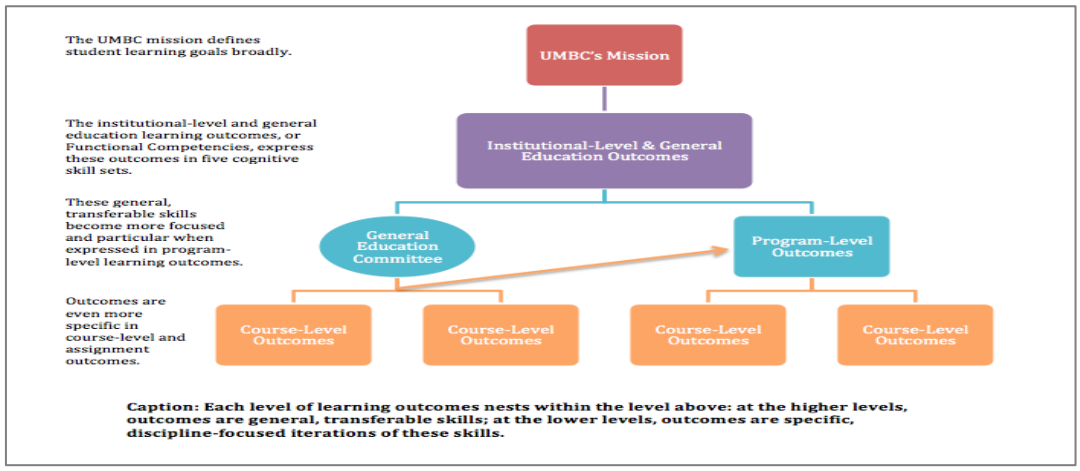
2 Learning across the institution: the functional competencies

In this section we analyze how course- and program-level learning outcomes enable students to acquire institutional-level learning outcomes. We begin by introducing UMBC's functional competencies (FCs),[77] five broad cognitive skills threaded through all of UMBC's courses and programs. Next we explore how program-level learning outcomes contribute to the FCs at the disciplinary level.

Each of these broad skill areas requires extensive practice. Our goal is to provide undergraduates with many different kinds of opportunities to practice these skills.[78] We want our students to be able to transfer the skills, so they can apply their learning to new situations and successfully solve problems or explore complicated issues. Students work to develop their FCs from their earliest courses in the general education program to their final courses in their majors.

Achieving integrated learning across programs requires alignment across levels, both in terms of outcomes and responsibilities, as illustrated in figure 18. When programs align their SLOs (course to program, program to institution), faculty members who measure learning at the course level also gain insights at the program and institutional levels. At meetings of the Council of Deans and the Assessment Committee, academic leaders present learning results and challenges that are relevant across colleges and for the University.

Figure 18: Aligned levels of learning note for layout: figure stretched too wide

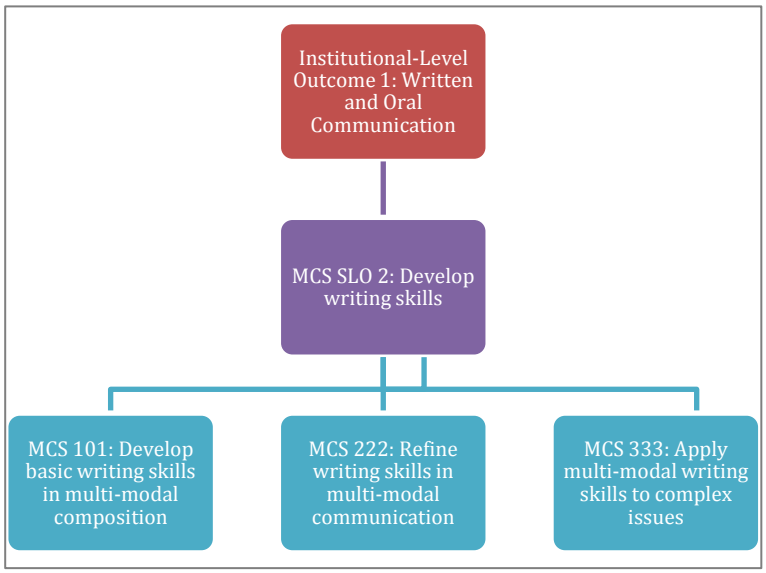


[77] General Education Functional Competencies
[78] Ibid.

3 Program-level learning

At the program level, the functional competencies gain discipline specificity, as illustrated in figure 19. The figure shows how the Media and Communications Studies Department links an institutional learning goals to outcomes (simplified for the schematic) related to student coursework.

Figure 19: Learning outcomes take on discipline specificity: an example from Media and Communications Studies (MCS)



Caption for figure above: The learning outcomes have been paraphrased to illustrate three levels of learning assessment: institutional-, program-, and course-level learning outcomes. Faculty scaffold student learning of course SLOs through a series of assignments and tests. Likewise, programs scaffold student learning of program SLOs through core courses and electives. Curricular alignment maximizes the impact of each course-level measure and the potential for meaningful aggregation of learning results.

Academic Program Review (APR) facilitates alignment efforts by fostering thoughtful reflection about how courses help students to achieve the learning outcomes set for the program and the institution.[79] Each program analyzes their educational offerings and how they work together to enable such mastery. Programs also present their learning assessment plans, including findings and interventions, and analyses of General Education Program course assessments. (See chapter 4, section 2.1 for more on APRs.)

[79] Academic Program Review (APR) Guidelines (April 2015)

National data suggest that UMBC stands out for the extent of our curriculum mapping work, which has been actively promoted by the University's academic leadership.[80] About 90 percent of UMBC's programs have implicitly or explicitly aligned the program-level learning outcomes to the institutional competencies. Some of the work was the result of the second annual Provost's Symposium on Teaching and Learning, held in fall 2015. The symposium, which provides opportunities for faculty and staff to promote and explore student learning through innovation and assessment, showcased mapping efforts.

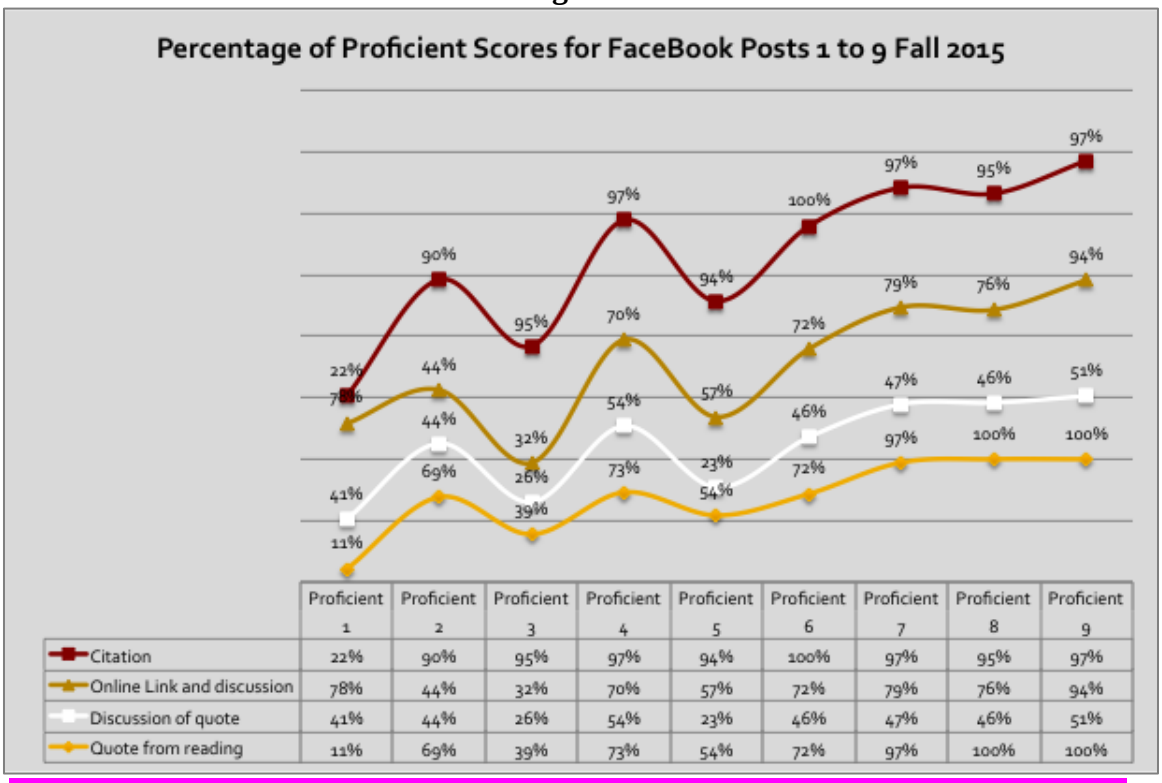
Curriculum mapping has both confirmed that students are acquiring targeted skills and yielded interventions that close gaps in student learning, as the examples from several programs below illustrate. In the first two instances cited—from the Department of Media and Communications Studies and the Honors College--faculty have had time for a first assessment of actions they took.

- Media and Communications Studies faculty analyzed curriculum through writing assignments measured with rubrics in an introductory class and in the capstone class. The exercise showed that students lacked the historical awareness necessary to contextualize texts and apply key theoretical concepts to their interpretation. In response, the department added a 100-level course in media-literacy skills along with courses in the political economy of media industries to enhance these skills and better prepare students for the capstone.[81]

  To find out if the new course improved students' skills, faculty created an assignment using Facebook posts that challenged students to contextualize texts. Rubric analysis of fall 2015 students' posts suggested that most students acquired the targeted skills, as shown in figure 20. By the ninth post, 100 percent of students demonstrated proficiency in selecting a relevant quote and 94 percent were able to proficiently add and connect new material to their text, up from 11 percent and 78 percent respectively in the first post. Students' discussion skills developed more slowly: just 51 percent were proficient in critically interpreting texts, up from 41 percent initially.

[80] Only 27 percent of doctoral universities and only 42 percent across all institutional classifications report successful program-to-institutional outcomes alignment and only 42 percent, according to Kuh, Jankowski, Ikenberry & Kinzie (2014) p. 8.
[81] APR Media & Communications Studies 2014-2015, p. 61.

Figure 20: Filling gaps revealed by curriculum mapping through a series of assignments



	Proficient 1	Proficient 2	Proficient 3	Proficient 4	Proficient 5	Proficient 6	Proficient 7	Proficient 8	Proficient 9
Citation	22%	90%	95%	97%	94%	100%	97%	95%	97%
Online Link and discussion	78%	44%	32%	70%	57%	72%	79%	76%	94%
Discussion of quote	41%	44%	26%	54%	23%	46%	47%	46%	51%
Quote from reading	11%	69%	39%	73%	54%	72%	97%	100%	100%

Chart needs to be better matched to text: Remove red ("citation") line, remove the first row of data, and label the remaining three rows as follows: 1. Connecting new material (substitute for "online link and discussion") 2. discussing quote (sub for "discussion of quote") and 3. selecting quote (sub for "quote from reading").

- The Honors College mapped a curriculum that lays out a program of high-impact teaching practices including an introductory forum, a living-learning community designed to foster cohort cohesion, applied learning and co-curricular experiences, honors sections of courses, and upper-level seminars.[82] To ensure that students begin with a strong foundation, faculty measured student learning in the Honors Forum, a 100-level core course, using a rubric linked to the course, program, and institutional learning outcomes. The assessment found that more than 80 percent of the 399 total papers assessed for three foundational skills (critical thinking, argument, and writing) met the benchmark in those areas or went beyond it.

- The English Language Institute (ELI) engaged in a series of curriculum mapping workshops. Working backward from the student learning objectives of English 110 (a course for English-language learners), the ELI revised the program's beginning-level focus on sentence development to challenge students earlier to develop paragraphs and

[82] Honors College Curriculum Map

essays, and allow for more practice and feedback. Faculty also created a series of integrated reading and writing assignments across other courses and levels.[83]

- Faculty members for Human-Centered Computing, a graduate program in Information Systems, analyzed their program with curriculum mapping, pinpointing core courses, electives, and pertinent courses from other programs. The faculty then built an assignment library for each stage of student learning.

- The Chemical, Biochemical, and Environmental Engineering (CBEE) Department's BS program in 2010 replaced a curriculum mapping system that assessed student learning course by course with one that brought the department better in line with the expectations of ABET, the engineering and technology accrediting organization. The new system provides for program-level direct assessment of learning outcomes. The previous course-by-course approach proved difficult to collapse into a picture of the overall student learning in the program. The department, in preparation for the next cycle, is now assessing the process that was put in place in 2010 and may decide to make minor adjustments for the next six-year ABET accreditation cycle.

  CBEE's work revealed a gap in safety instruction, so the faculty added this to the curriculum in several courses. Students build competency in chemical engineering safety through projects that incorporate laboratory safety awareness, and students are now required to complete eight Safety and Chemical Engineering Education Program certificates.

4 How program and general education courses work together to help students gain the functional competencies

The linking of our functional competencies to our general education program has deliberately devolved the University's institutional SLOs to departments and programs, where these SLOs can often be most effectively taught and assessed. In this section, we demonstrate how UMBC students achieve the functional competencies across General Education requirements, requirements for a major, and co-curricular learning opportunities. Imparting the functional competencies helps us to fulfill our mission, which promises students "a strong liberal arts foundation that prepares them for graduate and professional study, entry into the workforce, and community service and leadership."

Functional competency 1: oral and written communication

The task of mastering oral and written communication is complicated by the challenges of transferring the skills across disciplines. UMBC has set this competency apart to ensure students have multiple learning opportunities and extensive support in writing and presenting.

[83] English Language Institute - Curriculum and Assessment Realignment Map

According to National Survey of Student Engagement data from 2001, 2004, 2005[84], students at UMBC had not practiced writing and speaking as much as comparable peers. In response to this indirect assessment data UMBC made a series of changes to address the need for more practice, starting with the establishment in 2003 of the Writing Board, a faculty and staff committee charged with creating a writing-in-the-disciplines program, and later, facilitating the creation and approval of writing-intensive (WI) courses. A second change was the revision of the General Education Program in fall 2007 to include an institution-level writing-intensive requirement for all students, which has expanded students' work in writing, reading, and presenting. All students must prepare for a WI course by taking a composition class within the first 30 credit hours of beginning their bachelor's degrees.[85]

Since 2006, the Writing Board has approved 112 WI courses in 36 majors. Table 5 shows that seniors at UMBC write a quantity of pages similar to seniors at other Mideast public institutions, but first-year students write fewer overall pages, on average.[86]

Table 5: Quantity of writing for UMBC students and comparable peers

2013 NSSE Results	UMBC	Mideast Public Institutions
First-year students wrote an average of …	37.3 pages	43.5 pages
Seniors wrote an average of …	74.5 pages	77.3 pages

Other changes, such as common writing assignments and rubrics in the Introduction to the Honors University course and models for revision in the Writing Center, have helped students learn how to write. The WI program has had an impact at the program level as well:

- The Department of Philosophy's direct assessment of learning outcomes in its introductory philosophy course revealed that, although most students made significant progress with their writing skills, 18.5 percent failed to demonstrate learning in the department SLO for oral and written communication. Philosophy faculty members are creating WI sections of both PHIL 100 and 152 to improve students' writing skills.[87]

- While two-thirds of Media and Communication Studies 2014 capstone students self-reported that they had mastered academic writing, the direct measure indicated that many needed additional practice. In response, faculty members added a WI course and created a 101 course to foster foundational learning in this area.[88]

[84] 2008 Progress Report on Assessment to Middle States, p. 58.
[85] Maryland Senate Bill 740: College and Career Readiness Act 2013 mandates that public universities plan for and track early completion of writing requirements.
[86] National Survey of Student Engagement (NSSE): 2013 Educational Activities Snapshot Report
[87] Closing the Loop Reports CAHSS 2015 - Philosophy
[88] APR Media & Communications Studies 2014-2015, p. 14

Results from a rubric assessment in the 101 course in fall 2015 demonstrated that students are building foundational skills in writing and analysis through assignments that challenge them to develop and express their own ideas integrated with content from course readings. In the final of a series of nine Facebook posts authored by students, for example, 91 percent earned proficient or competent scores in written communication blended with critical thinking.

- The Chemical, Biochemical and Environmental Engineering Department removed a technical writing course from its curriculum and embedded writing in five chemical engineering courses to allow students to concentrate on technical writing within the chemical engineering discipline. Two of its core classes attained WI status. By fall 2014 at least 85 percent of students annually were exceeding the minimum standard of the ABET writing requirements.

We have also focused on strengthening and assessing oral communication. For instance, in the computer science BA and an honors forum course, faculty members use rubrics to assess how well students have learned to make an oral presentation. In the computer science program, faculty members examine data from the presentation rubrics every two years to find patterns of strong learning and pinpoint learning gaps.[89]

Functional competency 2: scientific and quantitative reasoning

UMBC students have numerous opportunities to become proficient in scientific and quantitative reasoning, which is the focus of a variety of courses and a primary concern of certain programs and departments. For many students the instruction appears to have been beneficial. The National Survey of Student Engagement's 2013 findings indicate that the quantitative reasoning skills of UMBC students are comparable to those of students at other institutions.[90] American Chemical Society exam data from UMBC's introductory chemistry courses demonstrate effective scientific reasoning with students typically scoring at or above the national average. NSSE also reports that "37 percent of [UMBC first-year] students 'frequently' used numerical information to examine a real-world problem or issue; 55 percent of seniors 'frequently' reached conclusions based on their own analysis of numerical information." [91]

Faculty members are working on strengthening instruction in this critical area, as exemplified below.

- Faculty members in the Department of Biological Sciences have been developing and piloting interdisciplinary learning modules emphasizing quantitative thinking along with complementary assessment tools for introductory biology topics. The work is being underwritten by the National Experiment in Undergraduate Science Education funded by

[89] Self-Study for ABET Review of the Computer Science Program - 2011-12 Accreditation Cycle, June 2011, p.8, 29
[90] National Survey of Student Engagement (NSSE): 2013 Engagement Indicators
[91] National Survey of Student Engagement (NSSE): 2013 Pocket Guide Report, p. 2.

the Howard Hughes Medical Institute. UMBC is one of just four universities[92] involved in this collaborative project to improve basic biological science instruction. Final data analyses will combine assessment scores with findings from follow-up student focus groups led by Faculty Development Center staff, allowing for triangulation of the evidence.

- In response to low pretest scores and high D/fail/withdrawal rates in a course on social stratification and inequality, the faculty of the Department of Sociology made a math general education course a prerequisite and also required prospective students to undergo a screening for knowledge of statistics to gain admission to the course. To give students coaching in quantitative reasoning, teaching assistant-led study sessions were added. These interventions appear to have lowered the rate at which students were retaking the course. Results from 2014 also show that pre- to post-test scores more than doubled.[93]

Functional competency 3: critical analysis and reasoning

The development of critical analysis and reasoning skills are central SLOs for many UMBC departments, as the examples below illustrate.

- The Philosophy Department's offerings "emphasize critical analysis, problem-solving and the formulation and evaluation of arguments in oral and written contexts" and employ reading, discussion, and extensive writing assignments to help students think through complex issues. Direct measures in the introductory philosophy course demonstrated that by the end of the semester, over 90 percent of students could critically evaluate arguments. In a course on critical thinking, 67 to 91 percent of students successfully demonstrated learning in critical thinking.[94] Capstone assessments in 2013-14 indicated that students were achieving this functional competency. [95]

- The Erickson School of Aging developed a critical thinking rubric to determine whether students can: formulate clear and relevant questions, gather and assess relevant information, draw well-reasoned conclusions and evaluate those conclusions against relevant criteria, question assumptions, and think with an open mind.

  This rubric was used in spring 2014 to assess student learning in a course on aging people, management and policy. Faculty members assessed a sample of 20 to 25 students in each of three sections. With each outcome worth two points, the averages for the three course sections were 4.51, 5.03, and 5.00 out of 6 points total. The rubric showed that students struggled more with the second and third outcomes, so faculty members plan to highlight the importance of those skills through examples in class discussion and additional feedback on student paper drafts.

[92] The other institutions are the University of Maryland, College Park; Purdue University; and the University of Miami.
[93] Closing the Loop Reports CAHSS 2015 - Sociology BA
[94] Closing the Loop Reports CAHSS 2015 - Philosophy
[95] APR Philosophy 2012-2013, p. 3

- In the History Department, direct assessment in 2013 showed that students were achieving three out of five of the program's SLOs, but lagging in integrating analytical thinking, argumentative writing, and the critical use of primary and secondary resources. In response, the department redesigned its gateway course for fall 2015. What used to be an 80-student, teaching-assistant-supported lecture course has become a 30-seat, small group format course taught solely by a professor. The department intends to use the course to identify struggling students and intervene with support. History faculty will measure effectiveness by comparing D/failure/withdrawal rates along with continued analysis of student learning via direct measures.

- The English Department assesses student mastery of writing, critical thinking, and information literacy by evaluating papers from upper-level classes. A senior exit survey adds insights about students' perceptions of their learning and their satisfaction with their learning opportunities. Faculty members assessed two functional competencies in three intermediate-level courses by determining whether 46 papers from these courses met expectations for these competencies. More than 80 percent of students met or exceeded expectations, which the faculty considered satisfactory. To reinforce learning expectations for students, the department decided to feature the functional competencies on course syllabi.[96]

- In the Chemical Engineering Department, 29 percent of the students in the lab portion of a problem-solving course fell below the minimum standard for being able to analyze data. Faculty increased discussion times and included a problem-based learning session where lab groups worked on an experimental design and analysis while instructors and teaching assistants provided guidance. The changes took place from 2013-2015, and in spring 2015, only 14 percent of the class fell below the minimum standard for being able to analyze data, strongly suggesting the effectiveness of this intervention.

Functional competency 4: technological competency

Technological competence at UMBC is understood to take a variety of forms. Students in STEM fields often require quite specialized kinds of competence, and faculty in the humanities and social sciences cultivate students' competence in digital storytelling, use of collaborative platforms such as wikis and blogs, statistical programs, and informed use of social media. Examples of how we assess this competency include:

- The BS in computer science program assesses student learning in its target technological competences (software solutions; communications; programming tools, techniques, and practices; maintaining skills currency; and building on foundational knowledge). To ascertain whether students have achieved proficiency in at least one high-level programming language, for example, the faculty gather random samples of student programming work in a sequence of six courses. Faculty members who teach the next courses in the sequence assess the projects with a rubric to determine language proficiency, design, and implementation learning. Similarly, exams measuring student

[96] Closing the Loop Reports CAHSS 2015 - English

learning in running time analysis are reviewed by faculty in the subsequent course to ensure that students are well prepared to move through the program's technology challenges.[97] The program also uses rubrics and surveys of alumni, recruiters, and employers along with an industry visiting committee's insights to assess student learning.

- Faculty members in the social sciences, especially in methods courses in psychology and sociology, develop students' technological competence by requiring and assessing proficiency in the use of analytics software programs such as SPSS. The BA in sociology program standardized the curriculum for a 300-level course to ensure consistent student preparation in SPSS. It is analyzing proficiency following the change.[98] In economics, Excel is a key program students must master. One economics professor typically assesses students' Excel abilities through a rubric he applies to a project assignment. He is planning to work with the Faculty Development Center (FDC) in 2015-2016 to develop a more nuanced rubric to determine more precisely how students engage with the technology as they problem solve.

- The Department of Media and Communications Studies' introductory course uses familiar technology platforms like Facebook to challenge students to think about media usage in weekly posts that interrogate course concepts, integrate ideas from course readings, and synthesize relevant nonprescribed material. Class and online interactions enable formative assessments, and indicate where faculty intervention is needed. Lab assignments featuring practice with multimedia tools scaffold a final video project in Photoshop, Garage Band, or Adobe Premier that reflects on and advances a central course concept.

  Results from a rubric analysis in fall 2015 of an assignment asking students to create an analysis of social media indicated that 55 percent of students had acquired exemplary technological skills and another 43 percent were competent in this area.

Functional competency 5: information literacy

Faculty members teaching and overseeing courses calling for information literacy are assessing their effectiveness in imparting this important competency. For example:

- The First-Year Seminar Program made information literacy the first functional competency to be reviewed across sections. The seminars aim to give students key tools for research. Early efforts to share rubrics and gather comparable data about student learning indicated that many incoming students need additional practice and support in this area.

  Preliminary rubric results across three fall 2015 seminars suggest that students are acquiring information literacy in the seminars, but there is still work to be done. As

[97] Self-Study for ABET Review of the Computer Science Program - 2011-12 Accreditation Cycle, June 2011, p. 22, 25, 27-28.
[98] Closing the Loop Reports CAHSS (2015)- Sociology BA

illustrated in figure 21, among 32 students, 90 percent were either exemplary (64 percent) or proficient (26 percent) in information literacy (functional competency 5) integrated with writing (functional competency 1) and critical thinking (functional competency 3).

Figure 21: Acquisition of information literacy by first-year seminar students

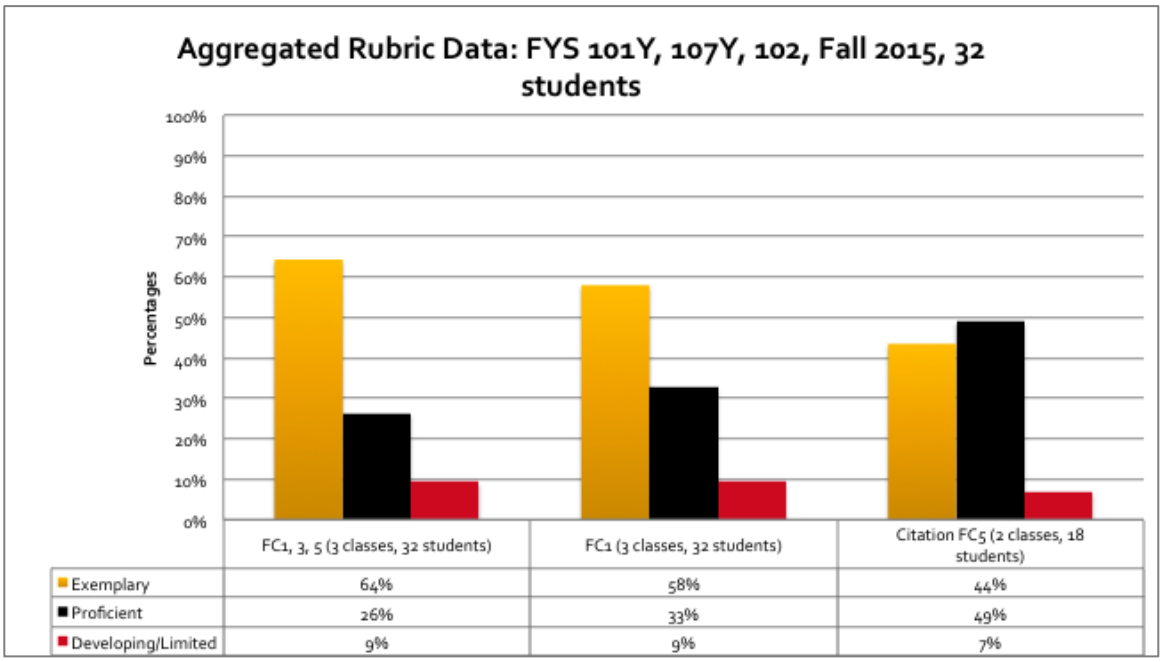


Figure 21 needs be modified to show only first set of bars and first column. Delete FC1 column and Citation FC5 column and associated bars; three remaining bars should have space between them..

- In the English Department, assessments in 2012 and 2014 revealed that despite some encouraging growth students' information literacy skills needed more development. To do that, over three years, the faculty made three significant changes: they added required courses to introduce students to research methodologies earlier, they set a goal to reinforce research methodologies in all English courses, and they revised the student learning outcomes for core courses with a plan to build on those SLOs in revising the outcomes of the other courses.[99]

- The Erickson School created an information literacy rubric that analyzes students' capacity to recognize if and when information is relevant to an assignment and to access, use, and evaluate relevant information. Faculty assessed 20 of the 80 students in two sections of the introductory course in spring 2014. Each element of the rubric contributed two points for a total of 4, and the averages for the two sections were 3.68 and 3.83. Students struggled somewhat with both tasks, and faculty plan to emphasize the importance of both in feedback on student paper drafts.[100]

[99] Closing the Loop Reports CAHSS 2015 - English
[100] 2014 Erickson School Biennial Assessment Report - GEC and WI Undergraduate Courses

5 Continuous improvement of teaching and learning

Most UMBC departments are effectively using learning-assessment data to improve student learning, and they are increasingly using direct measures of student learning to propose changes to courses and programs. Direct measures of student learning coupled with curriculum mapping make it easier for departments to pinpoint where they can refine learning opportunities. UMBC's leadership has worked with the faculty to focus our learning-assessment culture on using the data to make changes ("closing-the-loop applications") and re-measuring to assess the effectiveness of each intervention.

Closing-the-Loop reports, which were requested from the three colleges by the Provost, describe assessment measures and data, how data were applied to continuous improvement, and plans for follow-up. Table 6 documents departmental measures of learning along with changes stemming from assessment and shows strongly upward trends. By spring 2015 more than three-quarters of all academic departments were proposing changes to curriculum or pedagogy based on assessments of student learning and more than two-thirds were using direct measures for assessment.

A significant amount of work remains, however. While the reports show that three out of four departments in the College of Engineering and Information Technology were proposing changes based on direct measures of student learning, two out of four and 9 out of 21 departments in the other two colleges—departments with the bulk of undergraduate students—had not done so.

Table 6: Comparison of colleges using direct measures and proposing changes based on assessment

Colleges (Departments)	Proposing Changes Based on Assessment	Using Direct Measures of Assessment	Proposing Changes from Direct Measures
AY 2009 and 2010			
CAHSS (21)	48%	61%	43%
CNMS (4)	25%	100%	25%
COEIT (4)	50%	75%	25%
AY 2012 to 2014			
CAHSS (21)	81%	90%	52%
CNMS (4)	50%	100%	25%
COEIT (4)	25%	75%	25%
Erickson School (1)	100%	100%	100%
Spring 2015			
CAHSS (21)	90%	62%	57%
CNMS (4)	100%	100%	50%
COEIT (4)	75%	75%	75%

[Caption] The standardized reporting mechanisms established at UMBC after 2009 include the Biennial Department Assessment Reports, preliminary data from 2015 Closing-the-Loop Reports, and APRs. Progress between 2009 and 2014 is captured in the table above.

Some examples of the ways departments have assessed student learning and made changes to pedagogy, course sequencing, or the assessment process follow:

- Mechanical Engineering has adopted the flipped classroom as an intervention in courses in fluid mechanics and machine design. In fluid mechanics, students achieved 60 percent competency in SLOs related to applying math, science, and engineering principles and in identifying, formulating, and solving problems, missing the 70 percent competency benchmark. A revised curriculum and a flipped instructional design (with active learning replacing lectures during class time) helped students to demonstrate competency in applying mathematical formulas to engineering problems: on specific examples of these SLOs, 86 percent of students demonstrated competency.[101] In the machine design course, spring 2014 data indicate 67 percent of students achieved satisfactory performance in the SLOs related to application of principles and design abilities as assessed in the first examination. Performance increased to 79 percent in the second examination. Data also indicate 52 percent of students achieved satisfactory performance on the SLO involving problem solving as assessed through homework assignments involving analysis and design. The flipped classroom model was continued and in-class-assignment scope was adjusted to ensure students could complete assignments in a single class period with help available. Spring 2015 data showed achievement of 82 percent in SLOs involving application and design and an increase in student achievement in problem solving to 72 percent.

- The Philosophy Department revised its 2009 learning assessment plan in June 2013 in response to assessment data and feedback from its 2012-2013 APR process. The program made two key changes: it clarified program-level student learning outcomes and enhanced the use of direct measures.[102]

- The Computer Science program established an Assessment Committee in 2010 in response to feedback from the ABET. To involve faculty across the program, two faculty members rotate on and off of the committee each academic year, while a chair and ABET coordinator are permanent members to provide continuity and organizational memory. Alumni surveys have also been added to the list of assessment tools, and certain courses were eliminated when alumni indicated they were not professionally useful.[103]

- In American Studies, the assessment committee gathered data about student learning in the department's capstone, upper-level, and general education courses. Faculty for each course wrote essays following a template to analyze student learning in response to specific assignments. The reflections yielded insights about student learning useful for curriculum mapping, but proved to be challenging to aggregate and demanded more faculty time than was available. To streamline assessments and move toward aggregating

[101] Closing the Loop Reports COEIT 2015 - Mechanical Engineering
[102] Closing the Loop Reports CAHSS 2015 - Philosophy
[103] Self-Study for ABET Review of the Computer Science Program -2011-12 Accreditation Cycle, June 2011 p. 6, 35.

quantitative data across courses, the faculty elected to focus on the SLO of research writing, producing rubrics for a series of writing assignments in a 300-level course. Likewise, a capstone rubric is in progress.

The analysis of the switch to rubric grading will be conducted in the fall. However, preliminary results suggest that faculty have found that rubrics were an improvement over regular grading in pedagogical terms because without spending more time faculty have been able to better clarify expectations, provide detailed feedback, and ensure accountability both for themselves and for their students. Rubrics have also been helpful for assessment, allowing faculty members to better see which parts of an assignment are working and which are not. For example, does an assignment help students build critical thinking skills and the skills to articulate those thoughts in writing or is it falling short in critical thinking but not in writing or vice versa?

6 Supplemental and co-curricular learning

Functional-competency acquisition is supported not only by departments but also by other units in the University and by the institution as a whole--evidence that the campus is committed to helping students gain these broad skills. UMBC as an institution seeks to ensure learning and success in several ways depending on student needs.

Students in general benefit from more effective pedagogy, including the Writing Intensive Program, which recognizes that most students need sustained guided practice to become competent writers. Applied learning experiences are available across programs and departments through undergraduate and graduate research award programs; the Shriver Center, which focuses on civic engagement; and the Career Center, which is oriented toward the workplace. The Albin O. Kuhn Library is also an important resource, providing extended skill-acquisition support and group and individual study space.

Additional help is offered to students at risk. Student groups identified as more likely to face academic challenges, such as students not affiliated with a particular learning community or transferring in to UMBC, are supported by the First Year Experience Program. Individual students flagged as in trouble receive assistance in the form of tutoring and supplemental instruction. Students on academic probation are required to take a student-success course provided by the Learning Resources Center.

More information on the ways UMBC fosters learning at the institutional level follows.

6.1 Tutoring centers

Three tutoring centers on campus reinforce and extend classroom teaching. Two of them focus on writing and math skills that are needed to achieve the functional competencies and to do well in a variety of courses and the third provides help for chemistry courses:

- **The Learning Resources Center** (LRC) provides tutoring in math courses.[104] The Maryland College and Career Readiness and College Completion Act of 2013 (also known as Senate Bill 740) mandates that public universities plan for and track early completion of math requirements. In compliance with the law, students must now complete a credit-bearing math and a credit-bearing English course within their first year of study. UMBC moves beyond compliance, however, by providing support so students succeed in those courses. We foster students' quantitative reasoning skills through individual and group tutoring, developmental math courses, the Supplemental Instruction program, and early alerts if student are at risk to earn a low grade in the course.

- The LRC also oversees the **Writing Center**, which provides support to help students meet the Writing-Intensive requirements successfully. The center uses one-on-one and group tutorial services. Student tutors gain expertise in peer review through a three-credit class designed to foster effective assessment and feedback skills. Faculty gain access to tutors' insights through a Writing Center Notification, an email that details the length of the session, the assignment reviewed, the issues addressed, and revisions and recommendations for continued work.

- The **Chemistry Tutorial Center** is staffed by a full-time chemistry professor and 30 advanced undergraduates who provide free tutoring for freshman- and sophomore-level classes.

6.2 Applied learning experiences

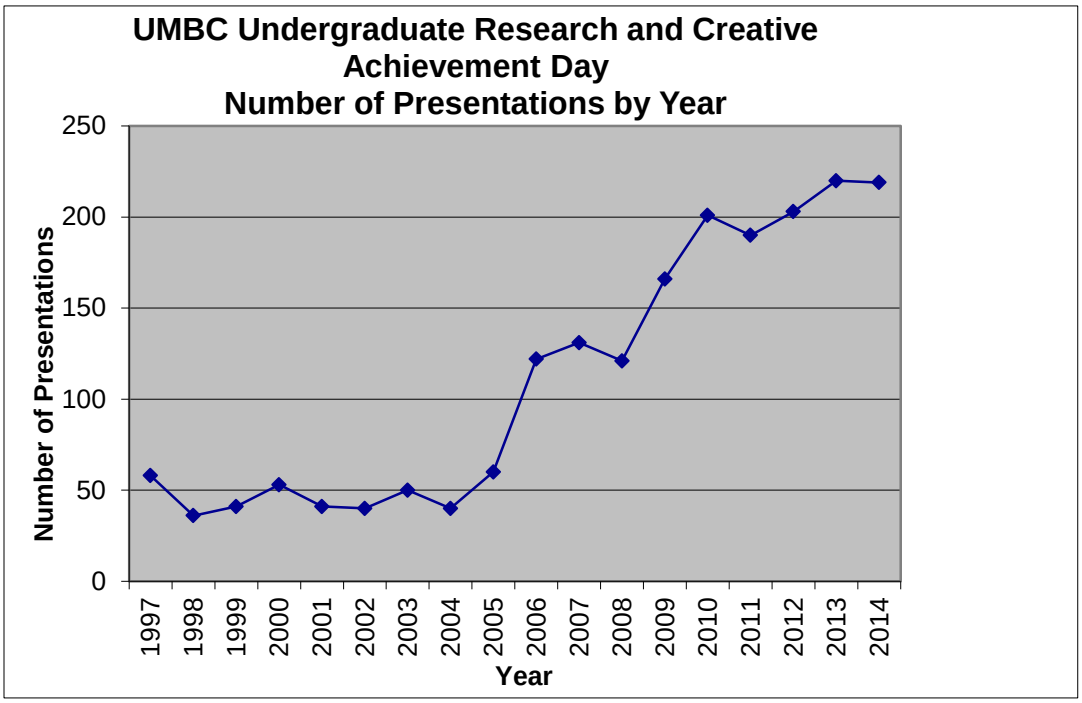
UMBC believes that learning experiences outside the classroom contribute to students' acquisition of the University's functional competencies. The new strategic plan calls on the University to "continue to build a campus culture that creates, supports, and expects applied learning experiences." Our students' successful completion of undergraduate, graduate, and community-based research; service-learning projects; internships; and study abroad suggest that they have mastered functional competencies. UMBC students can and do effectively apply their learning to complex problems, one of the hallmarks of mastery. Our BreakingGround movement, which nurtures civic agency and promotes positive social change, seeks to tap into that student potential. Since its inception in 2012, the now nationally recognized BreakingGround has tied applied learning to social responsibility.

6.2.1 Undergraduate research

UMBC provides research experiences for undergraduates as well as graduate students and makes available or requires internships, some of them integrated into course work toward a degree. Both the Undergraduate Research Awards (URA) program, which recognizes and funds research, and the Undergraduate Research and Creative Achievement Day (URCAD), where students showcase their research, help undergraduates build and demonstrate functional competencies. Participation in URCAD is increasing, as shown in figure 22.

[104] Self-Study for ABET Review of the Chemical and Biochemical Engineering Program, April 2010, p. 10.

Figure 22: Number of URCAD presentations annually 1997-2014



Figures 23 and 24 show the growth in funding for undergraduate research awards and in the total number of awards respectively over the past decade.

Figure 23: Total funding for undergraduate research awards

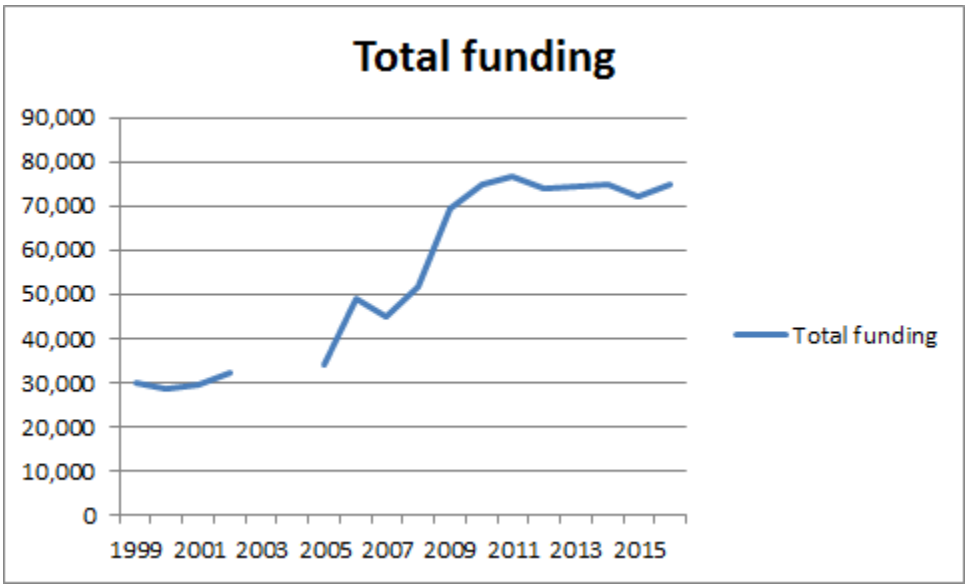
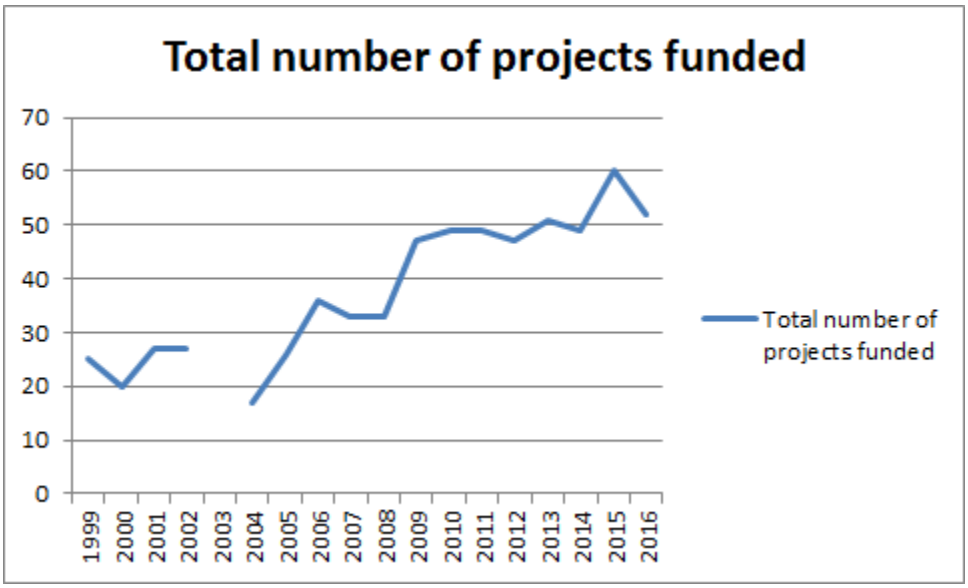


Figure 24: Total number of undergraduate research projects funded



In spring 2016 UMBC began surveying students and their faculty mentors involved in URA and URCAD research using an instrument modeled on one developed at SUNY Buffalo. The instrument asks students to assess their own learning and mentors to assess their students' learning, with each survey question aligned with a functional competency. Staff are working on ways to improve the response rates for 2017 because the post-research surveys drew many fewer responses than the pre-research survey (apparently due to end-of-the-semester overload). Nonetheless, the mentor-survey results suggest that the URA experience contributes to student learning in at least three of the functional competencies, with 99 percent of students demonstrating skills in written communication often or more frequently during the project, 95 percent demonstrating skills in critical reasoning often or more frequently during the project, and 84 percent demonstrating information literacy often or more frequently during the project.

While URCAD and the URA program are the most prominent examples of undergraduate student research experiences that promote acquisition of the functional competencies, they are not alone:

- The College of Natural and Mathematical Sciences (CNMS) offers the UMBC Summer Undergraduate Research Fest (SURF), which includes student researchers from the MARC U*STAR program, High Performance Computing, the Research Experiences for Undergraduates site at UMBC, the Summer Biomedical Training programs and other programs. [105]

- All Meyerhoff Program Scholars are required to participate in research experiences either on or off campus each summer after the freshman year. Many continue their research in

[105] Summer Undergraduate Research Fest SURF

labs on campus or the surrounding areas during the academic year. A number of them publish in refereed journals with their mentor.

- The McNair Scholars Program for undergraduate students who are first-generation college attendees or members of underrepresented minority groups offers the Annual McNair Scholars Research Conference at UMBC.

- The CNMS, the Department of Biological Sciences, and the Department of Chemistry and Biochemistry sponsor the Undergraduate Research Symposium in the Chemical and Biological Sciences each fall.[106] 2015 marked the 18th year of the program.

- On- and off-campus opportunities for research are readily available to students through the Office of Undergraduate Education (OUE) web site, including resources to help with application materials.[107]

- The OUE offers students (and faculty mentors) training resources to help them create their application materials, craft their projects, and prepare to share their work in presentations.

UMBC has consistently paid attention to the pedagogical payoffs of undergraduate research, a fact not lost on the authors of the book *Worth the Price of Admission* about effective colleges and universities. The authors write, "Of all the research universities we've visited, [UMBC] is the place that has most capably connected research with undergraduate education." [108]

6.2.2 Internships and service learning

Internships and sustained, structured opportunities for community service help students develop the functional competencies in the meaningful context of real-world work. These opportunities are also prime ways UMBC fulfills its mission to prepare students for "entry into the workforce and community service and leadership."

Many workplace-oriented internships as well as cooperative-education arrangements and research practicums are coordinated by UMBC's Career Center. These opportunities are continuing to grow at both the undergraduate and graduate levels. During the 2015-2016 academic year, more than 1,800 such experiences were offered.

Some internships are required by departments or programs for degrees. For example:

- The Department of Media and Communications Studies' internship extends the major's theoretical and applied coursework with a 120-hour learning opportunity designed to help

[106] Undergraduate Research Symposium in the Chemical and Biological Sciences
[107] Getting Started in Research-Undergraduate Research
[108] Undergraduate Research and URCAD

students build the oral, written, and organizational skills they need for successful careers[109]

- In the Computer Science Department's program for the BS, students participate in an industrial internship, where supervisors evaluate students' applied communication skills[110]

- The master of public policy program requires students without relevant policy experience to complete an internship prior to graduation

Faculty in several departments are including as part of their courses projects based in the community beyond the campus, such as creating oral histories of deindustrialized communities in Baltimore or designing adaptations of living spaces or equipment for individuals with disabilities. Social science faculty have led students in creating discipline-related apps to serve community needs.

The Career Center surveys the students enrolled in internships, co-op education, and practicums, asking them to comment on how their leadership skills, self-confidence, and awareness of civic responsibility are affected by their experiences. Table 7 shows the results of surveying 3,333 students over FY 2013-2016.

Table 7: Results of student survey of learning gains from internships, co-op education, and practicums, FY 2013-2016

Scale	Leadership Skills	Self-Confidence	Awareness of Civic Responsibilities
ncreased Significantly	22%	35%	25%
Increased Moderately	27%	32%	25%
Increased Slightly	29%	22%	25%
TOTAL % of students ndicating an increase s a direct result of their experience.	**78%**	**89%**	**75%**

The Shriver Center, UMBC's nationally known program for community service and civic engagement, provides students with the opportunities and training to work with partners throughout the greater Baltimore region. These opportunities include service learning (including K-16 partnerships); the Public Service Scholars Programs (including the Governor's Summer

[109] APR Media & Communications Studies 2014-2015, p. 12

[110] Self-Study for ABET Review of the Computer Science Program - -2011-12 Accreditation Cycle, June 2011, p. 8.

Internship Program; the Maryland Nonprofit Leadership Program; the Maryland Department of Transportation Fellows Program; and, the Public Service Law Fellows Program); the Shriver Peaceworker Fellows Program (for returned Peace Corps volunteers pursuing advanced degrees); and the Choice Program at UMBC (including its intensive advocacy, education, and jobs initiatives).

The Shriver Center focuses assessment on student learning outcomes, both cognitive and affective, many of which align to UMBC's general education functional competences. They include the development of written and oral communications skills; self-confidence and competence; social responsibility and awareness; enhanced awareness of career options; and professional skills such as time management, teamwork, and timeliness. What is distinctive about SLOs in the Shriver Center is the role students play in elaborating them. At the beginning of the practicum course associated with each applied learning experience, students work with staff members to identify three to five SLOs for that semester. Students journal about their Applied Learning Experiences (ALEs) in relationship to those SLOs, and have opportunities to discuss their progress towards them throughout and at the end of the ALE. ALE supervisors also complete an evaluation of students' performance, assessing students' progress toward achievement of their SLOs. Assessment of these sources to date in 2015 showed that student self-confidence, problem solving capacity and clarity about career options all greatly increased. Students participating in applied learning experiences, including service learning specifically, also had better academic outcomes than students who did not participate, including higher GPAs, more credits earned per term, and higher graduation rates, as shown in figure 25. [111]

Figure 25: Higher academic outcomes for UMBC students participating in applied learning experiences

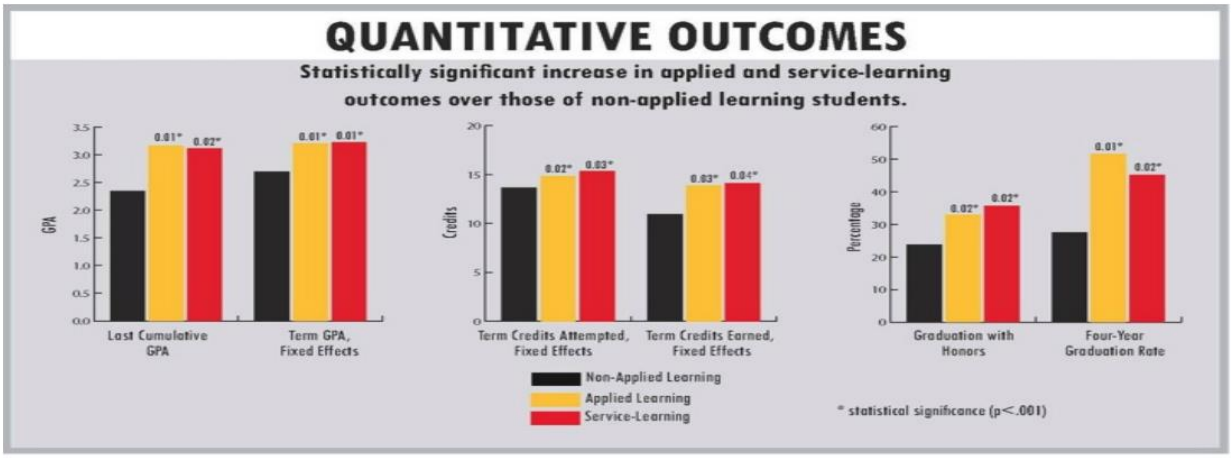


Figure 2: *An analysis of 55,000 students over 18 years indicates that types of ALEs studied positively influence GPA, Credits Attempted, Credits Earned, Graduation with Honors and Four-Year Graduation Rate (Penniston, 2014).*

[111] Shriver Center Results
Penniston, Thomas. (2014). The Impacts of Service Learning Participation Upon Post-Secondary Students' Academic and Social Development. Diss. UMBC.

In 2014 a group of faculty and staff members in coordination with the Shriver Center proposed to develop an assessment instrument to determine whether and to what extent students participating in applied learning experiences acquire affective (i.e., noncognitive) functional competencies such as self-awareness and sensitivity to context. These competencies relate directly to our mission to prepare students for the workplace and civic participation, which often require social and emotional skills if one is to be effective. UMBC's interest in cultivating affective and cultural competencies is also linked to that part of our mission that embraces "cultural and ethnic diversity" and "social responsibility" as important ideals.

This faculty-Shriver Center group has identified a potential unifying framework for some of the critical learning gained from such experiences—Bloom's affective domain. Using this affective taxonomy as a starting point, the group developed SLOs and is designing a pre/post-experience survey instrument to measure student development in the affective domain as a result of an applied learning experience. The group was awarded a Hrabowski Innovation Fund Implementation and Research Award (the funding is independent of the University's budget) in May 2015 to refine their survey tool and analyze results from the courses that have participated in the research project. The group's work could provide an invaluable contribution to the field of learning assessment. Currently, numerous programs, including the First-Year Experience programs (IHU, FYS), the Learning Resources Center (which includes the goal-setting and study skill course LRC 101A), the Honors College, the Women's Center, and the Sherman STEM Scholars program, are developing direct measures for assessing affective competencies.

6.3 Financial literacy: connecting functional competencies across the institution

Financial literacy combines scientific and quantitative reasoning and critical analysis and reasoning, and spans curricular and co-curricular areas at UMBC. Given the challenges students face in financing their college educations, the University seeks to develop financial literacy as well as build those broader functional competencies with several initiatives. For example, sections of the course Introduction to the Honors University include financial literacy as a key content area. UMBC's Financial Literacy Work Group, co-led by the offices of Financial Services and Enrollment Management, created the Financialsmarts.edu web site to provide information, training, and resources to enhance financial literacy. The work group administered an undergraduate student survey on financial literacy[112] and offers an online Blackboard course, among other initiatives, as part of its ongoing efforts.

Another effort targeted students in the School of Social Work. The school recognized that while social workers strive to increase the financial well-being of their clients, they themselves are at a disadvantage if they are not adequately financially literate. Researchers received a Hrabowski Innovation Fund Award[113] in 2013 to develop a program of workshops and activities to build

[112] Financial Literacy Survey Results 2014

[113] The Hrabowski Fund for Innovation is a competitive grant program established in 2013 to fund work by faculty members who are pioneering novel ways of approaching teaching and learning, with a particular focus on helping more students from all backgrounds to persist and excel.

financial literacy and self-efficacy in students and assess the results of the intervention. The researchers administered two validated measures, Lown's Financial Self-Efficacy Scale and Danes and Haberman's questionnaire on financial knowledge, self-efficacy, and behavior before and after students participated in this intervention. The survey results showed that students had statistically significantly improved scores after the intervention. A focus group found that students felt the process had been enjoyable and highly informative.[114]

7 Initiatives for student success

UMBC is committed to diversity and meeting the needs of a diverse student body. The University enrolls high-performing first-time freshmen and upperclassmen who have completed transfer programs at Maryland community colleges. It enrolls many members of the groups that are generally underrepresented on college campuses—African Americans, Hispanics, and students from families where no one has yet graduated from college. UMBC monitors indirect assessment measures such as grades and retention data to track the success of our students in various demographic groups. As we identify areas of concern, we design and implement innovative programs aimed at retaining students and ensuring they graduate—often called student-success measures. A sampling of these initiatives is highlighted below.

7.1 Addressing UMBC's freshman-transfer student achievement gap

In 2008, UMBC identified a difference in persistence and graduation between freshmen and transfer students, with African American male transfer students especially at risk.[115] In response to this data, UMBC allocated funding to support several initiatives that address this achievement gap. The initiatives, which have tended to focus on courses in which transfer students struggle, have likely had benefits for non-transfer students as well.

Transfer student seminars

These one- or two-credit seminars are linked to courses typically taken by new transfer students and were developed to address our achievement gap. A transfer student seminar reinforces lecture content and works on discipline-specific content gaps while also teaching study skills, test preparation, time management, and other key skills needed by transfer students. Student self-assessment continues to show statistically significant positive change on all self-report measures, including directing a study group, preparing an annotated bibliography, locating key offices, identifying opportunities for tutoring an academic assistance, and writing a resume. Calculation of simple proportions show that one-semester and one-year retention rates for transfer students who enroll in a transfer student seminar are higher than for transfer students as a whole, but we do not yet know whether the difference between those who received the intervention and those who did not is statistically significant.

[114] School of Social Work Hrabowski Innovation Fund Final Report

[115] UG Program Directors (UPD) Meeting Notes - October 2008 and Cultural Diversity Report 2012

Supplemental Instruction

National data suggested that Supplemental Instruction (SI), a form of peer tutoring, helps students who might otherwise struggle. After a site visit to Clemson University to learn more, UMBC leaders started our own program in 2009. The office that is now IRADS identified lower-level math courses, including algebra and elementary functions, as significant obstacles to retention and those classes were paired with SI. By fall 2011, SI had been expanded to all three sections of precalculus, all four sections of the second course in computer science, sections of introductory biology, and experimental psychology. Data from the past few years show that students who participate in an SI section consistently outperform students who do not, based on both failure rates and the proportions of students earning As, Bs, or Cs.

Introduction to an Honors University classes

Introduction to An Honors University (IHU) courses help orient new students and address study skills. These one-credit special courses piggyback on regular courses that students typically take in their first year. The Office of Undergraduate Education (OUE) has made IHU courses available for transfer students.

UMBC has long been committed to assessing the impact of IHUs and First-Year Seminars (FYS), which are also open to transfer students, on student learning and success. For example in 2006, the Office of Institutional Research (OIR, now IRADS) explored the impact of these new-student experiences using course evaluations, NSSE data, and institutional data. Our researchers asked, How do students who take the FYS or IHU compare to those who do not?[116] OIR/IRADS found that FYS students wrote, communicated, and presented better and were more involved class participants than non-FYS students. The Office of Undergraduate Education is currently studying First-Year Seminars by means of direct measures that were implemented in spring 2015.[117]

Assessment has been used to improve components of IHU classes. For example, questions about using the library have been included in the general IHU student assessment (a pre- and post-test) so that the reference librarians who teach that unit can gauge its effectiveness and make changes accordingly. Results from the 2015 spring and fall assessments have been received, and spring 2016 results are anticipated.

Expansion of the First-Year Intervention program to transfer students

The First-Year Intervention (FYI) early-alert program, which communicates with students who are receiving any course grade below C by the sixth week of each semester as reported by faculty teaching more than 800 courses, was expanded to include transfer students in fall 2010. In spring 2011 a total of 334 alerts were sent to 138 transfer students out of 211 transfer students

[116] 2008 Progress Report on Assessment to Middle States, p. 56-7.

[117] Effective Uses of NSSE Data: Evaluating First-Year Student Success Initiatives, 2006; National Survey of Student Engagement (NSSE): 2013 High Impact Practices; Strategic Retention Initiatives: The Role of First-year Seminar Programming; Strategic Retention Initiatives: The Role of First-Year Experiences, 2008

identified with fewer than 30 credits. A pre-transfer advisor, hired in 2013, contacted all transfer students receiving an early alert in the fall 2013 semester. One hundred and forty students out of 505 invited received academic coaching. Among all transfer students who received alerts, 59.5 percent ended the semester with a passing grade or withdrew from the alerted course(s). Among the students who received alerts and also met with an advisor, 65 percent ended the semester with a passing grade or withdrew. This result is consistent with a positive effect from the advising intervention, but we have not calculated the difference between advised and non-advised students who received alerts.

7.2 Other success initiatives

Some of UMBC's student-success initiatives are not targeted at transfer students in particular but help struggling or underachieving students in several categories, including students in introductory STEM courses and members of underrepresented minority groups. Several of these efforts are highlighted below.

Quiz Zero and the Math Gym

In 2013 one of the first Hrabowski Innovation Fund grants was awarded to the chair of the Department of Mathematics and Statistics for the creation and initial support of the Math Gym. The program helps students secure the foundational math skills they need for success in their courses through a personalized plan of practice.[118] The initiative grew from the Math Department's 2007 implementation of Quiz Zero (QZ), an initial diagnostic test of students' readiness for the rigor of the math course into which they had placed. Findings have consistently shown that 70 percent of students who fail their initial QZ go on to fail the course. Overall, in almost every range of QZ score, students who attended the Math Gym did better than students who did not, with positive results generally greatest for students who visited four or more times, as shown in the table 8.[119]

[118] Math Gym

[119]For more information see Fall 2014 Math Gym Data Analysis and Spring 2014 Math Gym Data Analysis

Table 8: Math gym attendance and passing grades

Repeat Attendance and Quiz Zero has an Impact on Final Grade

Percentage of students with a passing (A,B, or C) final grade				
	Number of visits to Math Gym			
QZ score	Never	1 - 3 visits	4 or more visits	Overall
Less than 20%	31%	62%	47%	46%
20% - less than 40%	42%	63%	78%	62%
40% - less than 60%	60%	57%	76%	63%
60% - less than 80%	69%	79%	88%	78%
80% or more	79%	88%	88%	83%
Overall	62%	69%	80%	69%

Introductory chemistry: the Discovery Center and a "flipped" format

Many students struggle with introductory STEM courses, as failure and withdrawal rates at UMBC and elsewhere attest. With support from the Office of Undergraduate Education, UMBC's Chemistry Discovery Center was established in 2005 with the dual aims of making the introductory chemistry course more rigorous and improving students' pass rates.[120] The Discovery Center provides introductory chemistry students with a guided-inquiry discussion section. After the establishment of the Chemistry Discovery Center and the institution of online homework, the failure rate in introductory chemistry fell by half with significantly more As and Bs than previously.

In another significant change, the format for introductory chemistry was "flipped" in fall 2011. Students prepare for class with online homework assignments and are held accountable for this preparation via in-class clicker quizzes. Students engage in problem solving in class and test their understanding during the class through clicker questions. Providing in-class time for processing and feedback gives students additional learning support. These two changes allowed instructors to raise the course standard for a C grade, meaning that students who passed were better prepared for subsequent courses. Even with more rigorous and appropriate course standards, D/fail/withdrawal rates remain lower than before the changes.

Identification and response to at-risk students

To identify at-risk students, UMBC looked to historical patterns of retention, persistence, and graduation. The record revealed that student groups at risk of underperforming are unaffiliated

[120] Chemistry Discovery Center

students, students without a declared major, transfer students, commuter students, male students, and STEM students. More broadly, students without some kind of affiliation on campus tended to be more likely to struggle than affiliated students with some form of institutional support, a finding bolstered by research elsewhere.[121]

Reviewing UMBC's efforts to improve retention and graduation rates shows that high-touch, active-learning efforts are effective. This is true of math, chemistry, physics, psychology, and English course redesigns, which include small-group break-out sessions or the creation of study groups. Also, and unsurprisingly, Living-Learning Communities, which offer several kinds of support to students (advising, community and peer support, Resident Assistant support, encouragement to take FYS and IHU classes), can be especially effective retention tools. Review of the interventions also shows that many students who could benefit from them are either not part of targeted demographic groups that are provided with support or otherwise do not take advantage of programs like IHU or FYS. We are starting to identify these underserved students by examining the data about them so they can be provided with resources. For instance, for students who do not meet the criteria for specific forms of programmatic support, their advisors are being encouraged to have them enroll in an IHU or FYS.

STEM BUILD@UMBC

The BUILD@UMBC project, announced in October 2014, draws on many of the experiences UMBC has had in supporting students. It is designed to support STEM students who show potential to excel and will likely do so with appropriate support, but who are also in danger of not completing their degrees. The initiative draws extensively on existing UMBC best practices, ranging from the supportive peer networks of our living-learning communities to the applied learning and internship placements of the Shriver Center. The initiative pulls in the rigorous undergraduate research preparation that is a hallmark of the MARC U*STAR program, McNair Scholars Program, and our partnership with the Howard Hughes Medical Institute. It expands the community college partnerships of the Gates STEM Transfer Student Success Initiative and the proactive mentorship of the Meyerhoff Scholars Program. The impact of this program on student learning and success will be assessed via indirect measures such as student grades and retention rates and some direct measures of student development via validated testing instruments.[122]

Degree-completion initiative

The Degree-Completion Initiative, just beginning a pilot, seeks to help students who are near completion of their degree requirements to finish and graduate. The pilot brings together staff members from the offices of Admissions, Advising, Financial Aid and the Registrar to identify seniors who are near completion; pools information on and resources for the students; and conducts highly personalized outreach to them. This initial effort will be assessed starting with

[121] See, for example, Gardner Institute: Gateway Course Success Inventory
[122] STEM BUILD at UMBC - NIH Funded Undergraduate Student Success Research Initiative and Study

the spring 2016 graduates: what proportion of near-completion seniors earned their degrees and with what resources of time and money expended?

8 Innovative pedagogy

UMBC's commitment to student learning and success has resulted in a nationally recognized culture of pedagogical innovation. Such innovation is called for in our new strategic plan, which aims to provide "state of the art undergraduate and graduate curricula delivered through innovative and effective approaches to teaching and learning." UMBC faculty members have adopted several such innovations for their courses and are experimenting with more. Described below are three major significant changes in pedagogy and the assessments that have so far accompanied them.

8.1 Course redesign

UMBC took advantage of grants offered by the University System of Maryland (USM) beginning in 2006 to address the problem of high D/failure/withdrawal rates in large gateway courses through course redesign. The goals of redesign under the program were to enhance student access, learning, and success, and to decrease costs. Working with USM, the National Center for Academic Transformation recommended the use of course-redesign models that use web-based resources and instructional platforms, instructional technology, and active learning to better support student learning even in large classes. Departments that applied for the grants committed to redesigning all sections of the targeted course.

The program ultimately supported the redesign of six UMBC courses: introductory psychology, developmental psychology, organic chemistry, precalculus, English composition, and introductory sociology. In the psychology, organic chemistry, and precalculus classes, student success increased, as measured by course completion with at least a grade of C. In Psychology 101, for instance, the change led to a decrease in Ds and failures from a high of 33 percent in 2007 to a 10 percent level maintained over six subsequent, consecutive semesters. The English composition course redesign allowed faculty members to provide more consistent content and objectives across sections and to provide students with more individualized support. A sample of fall 2014 essays from a range of assignments, instructors, and predicted levels of student performance found improvement in all four learning outcomes that were assessed.[123]

Results of the course-redesign work were shared during a panel session at the Provost's Teaching and Learning Symposium in September 2014. Common lessons centered on using various online exercises outside of class and active leaning within the class sessions. This combination seemed to best support student learning and retention.

[123] Course Redesign (CHEM 351, ENGL 100, MATH 150, PSYC 200, SOCY 101) Reports

8.2 Team-based learning

UMBC faculty in biology, mathematics, visual arts, and Spanish, among other departments, are experimenting with team-based learning (TBL). A number of them participate in a TBL discussion group that meets monthly during the academic year. The 2014 Provost's Teaching and Learning Symposium featured a panel of faculty who use TBL from across the campus sharing their approaches and outcomes. Some faculty members are trying to determine the effect of TBL on student achievement. For example:

- Biology faculty members compared D/failure/withdrawal rates before and after redesign of the anatomy and physiology course aimed at improving students' problem-solving skills. The D/failure/withdrawal rate dropped more than 20 percentage points, and students demonstrated enhanced abilities to apply biological concepts to analyzing and solving problems.[124]

- In the genetics course two sets of instructors compared the results of different pedagogical approaches using the Genetics Concept Assessment Test. One group employed an interactive lecture format with discussion sections and the other used TBL techniques. Results in 2011-2012 suggested that the approaches produced equivalent learning gains.[125]

- A faculty member in the Department of Mathematics and Statistics department compared his students' performance in a linear algebra course in a semester during which he used TBL to their performance in prior semesters when he used a more traditional approach. Students not only earned better grades in the TBL semester, but performed significantly better on the final exam.[126]

8.3 Flipped classrooms

A number of UMBC faculty are using "flipped classrooms" or related approaches designed to free up in-class time for discussing and applying concepts. In flipped classrooms, video lectures are given as homework with problem solving or other forms of more active learning taking class time. Faculty members in mechanical engineering and ancient studies employ video lectures as part of the pre-class assignments. Systematic studies of the impact of these approaches on student learning have not yet been conducted, but faculty members report that students are more prepared for class and more engaged as a result of the new methods.[127]

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[124]Closing the Loop Reports CNMS 2015 - Biology

[125] 2014 CNMS Biennial Assessment Report - COD 11-24-14

[126] "A Modified Approach to Team-Based Learning in Linear Algebra Courses" by Nanes, K. (Dec. 2014), International Journal of Mathematical Education in Science & Technology., Vol. 45 Issue 8, p.1208-1219.

[127] Closing the Loop Reports COEIT 2015 - Mechanical Engineering; APR Ancient Studies 2014-2105

9 Graduate student learning

UMBC Graduate School learning assessment has gained momentum. Graduate programs are in the process of revising their assessment plans. To support this work, three programs--Systems Engineering, Sociology, and Geography and Environmental Systems--presented at the Provost's 2015 Teaching & Learning Symposium, fostering a discussion among participants about the specific challenges of assessing graduate students. Attendees, for example Human Centered Computing faculty members, applied this training to developing their plans. Graduate program advisers will continue to discuss and present the plans at Graduate School meetings.

Some of the ways that graduate programs have planned for, conducted, or responded to assessment are highlighted below:

- The College of Natural and Mathematical Sciences Student Learning Assessment Advisory Committee is exploring ways to collect graduate student learning outcomes assessment data from current practices, like competency exams and dissertations, with support from the Faculty Development Center. The Gerontology doctoral program learned from an alumni survey that students felt they needed better training in academic writing. The faculty created a series of academic writing workshops to meet this need; follow-up assessments are pending. Alumni also called for support in preparing for comprehensive exams. The resulting intervention improved the success rate in the first round of exams. Additionally, the program has instituted an Annual Review of Progress on Student Learning Outcomes, where students work with faculty advisors to analyze their learning gains.[128]

- The Language, Literacy, and Culture Department's doctoral program conducts exit interviews to provide data about student satisfaction with the program's learning opportunities.[129]

- The Computer Science Department assessed its doctoral program's comprehensive exams and discovered inconsistencies depending on who was writing and grading the exams. Faculty also found that the exams largely duplicated final exams for the corresponding courses. The graduate program committee eliminated the exams and replaced them with a portfolio of work, including student grades in core courses and evidence of research ability, such as a research article or a literature survey. The portfolio was also designed to engage students, particularly part-time students, in meaningful research with faculty members early in their careers, thus reducing the likelihood of student attrition. Insight into the importance of research with faculty stemmed from data and analysis associated with the PhD Completion Project for which UMBC was selected in 2004. The project

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[128] Closing the Loop Reports CAHSS 2015 - Gerontology
[129] Closing the Loop Reports CAHSS 2015 - Language, Literacy & Culture

provided funding to gather baseline data, create interventions, and evaluate the impact of the interventions on doctoral-completion rates.

- The PhD Completion Project also led to annual reviews of all PhD students by departmental faculty to ensure that students are making satisfactory progress toward their degrees. All PhD programs have implemented such reviews.

- Psychology assesses all four of its graduate programs using a common, student-exit survey and individualized direct measures. Two of the programs, including the Human Services Psychology (HSP) PhD, use as a direct measure the results of students' comprehensive exams and the dissertation. Criteria used to assess these products include students' abilities to demonstrate critical reasoning and apply theories and empirical findings. Table 9 shows three years of passing rates for the qualifying exam in the Human Services Psychology program. The data indicate that at most one student a year not does not achieve the learning outcomes represented by the exam.

Table 9: Human Services Psychology qualifying/comprehensive exam passage

Year of program entry	**2009**	**2010**	**2011**
N	***8***	***11***	***12***
% who passed exam	62%	100%	92%
% who did not take exam (still enrolled)	25%	0%	0%
% who did not take exam (no longer enrolled)	0%	0%	0%
% who did not pass exam (still enrolled)	13%	0%	0%
% who did not pass exam (no longer enrolled)	0%	0%	9%

- Systems engineering faculty have completed assessment planning and curriculum mapping, as documented in their self-study for their 2015 Academic Program Review.

- The MA in Historical Studies program reviewed recently completed master's theses and surveyed graduates of the program who completed their degrees between fall 2013 and spring 2015 about their perceived mastery of program SLOs. Responding to the findings, the faculty revised the syllabus of one course and redesigned another.

- The MA in Applied Sociology uses a mix of measures to assess student learning from application to graduation:

    - In the graduate research methodology course, post-test results demonstrated significant growth in student learning after one section switched to TBL approaches.

- In the graduate statistical analysis course, faculty members introduced formalized peer review with rubrics in response to problems with writing quality and report construction. Professional report writing subsequently improved.

- Exit surveys of sociology undergraduates show that many do not feel prepared to write reports or literature reviews; other assessments reveal high variability in student writing skills. Throughout the graduate curriculum, faculty have increased the focus on writing, including adding an advanced topics course in 2015 and instituting peer reviews for assignments in the research methodology and statistical analysis courses. Finally, in response to the Academic Program Review process, the program has revised its requirements for the analytical paper required for the MA, making them more uniform and clarifying them.[130]

10 Employer-survey evidence for student learning and success

In addition to the many other measures of student learning mentioned in this chapter, some departments receive detailed feedback from employers about how well prepared the UMBC graduates they employ are. One such department is Emergency Health Services (EHS). The EHS curriculum is designed to produce entry-level supervisors and paramedics for emergency services organizations, and employer surveys demonstrate successful student learning and suggest that EHS graduates can effectively play these roles.[131] For the undergraduate management track, students have generally been rated "very good" or "excellent" in supervisor evaluations and 100 percent of employers indicated they would hire a UMBC EHS graduate. Internship agencies have been very impressed with the ability of students to produce work products of an acceptable standard.[132] Further, 80 percent of employers responded that UMBC graduates had a good or excellent reputation.[133]

Employer surveys of students from EHS graduate program were similarly positive, though they suggested that the program should place more emphasis on formal and written communication and on understanding healthcare reimbursement. Twelve of 13 employers said they would hire another UMBC EHS graduate. Employers found that UMBC graduates understand and value relations to and interaction with others and that they effectively assumed leadership roles.

The Education Department also surveys employers of their graduates. It invites principals who are or have been part of its professional-development school network to respond to a survey on the newly certified graduates (at both bachelor's and master's levels) that they have supervised. It asks them to rank on a 1- to 4- scale how well prepared the graduates are with the knowledge, skills, and dispositions that the department seeks to develop. As shown in table 10, most employers from 2008 to 2010 found UMBC graduates to be well prepared, with means for items ranging from 3.36 to 3.81 out of 4, which represents "highly prepared." Respondents said UMBC

[130] Closing the Loop Reports CAHSS 2015 - Sociology MA
[131] APR Emergency Health Services 2009-2010, p. 7
[132] Ibid, p. 10
[133] Ibid, p. 10

alumni are most prepared to understand and value diversity (3.81) and least prepared to manage student behavior in a constructive manner (3.36) and advocate for democracy and social justice in the classroom/school (3.66). Employer feedback data is considered each semester in all programs in the continuous-improvement review process.[134]

Table 10: Education Department employer survey - summary of employer feedback 2011

Employer Feedback Survey Summary Data
UMBC Initial Certification Programs
2008-2010 N=5 School Districts

Survey Items	**Ra**	**Mean**
Key Knowledge, Skills and Dispositions	**nge**	
Knowledge and skills in the areas of certification.	1-4	3.72
Implementation of lessons to meet students' diverse strengths and needs.	1-4	3.65
Management of students' behavior in a constructive manner	1-4	3.36
Professional dispositions of caring, responsiveness, and thoughtfulness	1-4	3.69
Reflection on practice	1-4	3.57
Understanding and valuing diversity	1-4	3.81
Collaboration with other professionals	1-4	3.64
Use of formal and informal assessments to evaluate student progress	1-4	3.36
Effective communication in speech and writing	1-4	3.62
Use of standards and objectives in planning lessons	1-4	3.70
Use of appropriate technology in the classroom	1-4	3.69
Positive interactions with students, families and school community	1-4	3.66
Advocacy for democracy and social justice in the classroom/school	1-4	3.66

Employers also rated MA in Education graduates highly. In spring 2010, employers ranked the graduates they supervised as "highly prepared" with a mean score of 3.5 out of 4 in their knowledge of subject and better than "satisfactorily prepared" but less than "highly prepared" with a mean score of 3.33 out of 4 in their understanding of pedagogy and learning.[135] Many of the teachers in this program are working to earned advanced certification from the state and have three or more years of satisfactory school-related performance. These teachers are held to higher standards by their school systems because they are experienced, which may account for their pedagogy and learning rating.

[134] Education Department Employer Survey - Summary of Employer Feedback, 2011
[135] NCATE Institutional Report for UMBC - Continuing Visit, November 2011

11 Conclusion and recommendations

UMBC faculty, staff, and administrators now regularly inquire about whether student learning is happening at multiple levels: What does it mean to obtain a degree from UMBC? What do our students know and what can they do? Is students' increased learning translating to improved student success measured in other ways, particularly two goals in the new strategic plan—increased graduation rates and faster times to the degree? What investments will produce greater learning of the types we have defined?

Many but not all UMBC programs have successfully navigated past compliance-focused learning assessment towards an authentic teaching and learning focus.[136] Some have closed the assessment loop in multiple cycles. Others are still experimenting to find the right tools for assessment. Overall, however, we have made substantial progress with 62 percent of the departments in the College of Humanities, Arts, and Social Sciences, 100 percent of departments in the College of Natural and Mathematical Sciences, and 75 percent of departments in the College of Engineering and Informational Technology using direct measures of undergraduate student learning as of spring 2015. Moreover, in each of the colleges, at least half of the departments are translating insights from the assessments into changes to curriculum and pedagogy. (See this chapter, table 6, p.111). Our aim is clear, as stated in our new strategic plan: "Continue to build the culture of academic assessment to support our faculty as the primary drivers of continuous improvement in student learning outcomes."

The Faculty Development Center is perhaps the most important agent of the culture change we are effecting at UMBC. As evidence of our commitment to learning assessment, our new strategic plan calls for the FDC to become the expanded Center for Teaching and Learning. The center employs a full-time assistant director for assessment. It leverages the expertise already on campus[137] and offers consulting services, workshops, faculty learning communities, and the Provost's Teaching and Learning Symposium to share successful strategies. The new FDC web site houses a growing collection of assessment resources.

Not only UMBC's faculty but UMBC as an institution is committed to supporting the 15 elements identified by the American Association of University Professors as the building blocks of a learning-assessment culture.[138] These include faculty ownership of assessment programs, ongoing professional development, administrative encouragement of assessment, and assessment of overall institutional effectiveness. At UMBC we expect not only decisions about teaching and learning to be driven by data, but decisions of every kind across campus to be evidence-based.

In assessment of student learning, we must address four challenges: developing and using meaningful direct measures; recognizing when data indicate that interventions are needed and

[136] GEC Assessment Committee Meeting Notes 2015

[137] For example, FDC Director Linda C. Hodges is the author of *Teaching Undergraduate Science: A Guide to Overcoming Obstacles to Student Learning* (2015).

[138] "Establishing a Culture of Assessment" by Wendy F. Weiner, *American Association of University Professors*

intervening accordingly; closing the loop by monitoring the results of interventions; and reporting the data in systematic ways to the college and the University. We have made great progress in each of these areas, but given the variety of departments and programs, the progress has been somewhat uneven.

We make the following recommendations for moving forward:

- **Cultivate and conduct meaningful assessment of student learning across all departments and programs.** Many departments conduct robust and effective assessments and use that data to inform decision-making, but not all. The FDC is working with more departments to help them refine their learning goals, map their curricula, create better assessment tools, and design effective interventions to improve student learning, and great strides have been made in the last few years. The FDC also maintains a web site that serves as a repository for public documents and resources related to assessment and shares best practices from individual programs. The successor to the FDC as envisioned in the University's new strategic plan, the Teaching and Learning Center, will help ensure that all departments have meaningful assessments that they use to improve their practices.

- **Establish a method for systemized data collection across all units of the University.** Currently courses, departments, and programs report their assessment data to the colleges and divisions in nonstandard formats, which hinders institutional-level planning. UMBC will work with the colleges and other units on campus (such as the Office of Undergraduate Education, the Division of Student Affairs, and the Graduate School) to collect student learning outcome data in more standardized forms (e.g., percentage of students achieving each functional competency) for comparison across the programs, units, and institution. In addition, UMBC will work both with outside vendors and the Division of Information Technology to create a viable, easy-to-use tool for compiling student learning outcome data. These efforts will be supported by the FDC and its proposed successor.

- **Systematically examine trends in aggregated data that reveal learning challenges for particular groups and identify continuing improvements for our diverse enrollment.** UMBC's examination of aggregated measures of student success have allowed us to implement interventions to support groups of students at risk, as noted in section 5 above. As we develop methods for compiling direct-measure data, we can also focus attention on disaggregating these data to gather richer information about the learning of populations of our students who are not succeeding. The detail available in direct measure data will allow us to design even more targeted and effective interventions for supporting these students in achieving their full potential.

- **Consider expanding our institutional learning outcomes beyond the cognitive.** As we compare course-level learning outcomes with those at the program and institutional level, we note that we have aspirations for our students' learning beyond those captured in our cognitive functional competencies. We often seek to cultivate students' emotional and cultural maturity in recognition of the complexity of today's society. This Self-Study has raised the question of whether we as an institution want to add to our institutional learning

goals, specifically by adding a cultural and/or an affective component. Our new strategic plan mentions the possibility of adding global and cultural competency, for instance. Such competencies would represent the next generation of challenge to our assessment efforts, but may be well worth the effort.

CHAPTER 6
CONCLUSION

Institutions of higher learning serve many purposes, but advancing knowledge through research, providing education and opportunities to learn that promote a healthy and socioeconomically mobile civic society, and contributing to the community are core functions and central to the mission, vision, and goals of UMBC.

Since its birth a half century ago, UMBC has recognized that its growth as a young campus would require careful attention to planning, budgeting, and resource allocation. For more than a decade, our strategic planning decisions have had to take into account challenging economic conditions. Those conditions are likely to continue to exist for much of the next half century

How, then, can this Self-Study help us to meet the challenges of both the stagnating growth of our resource base and the changing demographics of the population we serve? If we wish to continue to offer a distinguished, high-quality education to students of many different backgrounds at an affordable price and advance our contributions to knowledge, we must develop our capacity for planning wisely, which draws heavily on assessment.

The work of the study groups that constructed the core of this Self-Study has made clear that UMBC is actively engaged in assessment activities throughout the entire enterprise and most especially the assessment of learning. Our efforts have been sustained, and we have changed the way that we operate, teach, and learn based on assessment.

But there is still more to be done. We must invest in, and improve upon, our ability to analyze and assess the impact of our activities and our decisions. This assessment must be formal and capture the attention of decision makers, it must be periodic rather than ad hoc, and it must be tied to planning and budgeting decisions. It must be used as the foundation for discussions about how the University allocates its resources.

The conclusions here follow directly from the recommendations of the separate study groups, groups that worked in parallel with limited coordination. There was consensus among the groups that that UMBC does an excellent job developing and communicating its strategic planning goals and decisions through an exceptionally strong shared-governance process. There was also widespread consensus that planning and budgeting are strongly linked to our mission, vision, and goals, and that this process has improved markedly over the past ten years.

But there was also a consensus view that our assessment of our decisions and their impact is less well developed. The study groups made a series of recommendations that are consistent and complementary. They have three broad observations in common:

We need to improve our ability to assess the results of strategic planning decisions.

The prior strategic plan, *Strategic Framework for 2016*, did not have the specificity necessary to easily tie its goals and objectives to assessment. Our new strategic plan, in contrast, contains

numerous measures of success as well as a commitment to analytics and assessment to aid our ability to make decisions in fulfillment of our mission. It presents an opportunity for each of the divisions to develop assessment plans aligned with goals, objectives, and metrics of the plan. With these tools, we must improve our ability to monitor progress toward our goals. If outcomes or external circumstances require changes to the strategic plan, we need to be able to assess those outcomes.

UMBC will need to build our analytics and assessment capabilities, including by assigning people to new work and putting an organizational structure into place that allows the proactive and coordinated use of analytics across all of our major divisions. Many of these issues of assessment, analytics, and constrained funding are relatively new to higher education, and UMBC will need to make full use of its innovative and entrepreneurial administrators, faculty, and staff to develop these tools and use them effectively.

We need to improve our ability to measure the impact of resource-allocation decisions.

We must improve our ability to monitor plans and results through the development of dashboards that are widely agree upon, accessible, and well understood. Efforts under way are the implementation of a vendor-developed, resource-allocation software system and the mixed vendor and in-house development of a course-scheduling software system. We also need to improve our review process for new academic programs and to compare their result projections to allow for more effective oversight and redirection when necessary.

We need to develop better ways for anticipating changes in the environment that have an impact on our resource base and the cost of providing our core services. We must recognize our decreased ability to buffer increases in cost by raising tuition. To those ends, we need protocols for measuring the impact of changes to state funding, specifically those related to performance-based funding, and ways to prepare for significant changes in the demographics and readiness of our student population. For the new strategic plan to have the greatest impact, UMBC will need to develop multiyear financial forecasts to record decisions already made and to better plan our strategic initiatives.

The assessment process needs to be periodic and formal.

UMBC's assessment of its strategic plan has been less periodic and formal than the development of the plan. The new plan provides us with an excellent opportunity to benchmark our progress, and it includes specific measures of success that should form the foundation for our assessments. We should commit to periodically review progress towards success through expanded use of the data galleries presented at annual retreats, enhanced analytical tools and efforts, and a formal process to communicate the results of our assessment that is owned by a senior administrator.

This process could be structured in a fashion similar to the successful APR process that has been in place at UMBC for a quarter century We should implement a process to have each division, college, and select academic-support units present assessment results to the other campus units every three to five years While divisions would continue to share annual data as part of the budget process, every three to five years would see formal presentation of the assessment data to

the Council of Vice Presidents and Deans, the President's Council, and other oversight groups. This could be combined with an opportunity to formally submit proposed adjustments to the divisional-assessment plans.

While simply stated, implementation of these recommendations will be a challenge. Some of UMBC's analytics and assessment activities are "siloed," or conducted independently by different offices, which can result in differences in measurement that may cloud assessment, delays in the recognition of issues needing to be addressed, duplication of efforts, and coordination problems that can hamper construction of effective responses to challenges. Work will need to be done to improve the coordination of information and decisions within and across divisions through a more formal process that includes an institutional assessment committee and a student success committee that meet frequently with a well understood charge and appropriate leadership to best translate insights into action. An interdisciplinary spirit and willingness to innovate characterizes UMBC's colleges and classrooms. Applying those same qualities to assessment suggests how much there is to gain.

APPENDIX

Members of Self-Study Steering Committee, Operating Committee, and Study Groups

Steering Committee Members	
Dorothy Caplan	President, Non-Exempt Staff Senate; Executive Administrative Assistant II, College of Natural & Mathematical Sciences (CNMS)
* Robert E. Carpenter	Professor of Economics; Special Assistant to the Provost for Institutional Effectiveness; Past President of the Faculty Senate
Scott E. Casper	Dean, College of Arts, Humanities, and Social Sciences; Professor of History
David Kinkopf	University System of Maryland Board of Regents
William LaCourse	Dean, College of Natural & Mathematical Sciences; Professor and Dean, CNMS, Chemistry and Biochemistry
Diane M. Lee	Vice Provost, Student Academic Affairs; Dean, Undergraduate Education; Professor of Education
Sue Plitt	President, Professional Staff Senate; *Associate Director, Career Center*
Patrice McDermott	Vice Provost, Faculty Affairs; Associate Professor of American Studies
Jonathan S. Graf	President, Graduate Student Association
Yvette Mozie-Ross	Vice Provost, Enrollment Management & Planning
Judah Ronch	Professor and Dean, The Erickson School
Julia M. Ross	Dean, College of Engineering & Information Technology; Professor and Chair of Chemical & Biochemical Engineering
* Philip Rous	Provost, Senior Vice President for Academic Affairs, Professor of Physics
Janet Rutledge	Dean and Vice Provost, Graduate Education; Affiliate Associate Professor, Computer Science & Electrical Engineering
Lynne Schaefer	Vice President, Administration and Finance
Sarah Shin	President, Faculty Senate; Professor of Education
Gregory Simmons	Vice President, Institutional Advancement
Karl Steiner	Vice President, Research
Jack Suess	Vice President, Information Technology
Bruce Walz	Professor and Chair, Emergency Health Services; Co-Chair, Strategic Planning Steering Committee; Chair of the Faculty Senate Academic Planning and Budgeting Committee
Nancy Young	Vice President, Student Affairs

* Indicates Co-Chairs

Operating Committee

The Operating Committee served as an advisory committee to the Steering Committee and provided guidance and feedback to the Study Groups. The Operating Committee also evaluated evidence produced by the Self-Study process and contributed to and edited the final Self-Study report. One of the co-chairs of each Study Group also served on the Operating Committee to enhance communication and collaboration between the Study Groups.

Operating Committee Members	
Robert E. Carpenter	Chair, Professor of Economics; Special Assistant to the Provost for Institutional Effectiveness
Connie Pierson	Chair, Study Group IV; Associate Vice Provost, Institutional Research, Analysis and Decision Support
Delana Gregg	Vice Chair; Academic Advisor, Honors College
Lee Hawthorne	Vice Chair; Director, Student Life
Amanda M. Knapp	Chair, Federal Compliance Group; Assistant Vice-Provost, Academic Standards and Policy Administration
Kathleen Hoffman	Professor of Mathematics and Statistics
Benjamin Lowenthal	Associate Vice President, Financial Services
Antonio Moreira	Vice Provost, Academic Affairs

Study Groups

The Study Groups were charged with addressing standards as identified in the *Characteristics of Excellence.* These groups were organized around the standards being reviewed in this selected topics Self-Study. They were responsible for responding to the agreed upon research questions and providing evidence-based recommendations for how to move UMBC forward. Study Groups were co-chaired by a senior administrator and a faculty member.

The study groups were inclusive and reflect an exceptionally strong shared-governance process at UMBC. Each group, while chosen to make best use of the experience and skills of its members in relationship to the standards and functions the group studied, includes a mix of faculty, staff, students, and administrators.

Study Group Members	
Study Group Focusing on Providing a Foundation for Effective Results: Planning, Budgeting, and Institutional Resources	
* Lynne Schaeffer	*Vice President, Administration and Finance*
* Nico Washington	*Associate Provost for Financial Management, Office of the Provost and Academic Affairs*
Kent Malwitz	*President, UMBC Training Centers*
Joyce Tenney	*Acting Director, Library*
Charlene Uhl	*Director, Budget and Resource Analysis*
Christopher Steele	*Senior Associate Vice Provost, Department of Professional Studies*
James R. Milani, Jr.	*Director of Administrative Affairs, College of Engineering and*

	Information Technology, Dean's Office
Study Group Focusing on Assessing Results and Continuing the Development of a Formalized, Periodic, and Proactive Institutional Effectiveness Function	
* Jack Suess	*Vice President, Information Technology*
Linda Baker	*Professor, Department of Psychology*
Kenneth Baron	*Assistant Vice Provost, Academic Advising and Student Success, Office for Academic and Pre-Professional Advising*
Rachel Brewster	*Professor, Department of Biological Sciences*
Caroline Baker	*Assistant Vice President, Careers & Corporate Partnerships*
Study Group Focusing on Assessing Student Success and Learning Outcomes to Enhance Institutional Effectiveness	
* Diane Lee	*Vice Provost, Student Academic Affairs; Dean, Undergraduate Education; Professor of Education*
* Simon Stacey	*Director, Honors College*
John Fritz	*Assistant Vice President, Instructional Technology and New Media*
Linda Hodges	*Director, Faculty Development Center*
Daniel Ritschel	*Professor, Department of History*
John Stolle-Mcallister	*Associate Dean, College of Arts, Humanities and Social Sciences*
Jill Randles	*Assistant Vice Provost, Division of Undergraduate Education*
Jennifer Harrison	*Assistant Director for Assessment, Faculty Development Center*
Sayre Posey	*Undergraduate Student*
Study Group Demonstrating Compliance through Document Review	
* Connie Pierson	*Director of Institutional Research, Institutional Research, Analysis & Decision Support (IRADS)*
Patrice McDermott	*Vice Provost for Faculty Affairs*
Karen Mattingly	*Coordinator of Special Projects, College of Engineering and Information Technology, Dean's Office*
Bridget Stone	*Operations Coordinator, Professional Programs, Department of Professional Studies*

* Indicates Co-Chairs