ACHIEVING THE DREAM℠
COMMUNITY COLLEGES COUNT

Assessing and Improving Student Outcomes: What We Are Learning at Miami Dade College

by Joanne Bashford and Doug Slater

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Achieving The Dream: Community Colleges Count is a multiyear national initiative to help more community college students succeed. The initiative is particularly concerned about student groups that traditionally have faced significant barriers to success, including students of color and low-income students. Achieving the Dream works on multiple fronts, including efforts at community colleges and in research, public engagement and public policy. It emphasizes the use of data to drive change.

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The Community College Research Center (CCRC), Teachers College, Columbia University, is the leading independent authority on the nation's more than 1,200 two-year colleges. CCRC's mission is to conduct research on the major issues affecting community colleges in the United States and to contribute to the development of practice and policy that expands access to higher education and promotes success for all students.

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Foreword

The Achieving the Dream: Community Colleges Count initiative represents a major force in a growing movement among higher education institutions to use data to improve student outcomes. This multiyear, national initiative, which is particularly concerned with student groups that have traditionally faced significant barriers to success, involves more than 80 colleges in 15 states. Achieving the Dream encourages participating colleges to engage faculty, student services staff, and administrators in examining data on student progress, in formulating strategies to address achievement gaps, and in evaluating those strategies to make them more effective. Participating colleges are also expected to use evidence of what works to promote student success as the basis for academic program review, strategic planning, and budgeting, thereby bringing to scale proven strategies and sustaining them over time.

Launching such an extensive reform effort is an ambitious undertaking, especially for colleges little experienced in using student data beyond what is required for reporting to government and accreditation agencies. Colleges must not only develop the technical capacity to conduct the necessary research, they must also create a culture in which such research is valued and utilized. Many participating colleges are making progress, yet, because the initiative is still relatively young, few examples exist that actually illustrate how institutions have engaged in substantial organizational change based on analysis of what works to promote student success.

Miami Dade College, the largest community college in the nation, is not participating in Achieving the Dream. Yet it is one of the small but growing number of institutions in the country that are taking a systematic approach to using data to inform college decision-making about student learning and performance. The account presented in these pages, told from the point of view of Miami Dade's Office of Institutional Effectiveness, discusses how that approach took shape. Because of its size and the strength of its institutional research capacity, Miami Dade may have begun with some resource advantages that other colleges lack. At the same time, the college's large size also meant that its leadership had to persuade stakeholders spread out among eight separate campuses to invest in the process. Finally, as the report makes clear, Miami Dade shares many of the same challenges as other community colleges, including large numbers of students unprepared for college-level work and a poor track record of student progression among students enrolled in remedial or developmental courses, especially in mathematics.

Miami Dade began its reform by using a deliberative, stepwise approach to analyzing and acting upon problems with student achievement in one key discipline, mathematics. That approach has begun to show promising results, and it is now being applied to improve the impact of academic programs and student services throughout the institution. We hope that the story of Miami Dade's experience in using data to promote student success is helpful to Achieving the Dream colleges and other institutions throughout the country that are undertaking similar efforts to improve student success.

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Executive Summary

This report describes how Miami Dade College (MDC) has begun to develop a systematic and data-informed method for assessing and improving student outcomes across its large eight-campus college. Told from the point of view of MDC's Office of Institutional Effectiveness, the report recounts how the college has responded to the problem of poor student progression along the developmental/college-level mathematics pathway.

Poor student achievement in mathematics is, of course, an issue of tremendous concern for many community colleges. At MDC, we have so far been encouraged by the effects of the strategies that have been undertaken over the past several years to address the problem. Some of the interventions that have been implemented are showing promising results. Equally important, the process that the college embarked upon to understand the roots of the problem, to act upon it, and to evaluate those actions has itself had a significant impact on faculty, administrators, and student support staff. It has to some extent been institutionalized in college-wide reform. Thus the approach taken to improve student outcomes in mathematics is now being used in other disciplines and program areas. It is also noteworthy that the strategies that the college researched and deployed to improve math outcomes were formalized in our re-accreditation-required Quality Enhancement Plan (QEP). The obligation to formulate the QEP and proceed by it have undoubtedly served to strengthen the commitment to improve student learning throughout the college.
We have organized this report by describing the steps that were taken throughout the process. The steps build upon one another as themes, although events and practices are not always presented in strict chronological order. Some incidents that appear in different sections actually took place in the same period of time.

Step 1: Identify Problem Areas

Different kinds of information coming from various sources confirmed for us that "college prep" and college-level math was a serious problem area throughout the college. (We refer to developmental courses as "college prep" courses at MDC.) Institutional analyses from the late 1990s had shown, for example, that students needing remediation in math, regardless of other remedial needs, had lower rates of college prep completion than students who did not need remediation in math but who did need remediation in both the reading and writing subject areas combined. We also knew that MDC students were having a difficult time passing the mathematics subtest of the College Level Academic Skills Test (CLAST), an important state-wide exam that is commonly used to qualify students for the associate degree or for junior-status transfer in Florida. And we knew that, despite the guidance given by advisors, many students were delaying their enrollment in college-level math courses needed for graduation until the very end of their college tenure. The mathematics pathway was clearly not functioning as it was intended.

Step 2: Gather More Data

We began to look for more information that would help us figure out how best to help students. We began tracking students and found that students who take sequenced developmental math courses without any delays between courses do better than those who sit out one or more semesters along the way. Tracking data also suggested that, contrary to the speculation of some faculty members, curricular misalignment between the three courses in MDC's developmental math sequence was a bigger problem than was flawed placement into developmental courses.

Our analytic findings were compelling for many faculty. Yet we also wanted to include more direct input from students themselves. We therefore held focus groups with developmental math students. The most striking comments heard in these focus groups involved embarrassment about asking questions in the classroom. Many focus group participants, in fact, felt that student

questions were largely unwelcome by their instructors in developmental math courses. This finding had a marked influence on members of the math discipline.

Step 3: Build Forums for Collaboration

By the fall of 2001, a groundswell of interest among key math faculty had grown around the early information we had gathered about developmental math. As a consequence, the vice provost invited math faculty members at each campus to learn about and discuss the data we had collected. The faculty who attended these roundtable discussions were very engaged, and they found the data persuasive. Indeed they asked us to conduct further research (which we did) on questions they felt were important, such as whether there were student outcome differences based on full-time faculty versus adjunct faculty instruction (there were not).

In 2003, the math faculty organized their first annual mathematics retreat to discuss relevant student data and possible interventions based on those data. In this first retreat, the math faculty focused on the issue of curricular alignment. They reviewed the content of the three developmental math courses. They decided to teach fewer competencies in each course and instead examine each associated topic area more deeply. They also redesigned the curriculum of each course so that the competencies taught in each were well aligned in the sequence.
The roundtables and the first annual mathematics retreat spurred some math faculty to explore innovative ideas to promote student success. In addition, the idea of holding discipline-based retreats to discuss student data and student success has since spread to other disciplines and program areas.

Step 4: Share Data Broadly

We also began to share the data we had amassed about developmental math more broadly throughout the college. In order to reach multiple audiences, we share data we collect about student success issues through a variety of venues. For example, we give a data-informed presentation about our student population and about particular challenges that students face at new faculty orientations. And we distribute easy-to-read institutional research summaries and recommendations for action, which are widely read by faculty and by the college and student leadership. The college also utilizes an online executive information system that provides queriable data on student performance and student feedback about instruction. (Nine terms of data are shown for most queries; thus, trends in pass rates, withdrawal rates, success rates, and student ratings are easy to identify.) Another way we share and collaborate is through what we call focused research, in which a group of faculty from a particular discipline work with institutional researchers in constructing research questions about student achievement. Finally, the college has initiated an internal grant process to encourage the development of specific strategies to address issues of concern about student success. Both faculty and student services staff may apply for modest grants. In 2006, 35 different proposals were selected for funding.

Step 5: Identify Strategies

Primarily through the roundtables and retreats described in Step 3, several strategies were identified for improving student learning and student progression in mathematics. Faculty participating in the college's re-accreditation went on to conduct more research on various interventions and then chose ten strategies for the college's Quality Enhancement Plan (QEP), which was reviewed by the Southern Association of Colleges and Schools (SACS) in a 2004 site visit. The goal of MDC's QEP is "to enhance student learning by developing innovative curricular, instructional, support, and assessment strategies in the high risk courses of College-Prep Mathematics, College-Prep Algebra, Intermediate Algebra, and College Algebra." The QEP strategies are: 1) Establish a program of frequent testing; 2) Provide learning prescriptions for students who demonstrate need; 3) Establish mathematics advisement

procedures; 4) Provide supplemental instruction for students repeating college-prep math and algebra; 5) Implement a certified tutor training program; 6) Provide math success skills training for students repeating college-prep math and algebra; 7) Email personalized interim reports to students; 8) Establish a program to incorporate math into other disciplines; 9) Provide math faculty training on accommodating different learning styles; and 10) Upgrade math support labs.

Step 6: Implement and Assess Strategies

We insist that everyone who wants to implement a new improvement strategy at MDC have some kind of assessment plan to test how well that strategy is working. All the QEP strategies, for example, include assessments based on comparisons with historical data, comparisons of experimental and control groups, or comparisons of pre- and post-training ratings. Faculty committees headed by one lead faculty member are in charge of implementing each QEP strategy.

Preliminary results on some of those strategies appear promising. The implementation of tutor training, for example, is associated with more frequent lab use and a modest increase in student satisfaction of math lab tutors. And since the improved math advisement was implemented, a higher proportion of students are taking their first required math course earlier than they did before. Likewise, more students are taking the next math course in their prescribed sequence immediately after completing the prerequisite course.

We have had mixed results with the frequent testing strategy. We encountered some strange findings after the first round of implementation — the strategy seemed to be working for some sections of courses but not for others. We learned that faculty had not been following a consistent method in implementing the strategy. In action that we refer to as "closing the loop"— using implementation results to make changes in how a strategy is carried out — a decision was made to better define and manage how faculty apply frequent testing so that the strategy will be implemented with greater integrity. We also note that "closing the loop" in a series of implementation cycles corresponds to the notion of continuous improvement advocated by SACS and others.

Step 7: Establish Accountability

While MDC's QEP and accreditation reports go a long way in assuring that the initial vigor of improvement efforts endure over time, in 2003 the college also adopted internal accountability requirements for the math discipline as well as for all MDC disciplines, schools, and student service areas. Each of these entities now prepares an annual report in which they articulate how they measure student outcomes. They also report on strategies they are using to improve student success and how, based on data, those strategies are working. The annual reports are an integral part of MDC's strategic plan, which includes additional accountability measures associated with the college's long-term goals.

Step 8: Institutionalize the Process

Annual reporting has become for the college a consistent and reliable method for disseminating information about the status of improvement strategies on a regular basis. The reports are reviewed by coordinating campus deans and presidents, and highlights are shared with the MDC executive committee so that decision makers are kept aware of the key strategies faculty are pursuing, what impacts the strategies are having, and how well these impacts match the strategic plan. Individual reflections about such efforts are also discussed in faculty and staff evaluations, thus emphasizing the importance the college places on promoting student success. Discussion and negotiation in a variety of venues — faculty meetings, executive committee meetings, new staff orientations, among others — is instrumental for institutionalizing the use of data to assess and improve student outcomes.

By incorporating the status of ongoing improvement strategies into standard review procedures such as annual reporting, the whole endeavor is better integrated into the regular functioning of the college.

Conclusion: Lessons Learned

We have learned a great deal in establishing this approach and broadening it for use in disciplines and program and service areas throughout the college. Throughout this report, we show how the use of data is crucial not only for developing appropriate strategies to address problems such as poor student progression, but also for determining if such strategies are effective, and for modifying those strategies when necessary. Several of the most important lessons we have learned so far relate to how data are used and shared.

1) **Start with available data and dig deeper as necessary.** We had long known that developmental math was not working well. We gathered more data so we could make valid assessments and choose appropriate interventions.

2) **Use a variety of measures and methods.** Cross-sectional analyses, longitudinal analyses, and benchmark comparisons can all provide insights. We found that including student voices through focus groups helped us both understand the challenges and garner support for change.

3) **Share, listen, and collaborate with stakeholders.** This is especially important for institutional researchers. Our researchers participate in various meetings throughout the college and try to interact with faculty and staff as interested helpers rather than as auditors.

4) **Establish assessment plans before implementing strategies.** In order to measure the effects of a given strategy, a method of assessment that addresses how that strategy contributes to improved student outcomes must be established beforehand. We found such assessment results crucial in recognizing problems in the implementation of the college's frequent testing strategy.

5) **Channel the enthusiasm for new ideas.** Once core strategies have been established, it is important to ensure that they are implemented and assessed with rigor throughout a complete cycle. Turning too much attention to other ideas that might well hold merit can serve to jeopardize existing efforts.

6) **Integrate innovation with existing college processes.** Whenever possible, MDC personnel used standard review procedures as channels for proposed innovations that required various approvals. Working within the traditional college structure made the whole endeavor easier to carry out.

Introduction

This report tells how Miami Dade College (MDC) is using the interpretation of a variety of data in order to make better-informed choices about the operation of student programs and services. MDC has made a number of changes in an attempt to improve student outcomes across this large, eight-campus college. While the endeavor continues to move forward, some specific strategies relevant to the college's developmental mathematics pathway that were launched a few years ago have begun to show promising results. What is more, the processes that took place in choosing, implementing, and assessing those strategies have to some meaningful extent been institutionalized through college-wide reform. Thus the methods of inquiry and action that have been applied to math are now being used in other disciplines and program areas.

In this report, we elaborate upon a number of "steps" that were taken to improve developmental and college-level math outcomes at MDC, beginning with the identification of math content as a serious area of concern for a large portion of the college's student population. We use the simple term "steps" with some caution, however. While the steps that we name in organizing this report are intended to express a causal chain of actions in terms of progress toward the goal of improved student outcomes, the events we describe are arranged thematically rather than in strict chronological order. Moreover, the steps we discuss should also be considered iterative. They can be, and have been, revisited multiple times in whatever order circumstances demand, forming feedback loops that accommodate new insights or that re-establish relevant facts or collective goals for faculty and staff. The steps are also iterative in the sense that they can be repeated in cycles to make cogent modifications to interventions that have already been adopted or to respond to new challenges. In this way, the steps function like action stages in a model for organizational change.

The eight steps we sketch out are these:

Step 1. Identify problem areas
Step 2. Gather more data
Step 3. Create forums for collaboration
Step 4. Share data broadly
Step 5. Identify strategies
Step 6. Implement and assess strategies
Step 7. Establish accountability
Step 8. Institutionalize the process

Before discussing these eight steps, we set the stage by introducing Miami Dade College and the characteristics of its students. In a final section, we conclude this report by reviewing some important lessons we learned as a result of this undertaking.

We tell this story from the perspective of the Office of Institutional Effectiveness (IE) at MDC. The IE office, made up of twelve staff members, is responsible for institutional research (IR), outcomes assessment, placement and exit test administration, student feedback surveying, and strategic planning. The IE office also provides extensive support for accreditation review.

Miami Dade College and its student demographics

Miami Dade College first opened its doors in 1960 on what is today known as the North Campus, near the Opa-Locka Airport. Originally named Dade Junior College, MDC has grown into the largest institution of higher education in the United States, serving well over 150,000 students per year and employing 8,300 persons in total, including 2,400 faculty members. This state-supported college has eight campuses and offers more that 150 associate degree programs. It maintains more than 50 transfer agreements with colleges in and outside Florida. While the college has, since 2003, begun to award bachelor's degrees in a handful of programs, it still functions primarily as a community college. More than 95 percent of its credit-earning students are Miami-Dade County residents. They pay Florida resident tuition, which is $69 per credit for lower division classes.

College mission and strategic plan. MDC's mission statement focuses explicitly on its students and the surrounding community:

> The mission of Miami Dade College is to provide accessible, affordable, high quality education by keeping the learner's needs at the center of decision-making and working in partnership with its dynamic, multi-cultural community.

MDC's strategic plan focuses on operational aspects

of the college mission. It identifies critical issues and sets long-range goals along five themes: access to the college, student achievement and success, serving the community, resource development and utilization, and employees and the college.

Enrollment. MDC currently enrolls about 158,000 students annually (about 80,000 are credit, degree-seeking students, and about 78,000 are in non-credit programs).

Race/ethnicity and citizenship. About 66% of credit students are Hispanic; 21% are Black Non-Hispanic. About 62% of credit students are U.S. citizens; about 29% have Resident Alien status; and almost 6% are refugees or asylees. MDC's overall student body comes from 182 different countries and speaks 93 languages. The greatest number of non-U.S. citizen credit students hold citizenship in Cuba (6,800), Haiti (2,600), Colombia (2,500), and other Latin American countries.

Gender. About 61% of credit students are female.

Age. The average age of credit students is 26 years. Only 31% are the "traditional" college age of 18-20 years. About 36% are age 26 or older. About 62% of vocational certificate students are age 26 or older.

Socioeconomic status and employment. About 51% of credit students are first-generation college students. Only 30% of credit students have parents who earned bachelor's degrees. The majority of credit students are employed, with 30% working 40 hours per week or more. About 35% of credit students are below the poverty threshold for their household size; about 57% are low income (150% of the poverty threshold). About half the students obtain financial aid in the form of grants, scholarships, loans, or employment.

College goals and part-time status. Most MDC credit students come to college to earn a degree. About 65% of credit students seek an A.A. (transfer) degree; about 24% seek a career oriented 2-year A.S. degree; about 8% seek a credit certificate in short term career programs or are taking courses to upgrade skills or prepare for transfer. About 66% of credit students are enrolled part-time. About 26% of students take most of their classes outside the "traditional" weekday school hours.

Issues that typically face MDC learners

While MDC is by any measure a very large institution, its learners are similar to those in other community colleges. Many MDC students face barriers to achievement associated with academic underpreparation, poor English skills, delayed entry to college, outside priorities such as a job or the care of dependents, and, finally, unfamiliarity with college and the benefits that college credentials provide in meeting career goals. Many students, in fact, face a multiplicity of such barriers.

Inadequate preparation. As in most community colleges, many of MDC's entering students are academically underprepared. Only about 20% of students enter MDC ready for college-level work, as indicated by our Computerized Placement Test (CPT). The great majority (80%) of incoming students need what MDC calls college preparatory courses (outside MDC, they are more commonly known as developmental or remedial courses) or ESL courses before beginning college-level coursework. About 25% of incoming students need remediation in all three basic skills areas — reading, writing, and math. At MDC, our mathematics "college prep" sequence is housed within and taught by the college-wide mathematics discipline. Our reading and writing college prep sequence, in contrast, is taught by a stand-alone college-wide reading and writing college prep discipline.

Weak English skills. About half of MDC students are non-native English speakers. About 20% of students begin in ESL before they take the CPT and move on to developmental or college-level courses. Whether or not they need ESL, many non-native English speaking students are challenged to complete college-level coursework in English. They may speak well, but they may not read or write as well as they should for engaging in course content. Again, this is a problem shared by students at many other community colleges.

Delayed entrance. Most incoming MDC students are delayed-entry students; that is, they have stayed out of school for more than one year before arriving on an MDC campus. Such students have lost momentum in learning, and they may have forgotten more of what they learned in high school than traditional-age students.

Employment and family responsibilities. Just over half of students are from low-income households. Needless to say, this economic insecurity creates worries and disruptions and reduces the time students have to devote to their studies. For many of these students, their first priority is earning enough money to contribute satisfactorily in paying household bills. College is generally not the first priority for them. As they navigate the low-wage labor market, they "fit college in" where they can. About 80% of students work part time; about 30% work full time. In addition, many of these same students have family responsibilities, such as taking care of children or parents. So it is not unusual for students to have a job as well as significant family responsibilities while they are taking classes.

Unfamiliarity with college life. Many low-income students are also first-generation college students. A large number of these students are wholly unfamiliar with college life. They often have poor study habits and lack clear goals for postsecondary education and employment. MDC offers a first-year Student Life Skills (SLS) program aimed at students who need help in addressing these issues. The program includes "student success" courses that teach study skills, time management skills (including the necessity of classroom commitment and of scheduling study time for each class), goal setting, and planning.

A great deal of effort in the SLS program is aimed at having students recognize the value of a college education in terms of the increasing skills and credentials that are needed for today's careers. This exercise is more complicated than simply informing a given student about the advantage of having a degree in the labor market. For a low-income, first-generation student may also receive conflicting messages from respected family members at home. The student might hear that college is something "extra" beyond what is really needed to attain a good job or that college is "not for everyone." The student might also encounter complaints about not contributing enough to pay for shared household expenses. Thus, dispelling the myth that college is frivolous or that college will not "get you anywhere" is not an easy task, especially for students who do not have close ties to anyone who has graduated from college.

First-generation students often need help in making connections to other students and to faculty and staff on campus so that they experience a sense of belonging. Each student in the SLS program develops a strong connection with an SLS faculty member, who serves as advisor and mentor in many cases. This relationship is often fundamental in having students slowly gain confidence and take on the belief they belong at MDC.

The Student Outcomes Improvement Process

Step 1: Identify problem areas

At MDC we have many different ways to look at what the college does well and what could be improved upon in terms of educating students. For example, we have access to longitudinal tracking data with Florida college comparisons, results from the Florida Basic Skills Exit Test and the College Level Academic Skills Test (CLAST), general education outcomes assessments, enrolled student and graduate surveys, transfer student success reports, and anecdotal reports, to name a few.

Core indicators report. One of the most important ways we look for problem areas in student achievement is through our MDC core indicators report, a kind of global report card that was developed in accordance with our college mission in 2003-2004. The core indicators report alerts the college executive committee and the academic and student leadership to situations in which MDC is not doing as well as it should, based especially on data comparisons with other institutions in the state. (MDC uses state accountability measures and participates in the national community college benchmarking project.)

Several different categories of indicators are shown on the core indicators report, including those that address (1) student access (what kinds of students MDC draws from high schools, and whether class locations and schedules are convenient), (2) student affordability (including the average percentage of student family income spent on education), (3) student success and progression (which features many indicators, including data on the proportion of students who complete "college prep" in two years, and how well those same students do in their first college-level courses, as well as retention and graduation rates), (4) success after leaving the college (e.g., transfer student performance and job placement data), (5) student satisfaction, (6) employees and the college (taken from

survey ratings, turnover rates, and training investments), (7) how well the college serves the community (minority participation rates, market penetration, service learning contributions), and (6) the efficient use of resources (including class size, student/faculty ratio, space utilization, grant funding).

Low college prep graduation rate. It was by looking at student success and progression indicators in about 2001 that it became clear to us that, first, MDC's graduation rate was not quite as high as the state average and that, second, MDC's graduation rate for those students needing remediation was not as high as the state average for such students. While our "college ready" rate compared favorably with the state average, our "college prep" rate was slightly lower than the state average. According to subsequent statewide analysis by the Florida Department of Education on the cohort of fall 2001 first-time-in-college students, MDC's overall five-year graduation rate was 23.2 percent, compared to 24.0 percent for the statewide community college system. The MDC graduation rate for college-ready students was 42.5 percent, compared to 40.9 percent statewide. For students who needed some kind of remediation, the MDC rate was 18.5 percent, compared to 18.8 percent statewide. For students who needed remediation in all three areas, the MDC rate was 9.8 percent, compared to 11.7 percent statewide.

Low college prep math program completion rate and low college prep math graduation rate. Armed with this fact, we delved deeper to figure out why it was that MDC students needing remediation faired slightly worse in terms of college completion than students needing remediation at other institutions. We knew that a significant hurdle for MDC "college prep" students was completing college prep in the first place. And the data showed that the college preparatory skills area with the lowest rate of completion was math. This was not a surprise to us. In the late 1990s, institutional analyses at MDC had indicated that college preparatory math was an area of concern. Those analyses had shown that fewer than 30 percent of students scoring at the lowest level on the mathematics placement subtest completed the college preparation program within three years, no matter what their score on the verbal placement subtests. In contrast, 40 percent of students scoring at the lowest level on both verbal subtests (reading and writing) completed the college preparatory program within three years, as long as they were not also deficient in math. (Students scoring at the lowest level on only one of the two verbal subtests had a 52 percent three-year college prep completion rate.)

Analysis by the Florida Department of Education of the graduation rates for various student groups in the fall 2001 cohort also showed differences among college prep program areas: the five-year graduation rate among MDC students needing remediation in math only was 23.3 percent, compared to 37.6 percent for reading only and 37.1 percent for writing only. For students needing remediation in math and one other subject area, the MDC graduation rates were 19.3 percent (math and reading) and 15.5 percent (math and writing), compared with 32.4 percent for students needing remediation in both reading and writing. Clearly, college preparatory math was a problem.

We continued to compare MDC's data to state system data to see if other factors were relevant. We came to realize that part of the reason that we lagged behind the state was that a higher proportion of our students needed remediation in all three skills areas, so MDC students needed more remediation, at least by these measures, than the state average. It is also the case that MDC offers multiple levels of remediation (in math, MDC offers three courses: college prep arithmetic, college prep mathematics, and college prep algebra). We speculated that MDC probably starts students at a lower level of remediation than do some other colleges in the state. This would mean that it takes longer for some of MDC's students to complete college prep and move on to college-level courses compared to students at colleges with fewer levels of remediation. Experiencing a longer delay until the start of college-level courses could affect graduation rates as well.

While student progression and success indicators, which now appear on the core indicators report, were the main sources of data in driving early discussion that identified developmental math as an important problem area that we wanted to focus on, we also had access to other data which were meaningful, some of which were available as much as ten years ago.

Poor sequencing in math course enrollments. For example, our longstanding knowledge of MDC students' frustrating experiences with the CLAST (particularly the

mathematics subtest) provided important clues about difficulties in math, and it guided more analysis about when students tend to take their required college-level math courses during their college tenure. The College Level Academic Skills Test (CLAST) once carried more weight than it does today (there are now curricular alternatives to taking or passing the CLAST). Until the late 1990s, all Florida community college students were required to pass all four parts of the test in order to qualify for the A.A. degree or to transfer as a junior to a four-year college. Attaining the minimum score needed on the math portion of the CLAST was the most significant problem MDC students had with the test. In far too many cases, students were ready in every other way to graduate, but they still had yet to pass the math portion of the CLAST.

The MDC IR office conducted some transcript analyses and cross-sectional analyses to gain more information about this issue. In so doing, we discovered that many students were postponing taking required math courses until the end of their tenure at MDC. Even more troubling, we learned that in some cases in which students needed only two or three more courses to fulfill their graduation course requirements, those two or three courses were, in fact, required math courses that had to be taken sequentially. This meant that students were sometimes required to spend an extra semester or even a year to complete their math courses after having completed all other coursework. This was no surprise to many of our faculty and advisors who struggled to persuade students to take math courses earlier, as these courses were often the ones that caused the most anxiety for students. Clearly we needed to find effective ways to compel students to take college-level math courses sooner in their community college tenure.

Step 2: Gather more data

Having recognized that math was a problem area, and having identified some specific problems that required action, we began to look for more information that would help us figure out how best to help students. State analyses (such as the one discussed above) turned out to be helpful, as were student focus groups that we conducted on several MDC campuses. At the same time, much of what we continued to look at was more student progression and success data.

It is worth noting that while the collection of these data took place before we began to meet in broad collaboration with faculty in formal meetings, this complex set of undertakings did not occur in isolation. It took place in consultation with academic deans and faculty members and, in particular, with key faculty from the math discipline. The fact that the gathering of data was a shared effort on the part of both institutional researchers and representatives of this academic discipline is very important. Not only was the cross-fertilization of knowledge and ideas useful, but the fact that we engaged in a collective and open effort meant that there was never a time when results were "unveiled" for an unwitting faculty. Rather, faculty members were integrally involved in formulating research questions and in learning from the findings as the data emerged.

High risk courses. For nearly ten years we have been identifying what are sometimes called "high risk" or

Table 1
High Risk Courses, Fall Term 2003

Course		Enrollment	Pass Rate
BSC 1005	Principles of Biology 1	1,883	59.7 %
LIT 2120	Survey of World Literature	663	59.3 %
CHM 1025	Introduction to Chemistry	692	59.2 %
BSC 2085	Human Anatomy and Physiology	2,147	59.1 %
ACG 2021L	Financial Accounting Lab	1,049	58.9 %
MAC 2311	Calculus and Analytical Geometry 1	442	57.5 %
MAC 1105	College Algebra	4,665	53.8 %
MAC 1140	Pre-Calculus Algebra	516	51.9 %
GLY 1001	General Education Earth Science	603	51.1 %
ANT 2410	Introduction to Cultural Anthropology	322	50.6 %
MAT 1033	Intermediate Algebra	5,979	50.1 %
MAT 0002	College Preparatory Arithmetic	1,706	49.9 %
MAT 0024	College Preparatory Algebra	2,414	48.7 %
MAT 0020	College Preparatory Mathematics	4,106	47.1 %
MAC 1114	Trigonometry	409	42.8 %

Notes: The *pass rate* is equal to the number of A, B, C, and S (satisfactory) grades divided by the total number of all grades, including withdrawals.

"gatekeeper" courses at MDC. We define these as large-enrollment courses that have a pass rate that is significantly lower than the average pass rate at the college. We identify high risk courses each year and show the results to the college leadership and faculty. In 2003 we identified 15 high risk courses (see Table 1). Eight of these courses were in the math discipline, and they included all 3 of the college prep math courses.

Table 2
Comparison of Pass Rates of Students Who Enrolled in a Course Immediately After Passing the Prerequisite in the Previous Term and Those Who Delayed (Spring Term 2002)

Course	Immediately	Delayed One Term	Delayed Two Terms
MAT 0024 (from MAT 0002)	38 %	29 %	20 %
MAT 1033 (from MAT 0020)	46 %	32 %	29 %
MAT 1033 (from MAT 0024)	53 %	35 %	33 %
MAC 1105 (from MAT 1033)	57 %	50 %	50 %

More recently, we have begun to ask more pointed questions about high risk math courses: Are students being placed into them without adequate preparation to be successful? Are students coming out of a prerequisite course without having gained competencies to succeed in the next "high risk" course in the sequence?

We began tracking students to see what level of math remediation they start in, how they progress, and what percentage of them in each cohort completes the math requirements they need for their degree (generally two college-level math courses) within three years. Using such tracking data, we are able to see where and to some extent why we lose students along the mathematics pathway. Are we losing students after the first remedial course they take because they did not pass that course? Or are we losing them after the first course because they did not enroll in the second course in the sequence? Or are we losing them because they took but did not pass the second course?

Immediate versus delayed progression. Much of our progression and success analysis focuses on course sequencing and the effects of taking breaks in such sequences. We can compare the pass rates for immediate versus delayed progression. For example, we looked at how much of a difference it makes if, after taking the first developmental math course, students sit out one or two semesters or longer before enrolling in the next course in the sequence. We found that it makes a considerable difference (see Table 2). If students take sequenced developmental math courses without any delay, they do better. While this result is not a big surprise — skills and concepts learned for the first time in one course might be forgotten if the next course that utilizes them is delayed for very long — it is an important finding that we have verified and passed along to our faculty and advisors so they can better persuade students enrolled in developmental math to complete the sequence in consecutive semesters.

CPT efficacy and curricular alignment. We can also make another kind of comparison using progression analysis. We can learn what percentage of those students who made an immediate (rather than delayed) succession to their second developmental math course actually pass that second course compared to those students who were placed, by virtue of the CPT, directly into that second course.

This comparison is important at MDC because some of the faculty believed that the passing scores on the CPT were not set correctly, and that students were being placed into math courses for which they were not truly prepared. But, in fact, when we looked at the results of progression analyses, we saw that the students who tested into the second level developmental math course actually did better than those who came up through the prior developmental course (see Table 3, next page). This means that a different issue is at play than what some faculty suspected. The greater problem involves not the CPT but rather how students progress between levels of developmental math. The data suggest that there may be some curricular misalignment in the developmental sequence, because many students who come out of the first developmental math course appear inadequately prepared for the next course.

State system research on SLS courses. State analyses have also provided us with useful information. In particular,

Table 3
Comparison of Pass Rates of Students Placed by the CPT and Those Who Passed the Prerequisite (Spring Term 2002)

Course	Placed by CPT Scores	Passed Prerequisite Prior Term	Gap (Difference)
College-Prep Algebra (MAT 0024)	65 %	38 % (from MAT 0002)	27 %
Intermediate Algebra (MAT 1033)	60 %	46 % (from MAT 0020)	14 %
Intermediate Algebra (MAT 1033)	60 %	53 % (from MAT 0024)	7 %
College Algebra (MAC 1105)	76 %	57 % (from MAT 1033)	19 %

the Florida state system's study of Student Success courses (which are called Student Life Skills, or SLS, courses in Florida) has helped us to better target subject area deficiencies. Using longitudinal student data, the state's analysis (Florida Department of Education, 2006; see also Zeidenberg, Jenkins, & Calcagno, 2007) found that SLS courses do, in fact, boost outcomes of students who do and who do not place into college prep. The state's researchers also broke their results down by subject area to see if SLS courses were just as helpful for students needing remediation in math as they were for students needing remediation in reading or writing. They found that SLS was not as helpful for developmental math students as it was for others.

This fact supported a decision the college had made in 2002 to develop a linked course option in which students taking a developmental math course also enroll in an SLS course during the same semester. The curriculum of these two courses is connected in an attempt to make the SLS content more relevant to college prep math students. For example, when the theme in the SLS course is effective test-taking strategies, instructors use examples from the math course to teach those strategies. (Early indications are that these two courses really do support one another, leading to improved progression and success in developmental math. For example, pass rates for several linked mathematics courses that were evaluated in 2004 were 10 or more percentage points higher than the same course taught on the same campus with approximately the same number of students without the link to the SLS course. Similarly, re-enrollment rates for the following term were 5 or more percentage points higher for students in the linked mathematics classes.)

Student focus groups. Another important way we gained understanding was by conducting focus groups with developmental math students in 2001. (Given the value of what we learn from focus group discussions, we have conducted numerous focus groups with other kinds of students since that time.) As described in this report, a picture based largely on numerical data was already emerging before we held these first focus groups: Students in need of math remediation do not do well in either developmental math or in college-level math courses; they tend to put off enrolling in math courses because they find them frustrating; they take breaks in between required math courses; and the developmental courses themselves are probably not aligned as well as they could be. Yet we also wanted to hear what students had to say about developmental math instruction and available support services.

We convened groups of developmental math students and asked questions such as these: What is helping you in these math courses? What are the instructors doing that is helpful? What are they not doing that would be helpful? Do you feel you are adequately prepared for each math course? Did the CPT put you in the right place? What do you think is important for success in these courses?

We heard a great deal from students. The most striking thing students told us — something that we now emphasize as a key point in new faculty orientation meetings — is how extraordinarily important it is for them to feel comfortable when asking questions in class. Many students reported feeling embarrassed when asking questions. They also reported feeling that their questions were not welcomed by instructors. Indeed, some students perceived that instructors gave the impression that if students do not already understand some basic concept relevant to a lesson, they should not even be in the class, let alone asking questions. Whether or not instructors actually meant to impart this impression, the students' perceptions of the dynamic is nonetheless meaningful and important. It is easy to see how this perceived dynamic could thwart student engagement in classroom learning.

Students in those first focus groups also told us that attendance is very important for success in developmental math courses because it is remarkably easy to "fall behind." Some noted that missing only one or two classes can mean having to struggle intensely to catch up. Unfortunately, missing an occasional class is not uncommon for students who have significant work obligations outside college; their scheduled work hours, we learned, are sometimes extended by employers with little or no warning to meet unexpected demands.

The students also told us that it would be helpful if faculty allowed students to work through some of their "homework" problems in class so that they could receive more guidance or get specific questions answered that might otherwise arise later in attempting to work through problems alone. Finally, the students noted that they found the math support labs to be very helpful, but thought the lab tutors could be more knowledgeable.

Step 3: Create forums for collaboration

Discipline-based roundtables and day-long discipline retreats with math faculty became the original major venues for sharing the data we were collecting and for collaborating with math faculty as a discipline. It is important to recognize that there was a broad overlap in terms of the gathering of data described in Step 2 and the sharing of data we describe below. Many activities and events discussed in Steps 2 and 3, and even Step 4, actually occurred during the same period of time.

Roundtables. By the fall of 2001, a groundswell of interest among key math faculty had grown around the early information we had gathered about developmental math. The vice provost for education therefore called together the math faculty in the first of a series of roundtable discussions. The vice provost invited faculty members at each campus, some of whom had not been involved with us at all, to learn about and discuss the data we had thus far collected. By this time, it was not difficult to persuade the faculty about the importance of our work. Throughout the college it was widely believed that achievement in the developmental math and early college-level math pathway was the single greatest challenge that our students faced on the road to graduation. Indeed the math faculty were probably growing weary of hearing that "problems in math" were a principal reason why MDC students were not succeeding in greater numbers. The math faculty who attended the roundtables were thus very willing to hear about our findings and to discuss what steps should be taken in light of this evidence.

We were also pleased that the data we shared in these first formal discussions were found to be persuasive among the attendees. Not only did the faculty accept the validity of the findings, they asked us to conduct further research on questions that they felt were important, which we did. For example, they asked us to find out whether students taking courses taught by full-time faculty had better outcomes than students taking courses taught by adjuncts. (This did not turn out to be true.) They also wanted to see more analysis related to placement testing procedures. For example, they were concerned that taking a practice test and "brushing up" prior to taking the CPT resulted in course placements that were too high for students' skill levels. (This also did not turn out to be true.) Finally, faculty wanted to review the success rates for students who were repeating math courses for the second or third time to see if they continued to struggle. (Analyses showed they did.)

The findings that spawned the most conversation among faculty at the roundtables were those that came from the developmental math student focus groups, and in particular the finding about how students perceived instructor attitudes about in-class questions. Many faculty were astonished that students "don't think we want them to ask questions," and some were initially incredulous. Yet it is likely that upon reflection this finding strongly affected the faculty. Some faculty members reported that they could imagine how some instructors — and perhaps even they themselves at times — might come across in the way that these students perceived. Including the student voices in the data we shared undoubtedly made a strong impression on the faculty.

Annual retreats. In 2003, the math faculty organized the first mathematics retreat in order to take a closer look at curricular alignment in the developmental math sequence and to confer about related matters. Their discussions resulted in action to improve the content of the developmental courses. They decided to teach fewer competencies in each course and instead explore each of the associated topic areas more deeply. They also redesigned the curriculum of each course so that

the competencies taught in each were well aligned in the sequence.

In the months that followed both those first roundtables and the first retreat, a number of math faculty who had attended became much more enthusiastic about making changes that would help students along the mathematics pathway. In subsequent years, these faculty have organized and held annual discipline-wide retreats to discuss problems, strategies, and the results of actions taken. They have helped to push strategies forward and to elicit greater interest on the part of their colleagues and especially new faculty. Institutional researchers provide data to support discussions and attend these annual retreats. We share whatever new institutional data we have, including data that speak to how well their strategies are working.

Since the launch of the annual math retreats, math faculty have begun to explore innovative ideas to promote student success. For example, after the first retreat, a few faculty who teach algebra decided that students might do better if they interacted with each other more deeply in problem-solving. These faculty replaced the desks in their classrooms with round tables, and they introduced a great deal of project-based instruction during classtime. Students were obliged to face each other and discuss how to work through problems, resulting in a more collaborative atmosphere in the classroom.

The idea of holding retreats to discuss student data and possible interventions based on those data has begun to spread to other disciplines and program areas. The ESL discipline and the nursing area have each held a retreat, and the college prep discipline (for reading and writing) is planning one in the near future. In addition, all disciplines hold a discipline meeting at least once per term. And each year they spend part of a professional development day in discipline discussions, which typically focus on student data and student improvement issues.

Step 4: Share data broadly

By 2003, we had learned a great deal about issues relevant to the developmental math pathway. Having gathered so much relevant data, we began to share it more widely with faculty college-wide. The IR office shares data in different ways, ranging from hard-copy and web-based distribution of research findings to PowerPoint presentations and face-to-face discussions with faculty in a variety of venues.

New faculty orientations. One such venue is new faculty orientations. In these orientations, we use data to provide an overall picture of our student population as well as to point to particular areas of concern. We use data to tell incoming faculty about what we see in terms of the students' greatest challenges and what the faculty's role might be in helping them meet those challenges. In the past few years, a portion of each orientation has been dedicated exclusively to developmental math. This is due both to the concern about developmental math already described and to the related fact that the faculty chose four high risk courses from the developmental math and early college-level math pathway as the topic for MDC's Quality Enhancement Plan (QEP), a college-wide faculty-led plan for improving student learning that the college developed in its last round of accreditation by the Southern Association of Colleges and Schools (SACS) (the site visit was in 2004). More about the college's QEP and SACS accreditation is described below.

Hard-copy and computer-based IR reporting. We also disseminate IR findings to the appropriate audience of college employees and others in the form of reports and briefing packages. Figure 1 shows an example of how student progression data are displayed in an MDC briefing package. These packages are prepared annually for each campus and the college with information that the presidents and leadership teams are most likely to need. IR findings are also disseminated through "capsules" and "spotlights" — very short, easy-to-read summaries of research findings and recommendations for action, which are widely read by faculty and staff as well as by the college and student leadership. In addition, we maintain an easy-to-navigate IR website, where faculty can go to get more detailed information about IR studies, including a page devoted to "focused research" specific to disciplines and programs (discussed below).

The college also utilizes an online executive information system, which includes a feature that provides queriable current and historical data on student performance and on student feedback about instruction. This system may be more well-developed at MDC than similar systems at other community colleges. It presents different levels of

Figure 1
Sample of Data on Student Progression Displayed in an MDC Briefing Package

How well are MDC students progressing through Math courses?

MAT 0002 Enrollment and Pass Rates				Successful Students' Progression to MAT 0024				Success in MAT 0024			
Fall 2003-1	Fall 2004-1	Fall 2005-1	Fall 2006-1	Spring 2003-2	Spring 2004-2	Spring 2005-2	Spring 2006-2	Spring 2003-2	Spring 2004-2	Spring 2005-2	Spring 2006-2
1,706	1,883	1,834	1,736	631	577	608	603	220	222	193	240
49.9%	41.3%	44.2%	44.8%	74.1%	74.2%	75.1%	77.5%	34.9%	38.5%	31.7%	39.8%
							Direct Placement Success:	62.9%	61.1%	56.2%	56.2%

The MAT 0002 pass rate improved slightly.

Progression to MAT 0024 increased.

Success in MAT 0024 increased, but lags direct placement students.

MAT 0020 Enrollment and Pass Rates				Successful Students' Progression to MAT 1033				Success in MAT 1033			
Fall 2003-1	Fall 2004-1	Fall 2005-1	Fall 2006-1	Spring 2003-2	Spring 2004-2	Spring 2005-2	Spring 2006-2	Spring 2003-2	Spring 2004-2	Spring 2005-2	Spring 2006-2
4,106	4,262	3,922	3,830	1,572	1,601	1,424	1,246	812	784	641	665
47.1%	46.9%	45.6%	39.1%	81.2%	80.1%	79.6%	83.3%	51.7%	49.0%	45.0%	53.4%
							Direct Placement Success:	64.5%	61.4%	64.2%	64.2%

The MAT 0020 pass rate decreased.

Progression to MAT 1033 increased and is high.

Success in MAT 1033 increased, but lags direct placement students.

detail according to the needs and authority of particular users. Faculty have access to a variety of data relevant to their own courses. They can, for example, find grades and other data for their courses in any previous term. Nine terms of data are shown for most queries. Thus, trends in pass rates, withdrawal rates, success rates, and student ratings are displayed prominently so faculty can quickly see the effect that innovative strategies or curricular changes may have on student success in their courses.

Chairs and academic administrators can use this system to view pass rates and other data for courses and individual faculty members. Having access to such an easy-to-use, powerful system allows for useful comparisons. If, for example, a faculty member is doing something innovative in teaching a course, the success rate in her course can be compared with that of the same course taught by other faculty. The information management system is geared primarily to the college leadership, and it is heavily used. While it does not track individual student data, it can yield results based on class- or faculty-level data. It also gives information on enrollments (including the mapping of enrollments by ZIP code), student feedback results, faculty productivity, and program review data.

Focused research. Another way we share data is through focused research, in which a group of faculty, usually from a particular discipline, work with IR researchers in formulating research questions about student achievement. Our experience with focused research first began, again, with the math discipline. Typically in focused research, IR researchers approach faculty with a suggested list of questions that we believe would help them systematically explore a topic that affects their students' success. The list is refined with input from discipline faculty to best identify student challenges and successes. Several questions included on the original focused research agenda for mathematics were: "How well are students performing in each course based on placement score ranges?"; "Which courses are students having the most difficulty passing and what are the success and withdrawal rates?"; "How are students who are repeating the course performing compared to students taking it for the first time?"; "How many students pass a college-level math course within two years and what is the progression path?"; and, "What special projects are being implemented to enhance success and are they working?".

Over the past two years, it has become increasingly common for campus departments or college-wide disciplines to approach the IR office (rather than vice versa) with questions that may spawn focused research. If more than one campus department in the same discipline begins to ask similar kinds of questions, we sometimes encourage all campuses to collaborate on a proposed research agenda. For example, we recently received questions from several campus science departments about how students who took introductory science courses perform later in advanced science or nursing courses. Instead of pursuing each question that was posed piecemeal, faculty from the entire science discipline convened with IR researchers to formulate a cohesive set of research questions about how introductory science courses impact the progression and

success of science students. Over the past several years, we have found that focused research is an effective means to involve faculty ideas in college-wide research.

Internal grants. In 2001, MDC initiated an internal grant process to encourage discussion of student success and the identification of specific strategies to address issues of concern. Faculty apply for Learning Innovations Grants; student services staff apply for Student Services Innovations Grants. Applicants submit a proposal on a problem they want to address, what strategy and actions they plan to take, what outcomes they hope to achieve, how they will evaluate results, and how much money they will need. A panel reviews applications and chooses the most promising ones. Participation in these grants has increased dramatically. In 2006, 20 Student Services proposals were selected, including one on providing supplemental instruction in mathematics for targeted groups and one on mentoring. The 15 Learning Innovations Grants recently funded include one that offers a "Mathematics Problem-of-the-Week" contest and several involving learning communities.

Step 5: Identify strategies

Primarily through the roundtables and retreats described in Step 3, several strategies were identified to improve student learning and student progression along the developmental/early college-level math pathway. Faculty began to implement some practices based on these strategies before the college began formal discussions in 2003 to develop a QEP for the college's SACS accreditation review that occurred a year later. Indeed some of the strategies piloted early on led to more formalized QEP strategies. (It is also the case that enthusiastic faculty continue to pursue strategies in addition to those included in our formal QEP.) While our initial investigation of developmental math took place before we devised our QEP, the processes set in motion by the QEP, and the fact that these processes and their results would impact the status of future accreditation reviews, served to strengthen the resolve of MDC faculty, staff, and leadership to seek out long-term strategies for improving student success in high-risk mathematics courses.

The SACS Quality Enhancement Plan. MDC and all other SACS-accredited colleges are now required to develop and use a QEP. SACS established the QEP framework as a requirement for re-accreditation in order to facilitate continuous quality improvement at all its participating institutions. A college creates a QEP based on a faculty-led, comprehensive analysis of the effectiveness of each college's student learning environment and the overarching college mission. Through this analysis, the faculty identify a topic associated with student learning that they want the college to focus on. Based on this topic, the QEP is used to chart a course of action for institutional improvement based on data-driven decision making steps. In subsequent years, each college is expected to show evidence establishing that improvement has occurred.

MDC's Quality Enhancement Plan. Consistent with our ongoing investigations, MDC faculty chose to address low student success in high-risk developmental and college-level math courses as the topic of MDC's QEP, which is titled *Student Success at Miami Dade College: The Mathematics Connection* (Miami Dade College, 2004). The specific goal of our QEP is "to enhance student learning by developing innovative curricular, instructional, support, and assessment strategies in the high risk courses of College-Prep Mathematics, College-Prep Algebra, Intermediate Algebra, and College Algebra." (p. 1). The period of implementation for the QEP is from 2004 through 2008. A 38-member QEP team, which included 10 math faculty, 10 faculty from other disciplines, student services personnel, chairs and deans, and students, was then selected.

Once we entered the QEP process, faculty committees were formed to write analytical reviews of relevant research and to visit other colleges engaged in strategies of interest. The faculty then presented several strategies that they wanted to try — linked courses (similar to the "math across the curriculum" approach), improvement of math advisement, and math lab tutor certified training, among others.

Frequent testing strategy. One important strategy they wanted to try was establishing frequent testing in high-risk math courses. The selection of this strategy was based on research for the QEP as well as by internal college data. Students in the focus groups had previously highlighted that attendance is critically important in math courses and that falling behind can occur quickly. Some students felt

that having more frequent tests would be helpful to reinforce and confirm that they really understood prior instruction.

Faculty accepted that idea and while conducting research for the QEP discovered that other institutions had found frequent testing to be useful in providing regular, consistent feedback to students and, ultimately, in improving outcomes. The math faculty also conducted a pilot program of frequent testing in a high risk math course on MDC's Kendall campus. In that pilot program, about 200 students were randomly selected to attend sections of Intermediate Algebra in which 15 short tests — in place of the more traditional 4 longer tests — were administered throughout the term. This "experimental group" had better pass rates, success rates, and withdrawal ratios than did those students in the "control group," which consisted of about 200 students who attended sections of the same course in which the 4 longer tests were administered (see Table 4).

Table 4
Pass Rates, Success and Withdrawal Ratios
for the Frequent Testing Pilot Conducted in Spring Term 2004

Group	N	Pass Rate	Success Ratio	Withdrawal Ratio
Control	200	0.545 = 54.5 %	0.686 = 68.6 %	0.205 = 20.5 %
Experimental	205	0.648 = 64.8 %	0.751 = 75.1 %	0.137 = 13.7 %

Notes: The *success ratio* is calculated by adding the total number of A, B, and C grades and dividing by the total number of all grades minus the number of withdrawals, i.e., Success ratio = (A+B+C) ÷ (all grades - withdrawals). The *withdrawal ratio* is calculated by dividing the number of withdrawals by the number of all grades, i.e., Withdrawal ratio = (withdrawals) ÷ (all grades). Since the pass rate is equal to the number of A, B, and C grades divided by the total number of all grades, including withdrawals, it follows that Pass rate = (1 – withdrawal ratio) × (success ratio).

Ten QEP strategies. MDC's QEP identified a total of ten strategies, along with assessments for each (Miami Dade College, 2004, pp. 59-60).

1. Establish a program of frequent assessment (assessment by comparing with historical data).
2. Provide learning prescriptions for students who demonstrate need (assessment by comparing experimental and control groups).
3. Establish mathematics advisement procedures (assessment by comparing with historical data).
4. Provide supplemental instruction for all students repeating college prep mathematics or college prep algebra (assessment by comparing experimental and control groups).
5. Implement a CRLA-certified tutor training program (assessment by comparing pre- and post-training ratings).
6. Provide math success skills training for all students repeating college prep mathematics or college prep algebra (assessment by comparing experimental and control groups).
7. Send personalized interim progress reports to students through their email accounts on file with the college (assessment by comparing experimental and control groups).
8. Establish a program to incorporate math into other disciplines (assessment by comparing experimental and control groups).
9. Provide math faculty training on accommodating different learning styles (assessment by comparing pre- and post-training ratings).
10. Upgrade the math support labs (assessment by comparing pre- and post-training ratings).

Interest of other disciplines. It is interesting to note that in the past few years, the systemic and data-based approach to improvement that was undertaken in math has been spreading to other disciplines and programs. The math faculty, who in years past had to endure significant negative attention, are now seen as innovative and progressive by other faculty who are calling on their own disciplines to engage in the same kind of systematic methods for improving curriculum, pedagogy, and supports for students in their courses and programs.

Step 6: Implement and assess strategies

We insist that everyone who wants to implement a new improvement strategy at MDC have some kind of assessment plan to test how well that strategy is working. To facilitate appropriate assessment, we strive to make the IR office very accessible to the faculty. We often get queries from faculty who want our input as they pilot new programs. The IR office helps create assessment tools for interventions of all kinds. We consult, for example, with all the Innovations Grant awardees to make sure that they have good evaluation

plans in place and to ensure that data they may require from the IR office for their assessments are ready when they need them.

Leading QEP implementation. Faculty committees headed by one lead faculty member are in charge of implementing each strategy described in our QEP. Having faculty, as opposed to administrators, in charge of implementation is helpful in gaining cooperation from others and in maintaining the QEP as a faculty-driven plan. We have found, however, that it is also important for the lead person to possess the authority to make things happen. Some faculty are unaccustomed to or uncomfortable in performing the tasks that are required by this role, such as asking for additional funds when needed or directing other faculty. This has contributed to inconsistent implementation of some strategies.

We are currently trying to find ways to help faculty committee leads fulfill their demanding roles. And we have recently hired a faculty member to be in charge of implementation of all QEP strategies. Released from her teaching responsibilities, she will be working with the IE office, the QEP oversight committee, and the math faculty to help ensure that the QEP strategies are implemented and evaluated as they were intended.

Preliminary results. For several of the QEP strategies undertaken, we have preliminary results about their impacts. For example, the implementation of tutor training has shown improvements in lab usage and in the helpfulness of the math lab tutors. Student surveys conducted in 2006 before and after training indicate that the lab usage rate increased by 7 percentage points (from 84% to 91%). And the frequency of daily or near-daily lab use by students increased by 5 percentage points (from 36% to 41%). While student satisfaction ratings of tutors were generally high before the training, ratings on two specific items increased by 3 percentage points: 1) the tutor was knowledgeable about the technology available in the lab (increased from 95% to 98%) ; and 2) the tutors were able to provide related information and/or suggestions about study techniques, note-taking skills, etc. (increased from 89% to 92%).

Regarding improved math advisement, a higher proportion of students are taking their first required math course earlier and in their first term than before the strategy was implemented. College-wide, 79 percent of students took mathematics during their first term in 2006 compared with 70 percent in 2003. Likewise, more students are taking the next math course in their prescribed sequence immediately after completing the prerequisite course. For example, 77.5 percent of students took MAT 0024 immediately after completing MAT 0002 in spring 2006 compared with 74.1 percent in 2003, and 83.3 percent took MAT 1033 immediately after completing the prerequisite in 2006 compared with 81.2 percent in 2003. (These results are shown on page 15 in Figure 1, which is an excerpt from an MDC briefing package.) As described below, we have had mixed results with the frequent testing strategy.

Implementation integrity. We have come to find that implementation integrity is very important. Our experience with the frequent testing strategy made that very apparent. When we first began to implement frequent testing in four high-risk math courses throughout the college in 2004, most faculty were enthusiastic. Many faculty agreed to incorporate the strategy, and instructors for the courses claimed to be using it once the term was underway. Yet during our first round in evaluating the associated course outcomes of students, we encountered some strange results. The strategy seemed to be working for some sections of the courses but not for others. For example, pass rates were higher for half of the frequent testing sections of MAT 0020 in 2005 (two were significantly higher). For MAC 1105, pass rates were significantly higher in six of the frequent testing sections, while five were significantly lower. The results we observed were so odd that we began to ask instructors for more specific information about how they were, in fact, implementing frequent testing.

As it turned out, the faculty were not following a consistent method in implementing the strategy. Some instructors were incorporating ten additional tests in their sections while others were adding only four or fewer additional tests. Equally important, while some instructors discussed the results of the tests with their students in great detail, other instructors engaged in little review of the results. Thus the frequent testing strategy was not implemented with great integrity in the first round.

We have experienced a similar problem in the implementation of other strategies. Learning

communities, for example, is an intervention that has been adopted by several disciplines. Yet some faculty who claimed to be involved in learning communities have not really integrated the curriculum of the linked courses. Nor have their participating students met to discuss themes common to the two courses, which would be expected in a learning community environment. It seems that we have a wide variety of linked courses and learning communities. Understanding the differences between them is important to assessment of the strategy.

Continuous improvement. We refer to the final aspect of implementation assessment as "closing the loop." It is a key feature of the overarching student outcomes improvement process. When results are obtained about how well a strategy is working, those results should then be used to shape how that strategy can be improved. Once we had some results on the frequent testing implementation, for example, we were compelled to act on that information. We used the results of the first round evaluations to help decide how to change the implementation to make it more effective. It is easy to see how "closing the loop" in a series of implementation cycles corresponds to the notion of continuous improvement advocated by SACS and other accreditation agencies.

Step 7: Establish accountability

It is easy to get excited by new interventions and reforms aimed at improving the quality of education for students. After the implementation of new practices has begun, however, it is also easy for faculty and staff to lose focus as they get overwhelmed by other responsibilities and projects. We wanted to be certain that the initial vigor of MDC's improvement efforts would be maintained over the long run. While the college's QEP and accreditation reports go a long way in assuring that this happens, in 2003 the college also adopted internal accountability requirements for all MDC disciplines, schools (collections of allied programs, such as the School of Allied Health), and student service areas.

Annual reports. Each of these entities must prepare an annual report in which they articulate the purpose of their discipline, school, or area and what their expected outcomes are for students enrolled in their courses and programs. They must also tell how they measure such outcomes. Finally they report on the strategies that they are using to improve outcomes and how well, based on data, those strategies are working.

Each annual report is then given to a campus dean for review. At MDC, one designated campus is responsible for the college-wide coordination of a particular discipline. For example, the Kendall campus is responsible for the math discipline. So the dean of the Kendall campus reviews and may make suggestions to the math discipline's annual report before that report goes to the campus president for final approval. Each report then goes from the campus president's office to the IE office, where it becomes part of our documentation on college improvement. The college's institutional effectiveness committee reviews the reports and provides feedback to each discipline.

Strategic plan. The annual reports are an integral part of MDC's strategic plan, which includes additional accountability measures specific to the college's long-term goals. One of five themes in the MDC strategic plan focuses on barriers to student success and following data-driven processes to identify and address particular challenges. The same theme includes objectives related to the assessment of institutional interdisciplinary learning outcomes. Strategic plan measures and associated data speak to how well the college is meeting its goals.

Step 8: Institutionalize the process

In this paper, we have already described methods that are used to share knowledge of what strategies are underway and how well they are working. The strongest of these methods in terms of campus-wide dissemination among decision makers with the most authority is probably the annual reporting process. As we have stated, all the information in the annual reports is reviewed by each coordinating campus dean. Highlights are then shared with the MDC executive committee so that everyone is aware of the key strategies that faculty are pursuing, what impacts the strategies have had, and how they match with the college's strategic plan.

Venues that support institutionalization. Sharing such information also encourages others to get involved and, ultimately, to institutionalize the process of systematic

change. In addition to regularly scheduled meetings and retreats already discussed, faculty also participate in a professional development day once a year. In the morning of this day, concurrent sessions are held in which faculty members may present improvement strategies they are undertaking. During these sessions faculty often showcase the successful strategies they have implemented and the results they have achieved. In the afternoon of the professional development day, discipline discussions take place. These have proven to be good venues for sharing and learning for faculty from the same discipline who reside on different campuses. For the future, the college will be developing a "faculty institute" in which faculty can get more involved in the study and evaluation of teaching and learning practices within their discipline, including those practices impacted by the specific strategies they are pursuing.

Faculty and staff evaluations. All these venues provide for informal and formal conversation among administrators and faculty that is instrumental for the institutionalization of student outcome improvement strategies as discussed in this paper. Finally, faculty and staff evaluations also play a role in soliciting support for this kind of college improvement. During evaluation reviews at MDC, faculty, staff, and administrators are asked to identify personal goals and to reflect on how their work advances the goals of their discipline, the QEP, the strategic plan and the mission of the college. By including this line of discussion in faculty and staff evaluation reviews, the college emphasizes the priority placed on strategic goals and on the improvement of student outcomes.

Conclusion: Lessons Learned So Far

As we have strived to make clear throughout this report, the use of data is crucial not only for developing appropriate strategies to address problems such as poor student progression, but also for determining if such strategies are effective, and for modifying them when necessary. We have found that sharing data with stakeholders throughout the college also helps to establish a "culture of inquiry and evidence" in which such data become a focus for discussion and action about student learning and achievement. Many of the lessons we have learned over the past several years are associated with how student data is utilized throughout the college. These lessons represent for us the key points to keep in mind for supporting institutional change that increases student success.

Start with available data and dig deeper as needed. Although the root causes may not be adequately understood, at many community colleges, key problems that thwart student success are probably well-known. At MDC, we knew that the developmental math pathway was not working well. By gathering more data related to that problem, discussions and useful disagreements arose that helped us better diagnose causes and choose interventions. The availability of additional data also helped to generate more interest in improving the situation.

Use a variety of measures and methods. Different kinds of data can be useful in gaining insights. Cross-sectional analyses are useful and generally easy to conduct. Longitudinal cohort analyses can indicate where particular groups of students encounter difficulties. Benchmark comparisons can help a community college understand its strengths and weaknesses vis-à-vis like institutions. At MDC, we found that allowing student voices to be heard through student focus group data was very important in understanding challenges in the developmental math pathway.

Share, listen, and collaborate with stakeholders. Communicating openly is very important for institutional researchers. At MDC, we encourage people to call and tell us if they think we are analyzing data poorly or if we are producing errors in our reports. By doing so, we can learn if we have made mistakes. And if through dialogue and investigation we learn that we have not done so, then the issue of possible error can be eliminated, and users of institutional data can better trust our results. MDC institutional researchers also participate in faculty meetings throughout the college. By participating in meetings of faculty and staff, researchers act more as "insiders" and helpers rather than as "auditors."

Establish assessment plans before implementing strategies. In order to understand if and how well a strategy is working, a method of assessment must be established before implementation begins. Appropriate assessment plans are necessary to determine if a strategy is working and whether or not modifications

should be made after it has been implemented for one or more cycles. At MDC, the assessment of the college's frequent testing strategy alerted us to the fact that the strategy was not being implemented as designed by all instructors. The implementation was therefore modified to promote greater implementation integrity.

Channel the enthusiasm for new ideas. Faculty are very creative, and once momentum for improvement builds, faculty may continue to develop new ideas to help students after core strategies have already been established. This is, of course, not to be discouraged. But it is important that the enthusiasm for new interventions does not interfere with the implementation or evaluation of strategies that are already underway. At MDC, we reminded faculty who wanted to implement additional strategies after our QEP was finalized that we may first want to see how well those QEP strategies are working.

Integrate innovation with existing college processes. To the extent that it is possible, working within the existing institutional structure is often easier than establishing new or separate processes. At MDC, we tried to incorporate our student outcome improvement strategies into the regular functioning of the college. We used the standard review processes associated with the strategic plan, the core indicators report, and annual reporting as channels for proposed innovations that required different kinds of approvals. For the most part, we worked within the established college-wide structure.

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