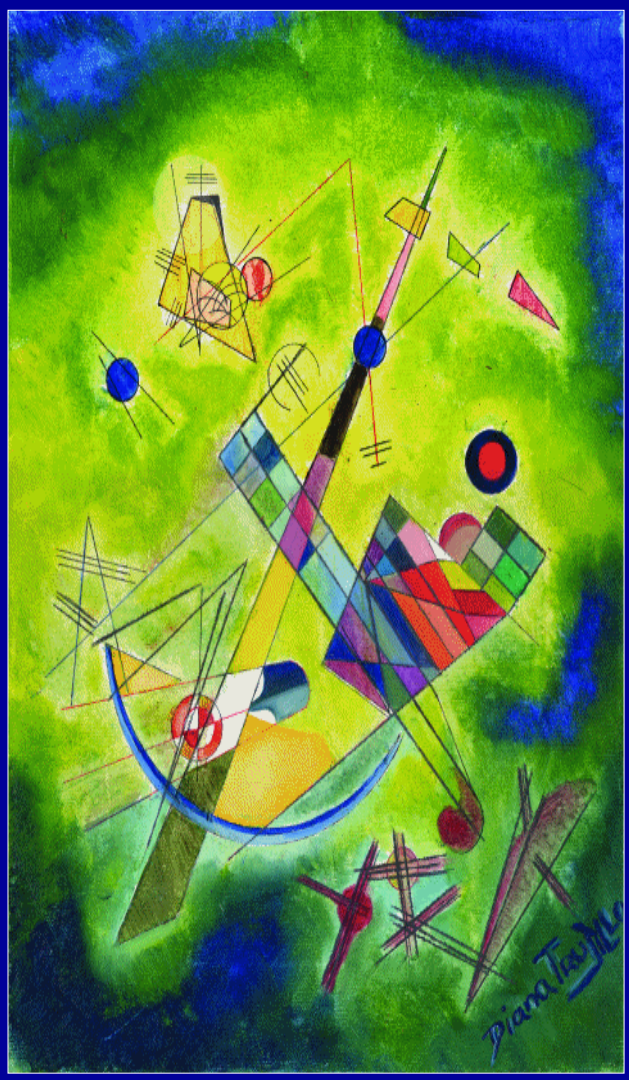
MIAMI DADE COLLEGE
QUALITY ENHANCEMENT PLAN



STUDENT SUCCESS AT MIAMI DADE COLLEGE: THE MATHEMATICS CONNECTION

Miami Dade College

QUALITY ENHANCEMENT PLAN

Opportunity Changes Everything
MIAMI DADE COLLEGE

Student Success at Miami Dade College:
The Mathematics Connection

A Quality Enhancement Plan Submitted to the Southern Association of Colleges and Schools Commission on Colleges

by

Miami Dade College

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ABOUT THE COVER

The artwork on the cover is displayed with permission from the artist, Diana Trujillo. Ms. Trujillo first came to Miami Dade College as a student from Cali, Colombia in the Fall of 2000. She spent her first year at the College studying English as a Second Language (ESL). For the remainder of her time at the College, she took courses toward an Associate in Arts degree, majoring in Engineering. Her mathematics courses consisted of the entire calculus sequence, including Multivariable Calculus, Differential Equations, and Linear Algebra.

While working 40 hours per week, Ms. Trujillo completed her degree requirements with a perfect 4.00 grade point average in mathematics and an overall grade point average of 3.86. She graduated from Miami Dade College in May 2004 with high honors.

In the summer of 2004, Ms. Trujillo transferred to the University of Florida as a double major in Aerospace and Mechanical Engineering. After she completes her Baccalaureate program, she plans to earn a Master's degree in Structural Design at the Massachusetts Institute of Technology. Her career goal is to obtain a position with the National Aeronautics and Space Administration.

Miami Dade College Quality Enhancement Plan

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Executive Summary

The goal of Miami Dade College's Quality Enhancement Plan 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. Historically, these courses have been designated as high risk courses because each of them has been a serious obstacle to meeting graduation requirements for a large number of students. In the past two years the pass rates in these courses have ranged from 41 percent to 54 percent.

The selection of this topic for the Quality Enhancement Plan was the result of several years of institutional research and analysis focused on an institutional effectiveness process which responded to the efforts of the faculty. The mathematics faculty have actively addressed the issue of student learning in these high risk courses by exploring and implementing a number of initiatives. Many of these initiatives are the result of mathematics faculty meetings, student focus groups, Mathematics Discipline Committee meetings, Mathematics Roundtables, conferences, and a Mathematics Retreat where various pedagogical and curricular issues were discussed and debated. These activities have led to the review of current tutorial support, the implementation of learning communities with other disciplines, the development of mathematics anxiety and study skills workshops, the combining of classroom instruction with computer-supported instruction, and the introduction of graphing calculators into the curriculum.

The Quality Enhancement Plan represents a significant step forward in addressing the issue of student learning and success in mathematics. Miami Dade College's Quality Enhancement Team identified the following strategies.

- Develop a supplemental instruction seminar for students repeating the college preparatory (developmental) courses.
- Provide learning prescriptions for underachieving students.
- Create a program to incorporate mathematics into other disciplines.
- Enhance the mathematics support labs on all campuses.
- Improve mathematics advisement.
- Establish a program of frequent assessment.
- Adopt a training program for mathematics tutors.
- Send interim progress reports to all students via their email accounts.

Miami Dade College's Quality Enhancement Plan is a significant component of the College's Learning Agenda. The Period of implementation will be from Fall 2004 through summer 2008. An evaluation plan that assigns responsibility and measures effectiveness will be incorporated.

Introduction to Miami Dade College

Mission Statement

The mission of Miami Dade College (MDC) 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, multicultural community.

Miami Dade College, Its Campuses and Centers

Miami Dade College's six campuses and two off-campus centers offer a wide range of higher education programs designed to respond to the education and career needs of the diverse and populous metropolitan Miami-Dade County community. MDC's open door policy ensures that each person seeking to enter higher education will have that opportunity.

The College offers three degree options and a wide range of occupational certificates and specialized programs. The Associate in Arts degree prepares students to transfer to a four-year institution for their junior and senior years. The Associate in Arts degree program offers more than 80 areas of concentration. The Associate in Science degree program prepares students for direct entry into the workforce, with more than 60 areas of study. Baccalaureate degrees in Exceptional Student Education, Secondary Mathematics Education, and Secondary Science Education prepare students to enter the teaching profession. In addition, the College offers numerous short-term occupational certificate programs and courses of study to enhance career knowledge.

MDC maintains more than 50 transfer agreements with colleges and universities across the state and throughout the country, guaranteeing entry for MDC graduates who meet established requirements. Likewise, the College actively partners with business and industry, establishing advisory boards and securing direct entry for many MDC graduates into career positions with successful and innovative companies in South Florida. In the past five years, more than 50 new Associate in Science and certificate programs have been developed in direct response to the emerging economy of the region.

North Campus

11380 N.W. 27th Avenue

Miami, Florida 33167

Credit and Non-Credit Enrollment (2002-2003): 49,605

Located in northern Miami-Dade County on a 245-acre site, this beautifully landscaped campus was the College's first campus, built in 1960 on land that once hosted a World War II naval air station. Its main academic buildings surround a serene lake and walking paths.

The North Campus is recognized for its unique programs:

- The School of Justice provides basic training for all police and correctional officers in Miami-Dade County, as well as over half the private security personnel. The School of Justice also offers continuing professional development classes for police departments throughout the county and features a state-of-the-art Assessment Center.
- The School of Fire and Environmental Sciences trains all Miami-Dade County firefighters and provides continuing education for municipalities throughout South Florida. A new live-fire training facility is the only one of its kind in South Florida. The School also offers programs in chemical and watershed management.
- The Funeral Services program is the only program offered by a public institution in southeast Florida that trains morticians and funeral service directors.
- The School of Entertainment Technologies prepares students to work in film, television, radio, sound engineering, music business, and digital imaging. The School operates Miami-Dade Cable-Tap, the County's free-access cable TV station.

The North Campus also administers the College's two permanent off-campus centers, the Hialeah Center and the Entrepreneurial Education Center. Both centers are within four miles of the North Campus.

The Hialeah Center

1776 West 49th Street

Hialeah, Florida 33012

Credit and Non-Credit Enrollment (2002-2003): 9,967

The Hialeah Center serves the Greater Hialeah-Miami Lakes area. The Center offers day and evening classes six days a week and provides comprehensive academic and student support services. A wide range of courses leading to an Associate in Arts or Associate in Science degree is offered. A variety of educational opportunities are also

available through Vocational Credit Certificate Programs, as well as through numerous courses that provide career entry training in computer technology, office technology, electronics, and early childhood education. The Hialeah Center houses a large and comprehensive English language training program for speakers of other languages.

The Entrepreneurial Education Center
6300 N.W. Seventh Avenue
Miami, Florida 33150
Credit and Non-Credit Enrollment (2002-2003): 3,600

The Entrepreneurial Education Center (EEC) opened its doors on October 4, 1989 in the heart of Liberty City, a predominantly African-American community within the City of Miami. The mission of the EEC is to implement the broader mission of the College while promoting entrepreneurship, business growth, and economic revitalization for the local residents of Liberty City and the surrounding communities. The EEC also offers a vast array of college credit and non-credit courses. Students may pursue certificate and vocational programs in a number of fields and participate in seminars and conferences that promote workforce training and business skills, facilitate entrepreneurship, and train for direct entry into the labor market.

Kendall Campus
11011 S.W. 104th Street
Miami, Florida 33176
Credit and Non-Credit Enrollment (2002-2003): 63,870

Kendall Campus, situated amidst a lush 185-acre tract of trees and lakes, opened in 1967. It is home to a wide variety of academic programs and specialized institutes. The campus features thirteen buildings equipped with the latest technology, a wellness center, athletic fields, and an Olympic-size pool. The Kendall Campus's Title V Project, "Creating a Culture of Success in Science, Mathematics, and Engineering," provides students with academic support services focused on enhancing student learning in these discipline areas. The Environmental Center is a 10-acre facility on campus which hosts Ecology Tours for over 10,000 school children each year. The Gourmet Academy is the culinary showplace of the Kendall Campus, offering a variety of non-credit programs and courses to the community. The Landscape Technology Program, located west of the main campus, maintains a large nursery and several greenhouses. One of the newest additions to the campus is the Geology Museum and Demonstration Center, which features one of the largest collections of geological specimens in the Southeast United States. The Kendall Campus Art Gallery provides the campus and surrounding community with nine

exhibitions each year and houses a permanent collection of over 700 works. The student newspaper, *The Catalyst,* and the campus literary magazine, *Miambiance,* are award-winning publications.

Wolfson Campus
300 N.E. Second Avenue
Miami, Florida 33132
Credit and Non-Credit Enrollment (2002-2003): 32,518

The Wolfson Campus opened in 1970, offering classes in the storefronts of downtown Miami. Since then, it has played an integral part in the effort to revitalize the downtown Miami area. As the only comprehensive urban college campus in the City of Miami, the Wolfson Campus capitalizes on its location at the center of downtown Miami's financial, government, technology, and cultural hubs. It offers programs in banking, business, computer technology, paralegal studies, architecture, economics, hospitality management, engineering, the arts, humanities, and social sciences. The Wolfson Campus is home to the Emerging Technologies Center of the Americas (ETCOTA), a state-of-the-art, 40,000 square foot high-tech training facility. ETCOTA has quickly become the leading provider of skilled professionals for the region's emerging technology industries. The campus also houses the New World School of the Arts, a comprehensive high school and college program, recognized as one of the best performing and visual arts schools in the country. Each year the Wolfson Campus hosts Miami Book Fair International, the nation's largest and finest literary festival, which brings hundreds of renowned authors and publishers and over 500,000 fairgoers to the campus.

Medical Center Campus
950 N.W. 20th Street
Miami, Florida 33127
Credit and Non-Credit Enrollment (2002-2003): 5,356

The Medical Center Campus, located on a 4.3-acre site in Miami's medical/civic center complex, opened in 1977. The campus is an integral part of the Miami healthcare community. It sits in close proximity to the city's medical center complex, consisting of the University of Miami School of Medicine, county-operated Jackson Memorial Hospital, Veterans Administration Hospital, Miami-Dade County Public Health Service, and other private and public healthcare facilities. With its special focus on nursing and allied health, the campus features state-of-the-art technology and provides its students with opportunities to prepare for high paying positions in a wide range of medical careers. The Medical Center Campus trains two-thirds of the county's registered nurses, and recently

initiated a Licensed Practical Nurse program. It offers more than twenty Allied Health programs, including Physician's Assistant, Opticianry, Emergency Medical Technician, Veterinary Technology, Physical Therapy, Dental Assistant, and more. Qualified and caring professional medical faculty guide students with support from tutors, labs, and clinical sites.

Homestead Campus
500 College Terrace
Miami, Florida 33030
Credit and Non-Credit Enrollment (2002-2003): 7,372

In 1990, the Homestead Campus became the fifth campus of Miami Dade College. It was opened in the historic downtown district of the City of Homestead with the mission to offer a full range of programs for the Homestead/Florida City communities. In doing so, the campus has enhanced the community's capacity to meet cultural and social needs, promoted teaching and learning excellence, and fostered a sense of community. That sense of community was very important following the devastation caused by Hurricane Andrew in 1992 and the subsequent closing of the Homestead Air Force Base. After Hurricane Andrew, the campus, like the City of Homestead, began to rebuild, adding four new buildings by 1996. In January of 2002, the Homestead Campus opened its Aviation Building, which houses an airport control tower simulator, landing runways, classrooms, and avionics equipment to support the aviation program. The aviation program also operates out of facilities at Miami International Airport and Tamiami Airport. Today, the Homestead Campus is a modern, six-building complex offering an array of academic programs, including aviation, entertainment technologies, arts and sciences, and nursing. The Campus's award-winning structures include a computer courtyard, student learning lab, career center, and specialized assessment facility. As the community continues to grow, the Homestead Campus will also grow, expanding its capabilities to meet the needs of the South Miami-Dade County region.

InterAmerican Campus
627 S.W. 27th Avenue
Miami, Florida 33135
Credit and Non-Credit Enrollment (2002-2003): 17,507

The InterAmerican Campus is located in the heart of Little Havana, one of the most colorful and lively neighborhoods in Miami's historic Latin Quarter district. The seed for the InterAmerican Campus was planted in 1972 when the downtown Wolfson Campus offered two night courses at the Belen Jesuit Prep School in East Little Havana. Sixty

students enrolled. By 1979 the program blossomed and was renamed the Wolfson Campus Division of Bilingual Studies, enrolling 2,000 students. In the early 1980s, an influx of students from Latin America and the Caribbean led to the addition of day classes and a full-time faculty. By 1986, the Division had grown to "Center" designation, and became the largest bilingual higher education learning facility in the United States. With credit enrollment increasing to 5,500 at the center, the College's District Board of Trustees petitioned the State of Florida for "campus" status. The request was approved and on March 27, 2001, the InterAmerican Campus was born. The District Board of Trustees designated the InterAmerican Campus as a full-fledged, full-service campus, the sixth campus of Miami Dade College. Today, the InterAmerican Campus provides service to students in over 200 programs. It is also home to the College's School of Education, now offering Bachelor's Degree programs in Secondary Mathematics Education, Secondary Science Education in the areas of Biology, Chemistry, Physics and Earth Science, and Exceptional Student Education.

Institutional Framework for the QEP

The College's Strategic Plan

The Miami Dade College Office of Institutional Research facilitates a systematic, broad-based, interrelated planning and evaluation process. The College's planning and evaluation process during 2000-2003 centered on three initiatives: (1) The Miami Dade College 2000-2005 Strategic Plan; (2) Research priorities set by the Campus Academic Deans; and (3) A Service Excellence Program.

The Miami Dade College 2000-2005 Strategic Plan focused on the operational aspects of the College mission. The twelve areas of emphasis were General Education, Enrollment Management, Student Services, Workforce Development, Professional Development and Training, Technology, The Honors College, Resource Development, Diversity, Cultural Affairs, Legislative Support, and Physical Plant: Access to Programs. Specific goals were assigned to these areas of emphasis and budget requests were tied to these areas.

The results of the College's planning and evaluation process redirected many areas of emphasis. The following are some examples:

- A Learning Agenda for the College was established and implemented. It included the Learning Innovations Program to fund faculty and student services proposals that demonstrate a clear impact on student learning and student success.
- Student recruitment and retention plans with measurable outcomes were developed on all MDC campuses. The plans focus on analyzing the performance

and retention of college preparatory students, supporting students in high risk mathematics courses, reducing the number of students transferring without degrees, reducing the number of students in good standing who stop attending, and increasing the number of program completers.

- Student focus groups were conducted to explore ways to increase student success.
- Professional development workshops were developed by College Training and Development (CTD) departments for faculty to enhance their teaching strategies.
- Grant activities were centralized in a concerted effort to write and submit grants in support of the College's educational goals, with priority given to grants which focus on student learning.

The Planning and Effectiveness Process

As Miami Dade College moved forward with its planning and effectiveness process, the College President appointed and charged a Strategic Plan Coordinating Committee to begin the process of developing the College's next Strategic Plan. During the same time frame, the Collegewide Academic and Student Services Council's (CASSC's) Academic and Student Services Effectiveness Committee was redefined as the CASSC Institutional Effectiveness Committee with expanded membership, and it was charged with taking a more active role in developing and implementing collegewide and campus-level effectiveness plans.

As a result of these efforts, the College's 2004-2010 Strategic Plan reflects five major themes: (1) Access to the College; (2) Student Achievement and Success; (3) Serving the Community; (4) Resource Development and Utilization; and (5) Employees and the College. The Strategic Planning Committee conducted an environmental scan to identify critical issues/challenges and met with student leaders to identify issues related to the five themes. All employees were invited to participate in setting the Miami Dade College strategic goals through an on-line process. The Strategic Planning Committee drafted objectives for each strategic goal, and college administrators at the executive level assumed responsibility for implementing specific goals and objectives. The draft Strategic Plan was shared with the College community before being submitted to the District Board of Trustees.

The College's Learning Agenda

In April 2001, the President of Miami Dade College invited faculty, administrators, and staff to expand the institution's focus on student learning so that it would truly encompass every aspect of student life. He encouraged the College community to

participate in building a new Learning Agenda that would be comprehensive in scope. The President emphasized that a key objective was to maximize the participation of all members of the institution through the creation of partnerships among faculty of various disciplines. In order to accomplish this, the following guidelines were established and followed:

- The Learning Agenda was to be driven by a team nominated from the ranks of faculty, administrators, and staff.
- The team was charged with identifying a full range of student support initiatives.
- Broad input was sought from all groups across the College.
- Personnel attended conferences and visited other institutions to help develop the components of the Learning Agenda.
- Discipline and student learning experts were invited to the College.
- A research agenda was defined.
- Faculty were invited to submit learning innovations which focused on new instructional strategies, learning models and new curriculum, learning research, and more.
- A faculty team was appointed to lead this initiative.

The following Learning Agenda initiatives provided a framework for broad-based participation with a collective focus on student learning.

- Learning Innovations Faculty Team

  Three faculty members were released from their classroom responsibilities and charged with holding forums for the exchange of ideas, conducting research, visiting other institutions with exemplary programs, attending conferences, and bringing experts to the College. This team maximized faculty involvement throughout the institution.

- Student Support Initiatives Team

  A group of staff and administrators led discussion groups and sponsored forums for the exchange of ideas, reviews of research, and visitations to other institutions with exemplary programs. They also invited experts to the College and attended conferences. As a result, they were able to propose new and innovative student support initiatives that focused on increasing student success. Through their efforts, staff and administrative involvement in student success initiatives increased.

- The Honors College

  In an effort to attract students of the highest caliber, the Honors College was established. It provides an opportunity for faculty collegewide to implement innovative, advanced learning strategies and to develop dynamic learning communities.

- Enrollment Management and Student Support Technology Systems

  These closely related initiatives enabled the College to enhance and coordinate its recruitment and retention efforts and to implement student support technology systems.

- Institutional Advancement

  Securing funding from external sources has become an increasing necessity during the last few years. Funding for programs that focus on student learning will continue to have the highest priority.

- Workforce Development

  Due to the priority that this program has received at both state and local levels, it became one of the College's initiatives. A comprehensive, integrated collegewide effort was implemented in order to increase linkage with the business community and to implement new programs that meet the changing needs of business and industry.

- Telecommunications Training

  This area emerged as a significant development in the area of workforce training. A master plan to establish a training center to address the training needs of the telecommunications industry was developed. The Emerging Technologies Center of the Americas (ETCOTA) was established and aligned with the priorities of the Greater Miami Chamber of Commerce's One Community, One Goal initiative.

- Financial Analysis and Planning

  With the advent of performance-based state funding of colleges and a new governance structure in the State of Florida Department of Education, each of which increased the emphasis on program completion, the College established new mechanisms and processes to analyze and review program offerings.

The Learning Agenda, with its overall focus on student learning and success, permeated every aspect of the institution and provided the basis for decision making. It reinforced Miami Dade College's commitment to increasing the value of student learning and to fostering a positive and supportive learning-centered environment. The Learning Agenda provided the framework for the development of the Quality Enhancement Plan.

The Challenge of Mathematics

American colleges and universities continue to be challenged by low success rates in mathematics. Although students believe that mathematics is important, the number of students who want to take more mathematics courses is steadily declining (Dossey, Mullis, Lindquist & Chambers, 1988). This can be alarming when coupled with the fact that the majority of American college students do not possess the mathematics skills or knowledge to meet the nation's technological needs. This has so concerned the academic community and specifically the members of the mathematics discipline that the National Council of Teachers of Mathematics has prominently placed the issues "Learning to Value Mathematics" and "Becoming Confident in One's Own Ability" on its research agenda in an attempt to change the nature of mathematics teaching (National Council of Teachers of Mathematics, 1999). Miami Dade College's open-door admissions policy provides a great challenge to the institution when, upon assessment, the majority of students seeking admission are not college-ready.

Initial Testing and Placement of Students in Mathematics

In an effort to provide effective educational services for students, the College adopted an entry level assessment program. This program identifies the student's academic strengths and weaknesses in reading, writing, and mathematics. The Computerized Placement Test (CPT) is used for this purpose, assessing in three areas: reading comprehension, sentence skills, and elementary algebra. Based on the score on the elementary algebra subtest, arithmetic or college level mathematics subtests may also be administered. Table 1 specifies course placement based on CPT scores. The range of scores on all subtests is 20 – 120. Courses into which students may be placed are

- MAT 0002: College Prep Arithmetic (non-credit)
- MAT 0020: College Prep Mathematics (non-credit)
- MAT 0024: College Prep Algebra (non-credit)
- MAT 1033: Intermediate Algebra (credit, but not toward a degree)
- MAC 1105: College Algebra (credit toward a degree)

Table 1

Placement Criteria Based on CPT Scores

Elementary Algebra Score	Arithmetic Score	College Level Mathematics Score	Course Placement
20 -71	20 – 29	Not administered	MAT 0002
	30 – 64		MAT 0020
	65 – 120		MAT 0024
72 – 89	Not administered	Not administered	MAT 1033
90 – 120	Not administered	20 – 39	MAT 1033
		40 – 62	MAC 1105
		63 – 120	See Mathematics Department

In lieu of CPT Elementary Algebra scores, students may submit SAT-1 or ACT mathematics scores. An SAT-1 mathematics score greater than or equal to 440 or an ACT mathematics score greater than or equal to 19 exempts a student from MAT 0020 and MAT 0024. A student may then take the College Level Mathematics Subtest to determine placement as shown in Table 1.

One of the challenges Miami Dade College faces is that many students enter underprepared for college level coursework. This is especially true in mathematics. During the Fall Term 2003, only 18 percent of incoming students who took the Computerized Placement Test (CPT), or who submitted SAT-1 or ACT scores, tested as college-ready in all areas.

Another area of concern for the College is progression within the mathematics curriculum. Whether a mathematics course is college preparatory or college level, students who placed into it based on their test scores are more likely to pass than those who took and passed the prerequisite course (Bashford, 2002). Table 2 illustrates these comparisons. Passing grades are A, B, and C in MAT 1033 and MAC 1105 and S (satisfactory) in the college preparatory classes of MAT 0020 and MAT 0024. A pass rate is computed by dividing the number of passing grades by the total number of grades.

Table 2

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

Pass Rates

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 pass rates in the third column are those of students who passed the prerequisite course during the term immediately prior to the Spring 2002 term. Table 3 illustrates that pass rates for students who satisfied the prerequisite but delayed enrolling for the next course are even lower.

Table 3

Comparison of Pass Rates of Students Who Enrolled in a Course Immediately After Passing the Prerequisite and Those Who Delayed

Pass Rates of Students Who Passed the Prerequisite

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 %

The Targeted High Risk Mathematics Courses

In 2001, the Campus Academic Deans requested the College's Office of Institutional Research to examine "stopping points" in the curriculum. This analysis focused on courses that were difficult for students to pass, with special attention given to courses required for progression to a degree. For the purpose of this analysis, Institutional Research defined high risk courses as those courses with a semester

enrollment of at least 300 students collegewide and pass rates below 60 percent. Table 4 lists all high risk courses for Fall term 2003.

Table 4

High Risk Courses, Fall Term 2003

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

The 2003 study showed that 15 courses at the College met the criteria for high risk. Eight of these were mathematics. The four having the largest enrollments were MAT 0020 (College-Prep Mathematics), MAT 0024 (College-Prep Algebra), MAT 1033 (Intermediate Algebra), and MAC 1105 (College Algebra). These four courses are specifically targeted by the QEP. Their catalog descriptions follow.

MAT 0020 (College Preparatory Mathematics) This course combines arithmetic and beginning algebra. Topics include sets, operations on signed numbers, solving linear equations and inequalities in one variable, operations on polynomials, factoring, integer [*sic*] exponents, radicals, graphing, and applications of these topics. Placement test scores or referral determine admission. This course does not satisfy college level mathematics requirements for graduation.

MAT 0024 (College Preparatory Algebra) This course introduces students to the basic concepts of algebra. Topics include sets, operations on signed numbers, solving linear equations and inequalities in one variable, operations on polynomials, factoring,

integer [*sic*] exponents, radicals, graphing, and applications of these topics. Placement test scores or referral determine admission. This course does not satisfy college level mathematics requirements for graduation.

MAT 1033 (Intermediate Algebra) Topics include factoring, operations with algebraic expressions, linear equations and inequalities, quadratic equations, exponents, radicals and radical expressions, algebraic fractions and fractional equations, applications, graphing, complex numbers, and an introduction to functions. Prerequisite: MAT 0020, MAT 0024, or a prescribed score on the Algebra Placement Test.

MAC 1105 (College Algebra) This course includes the following topics: functions and functional notation; domains and ranges of functions; graphs of functions and relations; operations on functions; inverse functions; linear, quadratic, and rational functions; absolute value and radical functions; exponential and logarithmic properties, functions, and equations; systems of equations and inequalities; mathematical modeling; and applications of the topics listed above. Prerequisite: MAT 1033 or a prescribed score on the Algebra Placement Test.

Previous College Initiatives in Mathematics

In an effort to address the challenge of mathematics at the College, faculty and administration engaged in several initiatives. These initiatives are described in this section.

The Mathematics Roundtables

In the Fall of 2001, the Vice Provost for Education, Policy, Programs, and Analysis initiated a series of roundtable discussions in an effort to encourage mathematics faculty to identify strategies that would improve student success in mathematics courses. An overall assumption was made that high course standards and student success must coexist, as any compromise of standards would be a disservice to students. It was also agreed that the roundtable discussions would:

1. Identify and address key questions.
2. Identify data needs.
3. Share findings of strategies that promote student success.
4. Share data findings.
5. Develop ideas for pilot projects.
6. Design pilot projects and implementation timelines.

The Mathematics Roundtables were well attended by both faculty and administrators. Participants presented issues and concerns that formed the foundation for a research agenda to analyze student learning in mathematics courses at the College. The following are examples of research requests made at the Mathematics Roundtables:

- Investigate the progression and success of students in mathematics courses.
- Update data regarding the percent of students who successfully complete Intermediate Algebra and College Algebra.
- Examine the effect that time between enrollments in sequential mathematics courses has on success in those courses.
- Collect data to determine if the mathematics anxiety workshops are having an effect on reducing student anxiety.
- Investigate the long term success resulting from a project that would pair college preparatory mathematics with an SLS (Student Life Skills) course.

As a result of the first Mathematics Roundtables, the participating faculty agreed to embark on a number of new initiatives:

- Investigate faculty development opportunities that focus on the art of instruction and how faculty should approach student questions in and out of the classroom.
- Create a video illustrating classroom situations that show how faculty behavior affects student response.
- Create professional development opportunities for adjunct faculty.
- Create learning communities involving mathematics.
- Widely disseminate the innovations implemented by mathematics faculty and implement assessment models to measure outcomes.

The Office of Institutional Research prepared a research agenda to study all of the issues and concerns raised at the Mathematics Roundtables. Several studies were conducted, data on course success and progression were updated, and several analyses that focused on student success were completed and disseminated through the Institutional Research website.

The Mathematics Retreat

In February 2003, the collegewide mathematics faculty participated in the first Mathematics Faculty Retreat. A collegewide committee of faculty planned this activity with support from the Office of Education Policy, Programs, and Analysis. The retreat gave mathematics faculty the opportunity to meet over a two-day period to discuss matters pertaining to curriculum and instruction for College-Prep Arithmetic (MAT 0002), College-

Prep Mathematics (MAT 0020), College-Prep Algebra (MAT 0024), Intermediate Algebra (MAT 1033), and College Algebra (MAC 1105). The mission of the retreat was to revise the curriculum and share teaching strategies that would contribute to increased student success in these courses. Presentations were made by several mathematics faculty who shared best practices and innovative strategies. Curriculum issues were debated and the revisions of course competencies were approved. The participants also presented several recommendations for the improvement of curriculum and instruction. The faculty then prioritized ideas that could positively affect student success. The following ideas emerged from that discussion:

- Create a mathematics resource center for faculty.
- Provide more institutional support for faculty initiatives.
- Increase professional development opportunities for faculty.
- Increase opportunities for the sharing of successful instructional strategies.
- Increase opportunities for the discussion of assessment strategies.

The Mathematics Retreat led to a renewed focus on student learning and a challenge to address specific mathematics courses that have been obstacles to graduation for thousands of students. The mathematics faculty responded to this challenge by improving the curriculum and by piloting teaching strategies that have shown initial success. (see pp.15-17)

Student Focus Groups

A series of student focus groups were held on each campus to seek information that would help identify the elements of student success in high risk mathematics courses. The students participating in the focus groups had successfully completed all of their college preparatory mathematics courses. A series of questions focused on study strategies and teaching strategies that helped the students succeed. Results from these focus groups were:

Question 1: What did you do to be successful in college prep mathematics?

- Stayed up-to-date in class. All students completed their homework assignments.
- Used available resources. All students said they sought assistance in the math lab.
- Studied with others informally and in study groups.
- Had a positive attitude. The students simply decided that they could succeed in their courses.

Question 2: What could you have done differently to increase your chances of success?

- Used time better by not procrastinating or not waiting to the last minute.
- Sought even more help in the math lab.

Question 3: What did the instructor do that helped you be successful?

- Had empathy for the students. Motivated and encouraged us.
- Used a variety of techniques. Explained topics in many different ways. Gave time to practice in class. Formed in-class study groups.
- Gave several exams.

Question 4: What things could or should your instructor do to help students succeed?

- Give more quizzes.
- Encourage study groups.
- Encourage questions in class.
- Relate material to real life.

Question 5: What could or should the College do to help students be successful?

- Hire lab tutors that don't discourage students.
- Inform students about help---workshops, labs, etc.
- Have good advisors. Provide early advisement regarding mathematics courses that are suitable for various programs.
- Have tutors in the classrooms.

Question 6: What advice would you give a friend or relative to help them be successful in mathematics?

- Believe that you can succeed in mathematics even if you are not mathematically talented.
- Do not procrastinate. Study regularly.
- Complete your mathematics requirement early. Take the courses in proper sequence.

Learning Innovations Golden Apple Grants

In support of the College's mission to "keep the learner's needs at the center of decision-making," a program to encourage learning innovations was developed as a result of the establishment of the Learning Agenda. The primary goals of this Learning

Innovations Program are to focus on learning throughout the College community and to contribute to a learning-centered work environment by

- Creating a faculty-driven collaboration focusing on student success
- Supporting initiatives that will increase the value of the teaching and learning experience for faculty, students, and staff
- Studying the teaching and learning process
- Assessing the outcomes of the teaching and learning process
- Sharing the teaching and learning process
- Fostering and sustaining a positive and supportive learning-centered work environment

The Learning Innovations Program funds the Golden Apple Grants that offer faculty an opportunity to submit proposals for projects that focus on student learning and student success. The grants are competitive and provide compensation for the faculty whose proposals are approved. The following are examples of faculty initiatives focused on student success in mathematics that have been funded to date:

- *A Learning Community for Mathematics Enhancement through Student Life Skills*
- *Supporting Future Teachers' Success through Learning Communities*
- *Mastering Mathematics: An Interdisciplinary Approach*
- *A New Way to Provide Relevant Information to the Faculty of High Risk Courses*
- *A Learning Community for College Algebra and Introductory Chemistry Students*
- *ARH 2472, a Cross-Curricular Approach to Teaching Art History Drawn from Mathematics*
- *Integrating English, Mathematics, and Technology Concepts through a Learning Community Approach*
- *Visual and Web-Enhanced College Trigonometry*

The Golden Apple Grants provide incentive for faculty to be innovative.

Selection of the QEP Topic

The Quality Enhancement Plan gave Miami Dade College the opportunity to develop a forward-thinking plan of action that transformed a process for reaccreditation into an activity that expanded its Learning Agenda. The QEP topic evolved from the College's institutional effectiveness process, institutional research data, the work of the faculty, and the campus retention plans. As the College investigated these previous initiatives and planning processes, it became evident that student success in mathematics was an area of major concern. This concern posed a challenge to the College as it examined its institutional data regarding high risk courses in mathematics as obstacles to student graduation and program completion. The data indicated that eight of the 15 courses designated as high risk courses were in mathematics. Of particular interest was the fact that four of these courses, College-Prep Mathematics (MAT 0020), College-Prep Algebra (MAT 0024), Intermediate Algebra (MAT 1033), and College Algebra (MAC 1105) are necessary for meeting general education requirements and are also prerequisites for more advanced mathematics and science courses. In addition, more students enroll in these four courses than in the remaining 11 high risk courses combined (17,164 vs. 10,432 in Fall 2003 – see Table 4). A careful analysis of these factors produced the emergence of a QEP topic: *Student Success at Miami Dade College: The Mathematics Connection.* Activities such as the Mathematics Roundtables, the Mathematics Retreat, Student Focus Groups, the Learning Innovations Golden Apple Grants, and the College's Learning Agenda are indicative of how this topic has been a focus of attention and has permeated the College's review and planning processes.

With these activities providing the foundation, student success and its connection to mathematics emerged as the topic for the Quality Enhancement Plan. After broad participation and review by the faculty on the Mathematics Retreat Committee; the College Academic and Student Support Council; the Executive Committee; the Academic, Student, and Administrative Deans; and the District Board of Trustees, it was acknowledged that this topic centered on student learning in an area where the entire College community had a series of shared interests, concerns, and support. Thus the selection of the QEP topic was based on a strong foundation that would engage the College community in continuing to develop the College's Learning Agenda.

Selection of the QEP Team

Broad participation with significant faculty membership became the guideline for the selection of the Quality Enhancement Team. It was agreed that the team would be chaired by a faculty member in order to ensure that the plan would be faculty driven and would engage the faculty in a significant way. The six Campus Presidents, the United Faculty of Miami Dade, and the Student Government Associations on all campuses then nominated individuals to serve as members of the QEP Team. The following 38 individuals were selected:

Team Member	Position	Campus
Patrick Bibby (QEP Chairperson)	Faculty, Mathematics	Kendall
Lourdes Espana	Faculty, Mathematics	North
Jack Alexander	Faculty, Mathematics	North
Alina Coronel	Faculty, Mathematics	Kendall
Charlotte Berceli	Faculty, Mathematics	Kendall
Bernard Mathon	Faculty, Mathematics	Wolfson
Alvio Dominguez	Faculty, Mathematics	Wolfson
Ian Cobham	Faculty, Mathematics	Homestead
Cleveland Taylor	Faculty, Mathematics	InterAmerican
Rosany Alvarez	Faculty, Mathematics	InterAmerican
Joann McNair	Faculty, College Prep Writing	North
Elizabeth Basinger	Faculty, ESL	North
Lois Willoughby	Faculty, Social Science	Kendall
Christopher Rogers	Faculty, Business	Kendall
Lenore Rodicio	Faculty, Chemistry	Wolfson
Alan Ngim	Faculty, Music	Wolfson
Annette Gibson	Faculty, Nursing	Medical
Jerry Brown	Faculty, Vision Care	Medical
Timothy Schmelzer	Faculty, Aviation	Homestead
Irene Canel-Petersen	Faculty, Speech	InterAmerican
Paul Edwards	Access Services	North
Sol Maury	New Student Center	Kendall
Jan Burlison	New Student Center	Wolfson
Dixie Lemons	Success Center	Medical
Wendy Lobos	New Student Center	Homestead
Carlos Rossie	New Student Center	InterAmerican
Leslie Roberts	Academic Dean	InterAmerican

Madeline Pumariega	Student Dean	Medical
J. Graham Smart	School Director	North
Alan Berkey	Associate Dean	Kendall
Norma Agras	Chair, Mathematics	Wolfson
Thomas Meyer	Chair, ESL	InterAmerican
Rosemary Garcia-Pendleton	Library Director	Homestead
Tawanna Boykin	Student	North
Shaista Mohammed	Student	Kendall
Hector Samalot	Student	Wolfson
Azza Mwidau	Student	Medical
Rafael Garcia	Student	Homestead
Alejandra Blanco	Student	InterAmerican
Peter W. Roulhac	Member, District Board of Trustees	

The Initial QEP Team Meetings and Resulting Committees

The Meeting of the Mathematics Subgroup

The first QEP meeting was held on October 22, 2003, with the 10 mathematics faculty who were members of the QEP team. The purpose of the meeting was to explore ideas for strategies that could be institutionalized and would address the issue of low student success in the targeted high risk mathematics courses. The ideas that emerged from the meeting could then be presented at the initial meeting of the full QEP team and serve as a starting point for discussion.

The discussion within the mathematics group eventually centered on the strategy of frequent assessment; for example, administering short quizzes in classes on a weekly or biweekly basis rather than hourly exams on a monthly basis. Some members of the group reported success with this strategy and were familiar with research showing that frequent assessment has a positive effect on student performance.

The mathematics subgroup agreed that a program of frequent assessment would consume too much class time and create a record-keeping nightmare. One possible solution to both concerns would be to administer assessments/tests using commercially produced testing software outside of class in a computer-based assessment center. Each student's tests would be computer graded and test scores would be automatically entered into the appropriate faculty member's electronic grade book. This plan would also provide additional class time for instruction or other assessment activities. The group decided that the formation of three committees would be necessary to develop the desired plan:

1. A software evaluation committee to evaluate the commercially produced testing software products.

2. A facilities committee to find space at each campus for the assessment center.
3. A system requirements committee to determine the hardware requirements for the assessment centers.

The Meeting of the Full QEP Team

The meeting with the full QEP team occurred on October 29, 2003. Presentations were made on the accreditation process, the requirements of the QEP, and the decision to focus on the targeted high risk mathematics courses. Members of the mathematics group then presented the proposal to establish a program of frequent assessment. The full team endorsed the proposal, but many members recommended that additional strategies be utilized to address the issue of low student success. The following strategies were approved:

1. Establish a program of frequent assessment.
2. Develop a supplemental instructional component linked to the college-prep courses MAT 0020 and MAT 0024.
3. Create a program to incorporate mathematics into other disciplines.
4. Enhance the existing mathematics support labs.
5. Improve mathematics advisement.
6. Investigate best practices in mathematics programs, facilities, and instructional strategies.

Corresponding to these approved strategies, the following committees were established:

1. Best Practices
2. Literature Research
3. Software Evaluation
4. System Requirements
5. Facilities
6. Student Support and Advisement
7. Mathematics Supplemental Instruction
8. Mathematics in Other Disciplines

It was agreed that a separate committee, consisting only of the mathematics faculty on the QEP team, be formed. This committee was to be called the Mathematics Committee. Each member of the Mathematics Committee would also serve on one of the other eight committees. Each of these nine committees would have a chairperson. A Steering Committee, comprising the nine committee chairpersons, would also be formed.

QEP Committee Membership and Resource Persons

Within two days of the meeting of the full QEP team, the following committee assignments were made:

- Best Practices Committee
  - Irene Canel-Petersen (chair), Speech Faculty, InterAmerican Campus
  - Rosany Alvarez, Mathematics Faculty, InterAmerican Campus
  - Rafael Garcia, Student, Homestead Campus
  - Wendy Lobos, Student Services, Homestead Campus
  - Alan Ngim, Music Faculty, Wolfson Campus
- Literature Research Committee
  - Rosemary Garcia-Pendleton (chair), Library Services, Homestead Campus
  - Ian Cobham, Mathematics Faculty, Homestead Campus
  - Leslie Roberts, Academic Dean, InterAmerican Campus
  - Cleveland Taylor, Mathematics Faculty, InterAmerican Campus
  - Lois Willoughby, Social Science Faculty, Kendall Campus
- Software Evaluation Committee
  - Charlotte Berceli (chair), Mathematics Faculty, Kendall Campus
  - Alejandra Blanco, Student, InterAmerican Campus
  - Alina Coronel, Mathematics Faculty, Kendall Campus
  - Carlos Rossie, Student Services, InterAmerican Campus
  - Graham Smart, School Director, North Campus
- System Requirements Committee
  - Chris Rogers (chair), Business Faculty, Kendall Campus
  - Jack Alexander, Mathematics Faculty, North Campus
  - Lenore Rodicio, Chemistry Faculty, Wolfson Campus
  - Hector Samalot, Student, Wolfson Campus
- Facilities Committee
  - Jan Burlison (chair), Student Services, Wolfson Campus
  - Alan Berkey, Associate Dean, Kendall Campus
  - Paul Edwards, Access Services, North Campus
  - Thomas Meyer, ESL Chairperson, InterAmerican Campus
- Student Support and Advisement Committee
  - Dixie Lemons (chair), Success Center, Medical Center Campus
  - Norma Agras, Mathematics Chairperson, Wolfson Campus
  - Elizabeth Basinger, ESL Faculty, North Campus
  - Tawanna Boykin, Student, North Campus
  - Madeline Pumariega, Student Dean, Medical Center Campus

- Mathematics Supplemental Instruction Committee
    - Sol Maury (chair), Student Services, Kendall Campus
    - Lourdes Espana, Mathematics Faculty, North Campus
    - Bernard Mathon, Mathematics Faculty, Wolfson Campus
    - Azza Mwidau, Student, Medical Center Campus
    - Timothy Schmelzer, Aviation Faculty, Homestead Campus
- Mathematics in Other Disciplines Committee
    - Joann McNair (chair), College-Prep Faculty, North Campus
    - Jerry Brown, Vision Care Faculty, Medical Center Campus
    - Alvio Dominguez, Mathematics Faculty, Wolfson Campus
    - Annette Gibson, Nursing Faculty, Medical Center Campus
    - Shaista Mohammed, Student, Kendall Campus
- Mathematics Committee
    - Rosany Alvarez (chair), Mathematics Faculty, InterAmerican Campus
    - Jack Alexander, Mathematics Faculty, North Campus
    - Charlotte Berceli, Mathematics Faculty, Kendall Campus
    - Alina Coronel, Mathematics Faculty, Kendall Campus
    - Ian Cobham, Mathematics Faculty, Homestead Campus
    - Alvio Dominguez, Mathematics Faculty, Wolfson Campus
    - Lourdes Espana, Mathematics Faculty, North Campus
    - Bernard Mathon, Mathematics Faculty, Wolfson Campus
    - Cleveland Taylor, Mathematics Faculty, InterAmerican Campus

After committee assignments were made, and during several months of deliberations, other College personnel agreed to serve as committee resource persons. Following is the final list of resource persons:

- Best Practices Committee
    - Yvette Lujan, Communication, Arts, and Philosophy, InterAmerican
- Literature Research Committee
    - Anne Baldwin, Institutional Research, District on Wolfson
- Software Evaluation Committee
    - Richard White, CIS Chairperson, Kendall
- System Requirements Committee
    - Bob Calabrese, Learning Resources, Wolfson
    - Colleen Chung, Business Lab, Kendall
- Facilities Committee
    - Campus Deans/Directors for Administration:

Cristina Mateo, North

Martha Garrity, Kendall

Miguel Menendez, Wolfson

Madeline Pumariega, Medical

John Greb, Homestead

Brian Stokes, InterAmerican

Oscar Irigoyen, Facilities Management, District on Kendall

- Student Support and Advisement Committee

  Campus mathematics lab supervisors:

  Bahaa Mourad, North

  Dana Crawford, Kendall

  Jose Depaz, Wolfson

  Carol Dietrick, Homestead

  Juan Garcia, InterAmerican

  Toni Bilbao, Associate Provost for Student Services, District on Wolfson

  Rene Garcia, Director of Enrollment Management, District on Wolfson

- Mathematics Supplemental Instruction Committee

  Susan Kah, Academic Affairs, Medical

  Jocelyne Legrand, Social Science, Wolfson

  Adriana Matas, Mathematics, Kendall

  Magali Rubio, Social Science, Kendall

- Mathematics in Other Disciplines Committee

  Patricia Jayne, Mathematics, Kendall

- Mathematics Committee

  Oscar Irigoyen, Facilities Management, District on Kendall

Definition of Student Learning

As the focus of the Quality Enhancement Plan was clarified, it became evident that student learning, as it relates to success in mathematics, needed to be defined. The following definition was accepted as one that truly addressed the focus of the QEP at Miami Dade College. Relative to the QEP, student learning is defined as:

1. Improved mastery of competencies in the targeted high risk mathematics courses of College-Prep Mathematics, College-Prep Algebra, Intermediate Algebra, and College Algebra.
2. A positive attitude toward the learning of mathematics.

QEP Committee Charges

Soon after the October 29, 2003 meeting of the full QEP team, the various QEP committees conducted their own meetings in order to determine their specific charges. The initial charges were reviewed and revised at the first meeting of the Steering Committee on January 27, 2004. The charges were again reviewed and revised at subsequent meetings of the Steering Committee. The charges listed below represent the final set.

Best Practices Committee

- Conduct research (internet, ERIC, journal articles, etc.) to discover best practices in mathematics education at the beginning college level.
- Conduct research to discover best practices in accommodating needs of students with disabilities.
- Determine possible visitations to best-practice institutions.
- Interview selected Miami Dade College mathematics faculty to determine how they adapt to the varied abilities and learning styles of their students.

Literature Research Committee

- Conduct research in the areas of supplemental instruction for mathematics, incorporating mathematics into other disciplines, support centers for mathematics students, mathematics advisement, learning styles, frequent testing, proctored mathematics assessment centers, and learning communities.

- Write a 10 to 15 page literature review with citations using the APA format.

Software Evaluation Committee

- Develop rubrics to evaluate all software.
- Evaluate commercially produced mathematics testing software. The software may be produced by textbook publishers as ancillaries or by independent companies.
- Evaluate commercially produced mathematics tutorial software. The software may be produced by textbook publishers as ancillaries or by independent companies.

System Requirements Committee

- Determine hardware requirements for a mathematics assessment center.
- Resolve the issue of test security.
- Explore backup systems in case of system failure.
- Accommodate the needs of students with disabilities.

Facilities Committee

- Determine the equipment and space requirements for a mathematics assessment center at each campus.
- Determine the requirements for a mathematics support center at each campus.
- Determine classroom needs for best mathematics instruction.
- Explore the feasibility of constructing dedicated mathematics buildings at North and Kendall Campuses.
- Be sure all facilities recommendations comply with national and state standards.
- Accommodate the needs of students with disabilities.

Student Support and Advisement Committee

- Determine tutor training needs.
- Determine advisement strategies to ensure that students enroll sequentially in their mathematics courses, *i.e.*, that they take no major term breaks from mathematics.
- (Joint charge with the Mathematics Committee) Design an early intervention plan for students who are not making sufficient progress.
- Determine appropriate strategies for advising and orienting new students.
- Accommodate the needs of students with disabilities.

Mathematics Supplemental Instruction Committee

- Determine the content of the supplemental instruction component.

- Determine which students should be involved with this component.
- Explore the possibility of providing mathematics tutoring as part of the supplemental instruction component.

Mathematics in Other Disciplines Committee

- Determine appropriate disciplines in which to incorporate mathematics and mathematical concepts.
- Design strategies to imbed mathematics in other disciplines.

Mathematics Committee

- Develop suggested syllabi that include frequent assessments for the targeted high risk courses.
- Determine possible grading criteria.
- Review textbooks associated with the software given a positive rating by the Software Evaluation Committee.
- (Joint charge with the Student Support and Advisement Committee) Design an early intervention plan for students who are not making sufficient progress.
- Determine the features of an ideal dedicated mathematics building.
- Recommend appropriate use of technology in the mathematics classroom.
- Accommodate the needs of students with disabilities.
- Serve as content-area resource persons to the other assigned committees.
- Promote the QEP to colleagues in the Mathematics Departments.

Steering Committee

- Keep the plan coordinated across all committees by meeting monthly through April 2004.
- Review and modify committee charges as needed.

Review of Related Literature

Educational research indicates that an academic environment can be created so that it provides a basis for effective teaching and learning. According to Chickering & Gamson (1987), this environment does the following:

1. Encourages contact between students and faculty. Frequent student-faculty contact in and out of classes is the most important factor in student motivation and involvement.
2. Develops reciprocity and cooperation among students…. Good learning, like good work, is collaborative and social, not competitive and isolated.
3. Encourages active learning. . . . Students must talk about what they are learning, write about it, relate it to past experience, and apply it to their daily lives.
4. Gives prompt feedback. . . . In classes, students need frequent opportunities to perform and receive suggestions for improvement.
5. Emphasizes time on task. Time plus energy equals learning.
6. Communicates high expectations. Expecting students to perform well becomes a self-fulfilling prophecy. . . .
7. Respects diverse talents and ways of learning. . . . Students need the opportunity to show their talents and learn in ways that work for them. Then they can be pushed to learn in new ways that do not come easily. . . . (pp. 2-4)

In addition to these general principles, the literature points to specific strategies that allow institutions to help students persist from semester to semester, succeed, and complete the progression of courses required of them in mathematics. Among these "best practices" are: (a) supplemental instruction designed specifically for mathematics; (b) accommodation for differences in student learning styles; (c) incorporating mathematics into other disciplines; (d) creation of a support center that accommodates student needs in the areas of tutoring and drill and practice problems; (e) advisement, specifically for mathematics courses, based on knowledge of the factors producing student success; (f) a program of frequent assessment; (g) establishment of a proctored mathematics assessment center allowing students and faculty more time on task in the classroom; and (h) learning communities.

Strategies Contributing to Student Success

The following strategies appear repeatedly in the literature, on college and university web sites, and in research studies as making a difference in the academic performance of significant numbers of students.

Supplemental Instruction for Mathematics

Supplemental instruction, generally designated as study skills courses, are typically offered to or required of students who are underprepared for college level courses and who therefore test into developmental courses in mathematics, writing, and/or reading (Astin, 1993; Boylan, 1999; Roueche & Roueche, 1993, 2000). These study skills courses expose students to strategies that may help them develop characteristics that have been shown to support academic achievement: attendance, time management, test-taking skills, test anxiety management (especially in mathematics), and note-taking and study habits (Astin, 1993; Faro-Schroeder, 1995; Long & Thomas, n.d.; Roueche & Roueche, 1993, 2000). Taking and successfully completing these courses increases the chance that students will continue in college (Holderman, 1995; Morris, 2001a).

One study of developmental courses at community colleges (Faro-Schroeder, 1995) showed that attendance was the best predictor of academic success, measured by course grade in developmental mathematics. The study recommended that attendance policies should be developed for all courses, particularly for courses designed to improve the academic skills of students. Many authors suggest that special courses or certain sections of these courses could be designed to emphasize skills specific to a discipline (Faro-Schroeder, 1995; Long & Thomas, n.d.; Saint Louis University Department of Mathematics, 1993).

In addition to formal courses in study and academic skill development, some colleges and universities post helpful information on their web sites (Long & Thomas, n.d.; Saint Louis University Department of Mathematics, 1993). For example, at Rogue Community College, a web document examines mathematics anxiety, taking a mathematics test, and how to study mathematics (Long & Thomas, n.d.). Another at Saint Louis University explains mathematics study skills, problem solving, studying for a mathematics test, taking a mathematics test, and getting assistance (Saint Louis University Department of Mathematics, 1993).

Minority students and students with learning disabilities are disproportionately represented in the population typically served by college preparatory and study skills courses (Fuller & Wehman, 2003; Hall, Spruill, & Webster, 2002; Heiman & Precel, 2003; Hrabowski, 2003; National Science Foundation, 2002). These students benefit from additional instruction about, and practice with, skills that are necessary for success in college. Because they are often enrolled in college preparatory courses, especially in mathematics, reading, and writing, it makes sense that a skills course that gives specific applications to other courses would help them immensely and increase student success and retention.

Suggestions in the literature about teaching for success include creating separate study skills courses for mathematics, adjusting already-existing study skills courses by incorporating mathematics terminology, adding an additional credit to specific developmental mathematics courses with appropriate additional content in the course, encouraging and advising more students to consider adding these courses to their programs, providing this kind of assistance to students as part of a larger student support service, and having more information about the topics in readily available formats, e.g., web sites, course handouts, syllabi, etc. (Brittenham et al., 2003; Long & Thomas, n.d.; Saint Louis University Department of Mathematics, 1993).

Accommodation for Differences in Student Learning Styles

Learning style research provides evidence that there are differences in the ways students learn (*e.g.*, visual, auditory, and kinesthetic), just as there are differences in the ways instructors approach and teach their subjects. The problem arises when an instructor's teaching style does not match the learning styles of the students. This may result in students becoming inattentive and unresponsive in class; doing poorly on tests; getting discouraged about the course, subject, and themselves; and, in some cases, changing majors or dropping out of school (Felder, 1988; O'Connor, 1997). According to Claxton and Murrell (1988), "some studies show that identifying a student's style and then providing instruction consistent with that style contribute to more effective learning." (p.1) More students benefit when their instructors use a variety of methods, including strategies that allow students to learn partly in a way they prefer, increasing willingness to learn and comprehension, and partly in less comfortable ways, providing a new perspective which can lead to greater skill acquisition. Claxton and Murrell add that, at the very least, learning about learning styles can help faculty become more sensitive to the differences in their classrooms and help them design experiences that match or expand the skills and strengths of the students.

O'Connor (1997) suggests that at least some modifications to curricular plans could be made in response to learning style issues. First, adding alternative activities and assignments allows students to select how they will demonstrate their subject mastery. Second, designing assignments that use many learning styles increases the number of skills with which students are comfortable. Third, creating complex, long-term projects allows students to collaborate with one another and to use multiple skills in order to complete the activity. Making these adjustments should contribute to successful learning environments.

Administering a learning styles inventory that allows students to identify their own learning strengths is helpful in promoting their understanding of how learning occurs, their

responsibility in the process, and the development of personal strategies for learning. However, this activity alone is not enough to enhance student learning and success. Claxton and Murrell (1988) suggest that it is of critical importance that professional development activities for faculty (*e.g.,* workshops, projects, and seminars) on incorporating accommodations for different learning styles be conducted for understanding the importance of learning style and suggesting modifications to traditional instructional strategies. In addition, encouraging, collecting, and using classroom research, formal and informal, can contribute to collaboration among faculty and administrators in enhancing the teaching-learning process. Finally, they feel that today's diverse student body and the existence of research that clearly identifies some of the dynamics of effective college teaching should encourage colleges to include knowledge about student development, learning theory, and instructional processes in faculty preparation and hiring decisions.

Incorporating Mathematics into Other Disciplines

Research indicates that strong classroom experiences and opportunities to use those experiences in other courses and other areas of life enhance both the amount of material students learn and their efforts to persist in their studies (Astin, 1993; Brittenham et al., 2003; Pascarella & Terenzini, 1991; Terenzini, 1992, 1993; Tinto, 1993a, 1993b). For developmental students, of whom as few as 10 percent complete degrees (Boylan, 1999), special intervention strategies which increase the amount of time and usage new material receives are indicated. One way to accomplish this is to incorporate the material into several courses at the same time. According to Cohen (1995),

> Mathematics faculty will actively involve students in meaningful mathematics problems that build upon their experiences, focus on broad mathematical themes, and build connection within branches of mathematics and between mathematics and other disciplines so that students will view mathematics as a connected whole relevant to their lives. . . . Students must have the opportunity to observe the interrelatedness of scientific and mathematical investigation and see first-hand how it connects to their lives. (p. 16)

At one large Midwestern public university, students were placed in developmental writing and mathematics courses simultaneously to develop their ability to write and solve problems in a timed setting. The faculty worked together to create connections between the courses and to meet the needs of the students. They identified terms and intellectual habits (*e.g.*, critical thinking, problem posing and problem solving) that support all academic disciplines and careers. They showed how these habits apply to all disciplines, particularly writing and mathematics. In a controlled experiment, there was a statistically significant difference between the experimental and control groups in pass rate, and 74.4

percent of the students in the experimental group returned for the next semester (Brittenham et al., 2003).

Panitz (2003) reports using writing strategies (*e.g.*, mathematical autobiography, learning contract, one-minute summary papers, and post-exam questionnaires) in mathematics courses to alleviate anxiety, to allow students to reflect on a particular class, and to review and synthesize what they have learned. He found that all of the following improved: motivation, critical thinking, intellectual skills, and mathematics grades.

At Dartmouth College, the Mathematics Department sets goals for integrating mathematics with courses across the curriculum by identifying patterns in student learning and faculty experience that transcend a single course or discipline. The faculty feel that an interdisciplinary approach that allows students to focus on their major area of interest in concert with mathematics will encourage their interest and improve their performance in both subjects. By approaching data from the natural sciences, the social sciences, and psychology in a mathematical manner, faculty find that students develop a better grasp of basic mathematical concepts and procedures (*e.g.*, fitting a curve to data, measuring variances, understanding graphs, and interpreting the results of statistical tests). Korey (1999) reports that their findings include:

> (a) Students' interest in mathematics is more important than their perceived mathematics ability in determining whether they study more mathematics. . . .
> (b) Real-life applications make mathematics more approachable and more interesting. . . .
> (c) Expanding the range of mathematics topics accessible to average college students increases their interest in mathematics. . . .
> (d) In-class group work helps college students learn mathematics. . . .
> (e) Interdisciplinary courses model the kind of creative, "out of the box" thinking needed in today's complex world. . . .
> (f) Planning and collaboratively teaching interdisciplinary courses offer faculty a valued opportunity for intellectual, pedagogical, and social exchange with their colleagues. . . . (General Findings section, para. 1-6)

Generally, incorporating mathematics into other disciplines strengthens students' skills in all of the disciplines involved and involves them in many types of resources and materials. This is particularly true for college developmental students and for students with learning disabilities (Fuller & Wehman, 2003; Hall, Spruill, & Webster, 2002; Heiman & Precel, 2003; Hrabowski, 2003). One of the most widely used and reported combinations is mathematics and developmental writing (Boylan, 1999; Brittenham et al., 2003; Korey, 1999; Panitz, 2003). Applications have also been found in the natural sciences, social sciences, and psychology (Korey, 1999). According to Cohen (1995), "Students will need to research sources other than standard mathematics textbooks to determine how mathematics provides a language for the sciences; plays a role in art,

music, and literature; is applied by economists; is used in business and manufacturing; and has had an impact on history." (p. 11)

Student Support Center for Mathematics Students

Students, faculty, and support staff could utilize a state-of-the-art mathematics support center. Students could have access to their instructors, to computer tutorial software for their mathematics courses, to review materials and manipulatives, to study areas, and to peer tutors. Faculty would be able to have more contact with their students and have access to all the materials as well. Support staff would be available to manage and coordinate the resources of the facility.

According to Butler, O'Hara, and Tunc (2000), the computer center at Ball State University has much more than computers. It features areas for students to study in groups and individually; a place for personal belongings; computers and software for course work, drill and practice, and tutorials; an area for faculty to use; a testing area; and teaching rooms. Faculty keep office hours there; proctors are available for group and individual testing; and tutors are accessible. Proctors and tutors are upper-division students, experienced lab assistants, and students who have previously completed the various courses. The student users experienced greater success and higher retention, especially in mathematics courses.

Childs *et al*. (1997) report that computer-assisted education is a valuable resource for independent learning, responds to different learning styles, makes the student an active participant in the learning process, and provides instant feedback. Students with disabilities can be accommodated with hardware and software that meet specific needs (Mull, 2003). Drill and practice in the skills students require can be made available. Computer-assisted education also prepares the student for today's technological environment (Chickering & Ehrmann, 1996).

At a large Midwestern public university, the Academic Resource Center coordinates learning communities; links courses in mathematics, study skills, and developmental writing; initiates early assessment and advisement; and provides supplemental instruction and tutoring. Brittenham *et al*. (2003) report that the following showed significant improvement: (a) attendance, (b) completion of assignments and homework, (c) pass rates, and (d) retention.

Advisement Specific to Mathematics Courses

Careful advisement for mathematics sequencing, in conjunction with early skill assessment, is essential for students to be successful in completing their course requirements, whatever their major. Miami Dade College data indicate that students are

more successful if they register for the subsequent course immediately after completing the prerequisite (Morris, 2001a, 2001b, 2002b). This is especially true if developmental courses are involved (Roueche & Roueche, 1993, 2000). It is also true for students with learning disabilities who may be more likely to need remedial courses (Fuller & Wehman, 2003; Hall, Spruill, & Webster, 2002; Heiman & Precel, 2003; Hrabowski, 2003; National Science Foundation, 2002).

Advisors and faculty need to be informed about the importance of requiring students to follow the mathematics sequence on a continuing basis. This may mean that additional training will have to be designed and delivered for those who advise and register students. Certainly students need to have advisors who are knowledgeable about the mathematics requirements, the necessity for continuous registration in mathematics courses, and the specific mathematics courses needed for majoring in different fields.

Program of Frequent Assessment

Students may be knowledgeable about study skills and simply fail to use them (Tuckman, n.d.) or they are unmotivated to use them. Tests provide an incentive to learn that is effective with many students who are otherwise unmotivated to study. They provide an opportunity to perform in order to achieve a desirable or important outcome. To test this supposition, Tuckman (n.d.) compared achievement results on a major examination taken by three groups: a class that received a 15-minute quiz at the beginning of every class, a class that did not take quizzes but had homework assignments, and a class that took only the major examination. He found that students in the frequent-testing group earned significantly higher grades than students in the other two groups. Students who showed the most improvement were those who began the course with low grade point averages and those who had a high procrastination tendency. He speculates that frequent testing, unlike homework problems that are based on using a text, provides an incentive motivation to store the information in long-term memory.

Faculty at the University of Kansas (2000) have found that frequent testing from the very beginning of the course keeps students on task and up-to-date with the course material. It also provides faculty with multiple measures leading to the final grade computation while providing students with frequent feedback. Early and frequent testing minimizes the effect of bad testing days. Childs *et al*. (1997) add that integrating frequent tests with active learning will also minimize test anxiety.

In the field of engineering, which is heavily dependent on skill in mathematics, Wankat and Oreovicz (1999) report that frequent testing results in increased time on task, more learning, and reduced test anxiety. Since administering more exams implies less time for lecture and practice in class, they recommend that more short quizzes and a few

exams will still produce the result of students continuing to study throughout the semester, thus increasing their achievement.

Frequent testing reduces the amount of information tested on any single assessment. For students with learning disabilities, testing often on smaller amounts of material reduces the interference of these disabilities with memory and application issues. Additionally, frequent testing improves focus and builds confidence (Corn, 1999; Fuller & Wehman, 2003; Hall, Spruill, & Webster, 2002; Heiman & Precel, 2003; Hrabowski, 2003).

Achievement is not the only area in which improvement is seen as a result of frequent testing. An improvement in the rate of retention is also reported (Butler, O'Hara, & Tunc, 2000; Brightman, n.d.). Clearly, frequent testing is a desirable strategy for enhancing learning in mathematics. According to Brightman (n.d.), the advantages are that it "maximizes student and teacher feedback, reduces testing anxiety, allows the instructor to drop one or more poor grades, provides for examinations early in the term, and provides more grades on which to base the final course grade." (p. 2)

Proctored Mathematics Assessment Center

One disadvantage of a program of frequent testing is that class time spent on lecture and problem solving is reduced. Thus, the establishment of a proctored mathematics assessment center, in which students could take tests outside of class time, would offset that difficulty. Such an assessment center would need computers and software that would generate tests, score tests, and enter scores in an electronic grade book. Special accommodations for students with disabilities would also be part of the equipment and software.

An assessment center such as this was implemented at Ball State University, first on a small scale as a pilot, and then collegewide. Interestingly, the center was used not only for mathematics, but also for other subjects such as psychology. Students were required to make reservations and to produce identification in order to use the center. No materials or other belongings, including book bags, were allowed in the area designated for testing. Student surveys conducted in the assessment center at the end of the first semester indicated that 90 percent of the students preferred this system to traditional testing. More cooperation among faculty, students, and support staff was observed. Students using the assessment center reported discussing mathematics with fellow students more than students taking in-class tests. The assessment center was also used for teaching large classes. Compared to students in large lecture sections, students in large classes that were taught in the assessment center showed higher success and retention rates. There was, however, a major concern about an apparent increase in cheating (Butler, O'Hara, & Tunc, 2000).

Learning Communities

Learning communities have been developed by institutions seeking ways for students to participate actively with faculty, build support networks among themselves, form friendships, and make connections to and within the institution (Kellogg, 1999). Within a learning community, the academic work provides students with opportunities for intellectual interaction with faculty and other students. Research shows that students who participate in learning communities have higher rates of success and retention, are more motivated, experience greater intellectual development, and are more involved in the institutional community (Brittenham et al., 2003; Johnson, Johnson, & Smith, 1991; Kellogg, 1999; Pascarella & Terenzini, 1991; Terenzini, 1992, 1993; Thomas & Higbee, 2000; Tinto, 1993a, 1993b, 2003).

Learning communities may use linked courses, student learning clusters, freshman interest groups (for students with the same major), theme-based courses, or coordinated interdisciplinary studies. Their common characteristic is that a cohort of students and faculty spend time together discussing academic content within and across courses and themes and issues. Successful learning communities continue from semester to semester, encouraging involvement and retention. Qualitative data suggest that the social support factor provides significant motivation to succeed and continue (Brittenham et al., 2003; Johnson, Johnson, & Smith, 1991; Tinto, 1993a, 1993b, 2003). Researchers have indicated that time on task and connections to and within the institution are important factors as well (Brittenham et al., 2003; Tinto, 1993a, 1993b, 2003). Quantitative data demonstrate that significant gains in student success and retention are being achieved in virtually every type of learning community and subject involved (Johnson, Johnson, & Smith, 1991; Tinto, 1993a, 1993b, 2003).

Summary

Since the mid-1990s, the United States has been facing a drop in the number of students choosing majors in mathematics, science, and engineering, coupled with declines in rates of success and retention. The problem appears to affect community colleges more dramatically than other institutions of higher education because many community college students are not prepared for college level courses. They often have family and other responsibilities that require part-time or full-time work. In addition, they may have economic, social, and personal problems that interfere with their academic responsibilities.

At the present time, eight of the 15 high risk courses at Miami Dade College are mathematics courses in which fewer than 60 percent of the students earn passing grades

of A, B, C, or S. Likewise, the continuation rate through the mathematics progression is low. Many students find themselves taking more than one remedial course, and some must repeat even these courses. Clearly, some intervention is necessary if the situation is to improve. Strategies that put the student as the center of decision making have the following characteristics: (a) there is frequent and substantive contact between faculty and students and among students, (b) there is active learning with sufficient time on task, (c) there are high expectations for success, and (d) there is respect and accommodation for a variety of learning styles (Chickering & Gamson, 1987).

The literature reveals that there are strategies that have increased the rates of success and retention in mathematics courses. Among these "best practices" are developing a specialized study skills course for mathematics, making accommodation for different student learning styles, incorporating mathematics into other disciplines, adding study skills content to mathematics courses, creating a comprehensive mathematics support center, offering specialized mathematics assessment and advisement, establishing a program of frequent testing, designing a proctored mathematics assessment center, and creating various kinds of learning communities. Each of these, in its own way, strengthens the skills of students, provides additional instruction and tutoring, addresses and accommodates different learning styles and disabilities, encourages students to complete their courses, and increases the likelihood that students will be successful. These "best practices" can enhance student learning. A plan that combines these practices will provide the mathematics connection to student success.

QEP-Related Activities

Soon after the QEP goals were set and charges were assigned to the committees, a variety of activities related to the QEP took place. These activities consisted of visitations to other institutions, dissemination of information about the QEP, interviews with selected mathematics faculty, facilities surveys, a frequent testing experiment, and making plans for faculty to participate in the Mathematics-Across-the-Curriculum Summer Institute in Washington State.

Visitations

Upon receiving their charges, members of the Best Practices Committee began investigating other institutions with exemplary programs or facilities. With consideration given to budget limitations on travel, it was decided to visit three institutions during March and April 2004: (1) Edmonds Community College in Lynwood, WA for their program in mathematics across the curriculum, (2) the Maricopa Colleges in greater Phoenix, AZ for their mathematics support centers and their mathematics-based study skills course, and (3) Iowa State University in Ames, IA for their computer-based mathematics testing center.

Edmonds Community College

Three members of the QEP team visited Edmonds Community College March 10 and 11, 2004. At Edmonds, mathematics is incorporated into another discipline by creating a partnership between a mathematics instructor and an instructor of another subject. The two instructors design a strategy to incorporate appropriate mathematics into the primary subject. At Edmonds, three alternatives were found that could be adapted at Miami Dade College.

1. A mathematics "guest lecturer" may visit the class of the primary subject instructor and deliver a lecture or a series of lectures to explain the mathematics related to a given topic in the primary subject.
2. A complete mathematics class and a complete class in another subject may be offered as "coordinated studies" courses, *i.e.*, as a learning community.
3. A one- or two-credit mathematics add-on, usually *Topics in Mathematics* may accompany a class in another subject. A student's grade for the mathematics add-on portion is usually determined by completing a project that applies the mathematics to the primary subject.

Examples of primary subjects into which mathematics has been incorporated at Edmonds Community College are Art History, Art, Political Science, Biology, English Composition, Anthropology, Chemistry, Ethnic Studies, and Economics. All of these strategies were discussed by the Mathematics in Other Disciplines Committee and incorporated into their recommendations.

The Maricopa Colleges

On March 24 and 25, 2004, three members of the QEP team visited four of the colleges in the Maricopa, AZ district: Glendale Community College, Phoenix College, Mesa Community College, and Scottsdale Community College. The purpose of the visit

was to inspect their facilities and to investigate their special arrangements for developmental mathematics courses.

Glendale Community College has a dedicated mathematics building containing private faculty offices (10 feet by 12 feet), state-of-the-art classrooms, a state-of-the-art support lab, a small testing center able to accommodate paper and pencil tests, mathematics-appropriate art work, a faculty lounge with a kitchen, a conference room, a small mathematics library, and an area for on-line mathematics courses. In Glendale's support lab, there are well-trained tutors, including some who have completed a College Reading and Learning Association (CRLA) certified training program. Of their 24 classrooms, three have computers with Internet access and eight have a computer linked to an overhead projector for the faculty

Glendale offers a two-credit course called *Tutored Mathematics*, MAT 108. This course is actually a hybrid. For a portion of each class meeting, such topics as test-taking skills, study skills, time management, and test anxiety are addressed. For the remainder of the hour, students receive tutoring in their specific courses. Support lab tutors are on hand to perform this function.

Phoenix College is the oldest of the Maricopa colleges. There is no dedicated mathematics building on the campus.

Mesa Community College is the largest of the Maricopa colleges with a fall term mathematics enrollment of 9,200 students. They have a dedicated mathematics/computer science building. Mathematics and Computer Science are combined into a single department. In the mathematics/computer science building, there are private offices for full time faculty, office space for adjuncts, and a faculty lounge/workroom. Space is also available for faculty-student small group sessions.

Scottsdale Community College has a dedicated mathematics building that contains private faculty offices, state-of-the-art classrooms, a state-of-the-art support lab, a faculty lounge with a kitchen, and office space for adjuncts. There is also a small area near the faculty offices where faculty can meet informally with small groups of students. Acoustics were given consideration in the architectural design of Scottsdale's support lab. Sound abatement baffles were hung from the ceiling throughout the area. Features of the facilities visited were incorporated in the recommendations of the Facilities and System Requirements Committees.

Iowa State University

Three members of the QEP team visited Iowa State University on April 22, 2004. The purpose of the visit was to inspect their mathematics computer-based testing lab. The testing lab contains approximately 30 computers. The testing software is supported

by MapleTA, which could work in conjunction with MDC's WebCT. Iowa State mathematics faculty developed the test items. The system ran on a local server. A proctor was on duty to check identifications of students reporting to take exams. Other than the presence of a proctor, there were no provisions made to prevent passive observations by other students. Testing lab features and testing software used at Iowa State University were discussed by the Facilities, Software Evaluation, and Best Practices Committees.

Dissemination of Information About the QEP

There was a major effort to disseminate information about the goals and objectives of the QEP to as many constituents of the College as possible. Between October 2003 and June 2004, formal presentations of the QEP were made to the College Executive Committee, the Collegewide CASSC, all campus CASSCs, Miami Dade College faculty who attended a Professional Development Day session, mathematics faculty who participated in the Mathematics Faculty Retreat, the Mathematics Discipline Committee, the Social Science Discipline Committee, campus senior leadership groups, mathematics chairs and their associate deans, the campus academic deans, the campus student deans, the campus administrative deans, faculty union leadership, all new faculty, the SACS Compliance team, the SACS Leadership team, and the District Board of Trustees.

To further promote the QEP, all of the College's 710 full-time faculty members were invited to submit proposals to incorporate mathematics into other disciplines. Twenty-two proposals were submitted. Information about the QEP was included on the College website. In 2003, the College President sent information about the QEP to all College employees via College email.

Mathematics Faculty Interviews

In an attempt to identify best teaching practices among mathematics faculty at the College, members of the Best Practices Committee conducted interviews with 10 mathematics faculty during March and April 2004. Faculty were asked to respond to the following questions:

1. What do you consider to be the strengths of your teaching?
2. What, if anything, do you want to change in your teaching?
3. What is your teaching philosophy?
4. Do you utilize technology in the classroom? If so, how?
5. What are the biggest obstacles/challenges for students?
6. What could be done to eliminate those obstacles?
7. What resources do you feel are most important for your students?

8. If you could have any resources for support, what would you choose?
9. Do you think that incorporating mathematics into other courses would improve students' performance in mathematics?

The results showed that faculty felt most successful if they were able to adapt to their students rather than insisting that their students adapt to them, to convince their students to utilize the resources available in the support labs, and to use a variety of teaching strategies in the classroom.

Mathematics Faculty Facilities Surveys

During January and February 2004, four surveys were distributed to all College full-time mathematics faculty members. The surveys requested input concerning their opinions about ideal mathematics facilities. Specifically, the surveys requested the following:

1. List the most important features of a state-of-the-art mathematics classroom.
2. List the most important features of a state-of-the-art mathematics support lab.
3. List the most important features of a state-of-the-art mathematics assessment center.
4. List the most important features of a state-of-the-art mathematics building.

Twenty-three faculty members responded to the survey. The results showed the following:

1. A state-of-the-art mathematics classroom should contain
    - Computers with Internet access
    - An overhead projector that can accommodate a computer and a graphing calculator
    - Student access to graphing calculators
    - White boards on every available wall
2. A state-of-the-art mathematics support lab should contain
    - Well trained tutors
    - Quiet windowed rooms for small groups
    - Quiet windowed rooms for individuals
    - Computers with mathematical software (tutorials, Maple, etc.) and Internet access
    - An area for videos
    - U-shaped tables for tutoring
    - Practice sheets and reviews
    - Solution manuals
    - Reference materials

3. A state-of-the-art mathematics assessment center should contain
    - An area for computer-based tests
    - An area for paper and pencil tests
    - An area for other forms of assessment
    - Well trained proctors to admit students, distribute tests and scratch paper, and answer questions
    - A reception/waiting area
    - Lockers for personal belongings
4. A state-of-the-art mathematics building should contain
    - State-of-the-art classrooms
    - A state-of-the-art support lab
    - A state-of-the-art assessment center
    - Private faculty offices
    - Office space for adjunct faculty
    - Mathematics-appropriate art work
    - A faculty lounge with a kitchen
    - Meeting/conference room(s)
    - An advisement/career area

The results of this survey were used in discussion regarding current facilities and their renovation/remodeling (see p. 52).

The Frequent Testing Experiment on Kendall Campus

During Spring term 2004, four mathematics faculty at the Kendall Campus agreed to participate in a frequent testing experiment. Each faculty member had been assigned to teach two or three classes of MAT 1033, Intermediate Algebra. A total of 10 classes were involved. Of these, five were randomly designated as control groups and the other five were designated as experimental groups. Care was taken to ensure that each faculty member had been assigned at least one group of each type. One faculty member taught two control groups and one experimental group. A second faculty member taught two experimental groups and one control group. The remaining two faculty members taught one group of each type. The course content was identical for all 10 classes involved in the experiment. Moreover, all faculty members used the same grading scale in all their classes (A: 90-100, B: 80-89, C: 70-79, D: 60-69, F: 0-59).

In each of the control groups, students were given four pre-constructed hour-long tests and a final exam. A review day was scheduled prior to each test and the final exam.

This arrangement is typical of the assessment schedule followed by the vast majority of mathematics faculty at the Kendall Campus.

In each of the experimental groups, students were given 15 pre-constructed half-hour quizzes and the same final exam as in the control sections. A review was scheduled only for the final exam.

A total of 200 students were registered in the five control groups, and 205 students were registered in the five experimental groups. The results of the experiment favored the experimental groups in pass rates, success ratios, withdrawal ratios, and student feedback results.

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)

The most successful classes will have high pass rates, high success ratios, and low withdrawal ratios. Table 5 summarizes the results of this experiment.

Table 5

Pass Rates, Success and Withdrawal Ratios for the Frequent Testing Experiment

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 %

The control group remained in the high risk category with a pass rate less than 60 percent. The experimental group, with a pass rate of 64.8 percent, moved out of the high risk category. Since students in both groups were evaluated with the same grading scale, there was no compromising of course standards. It is reasonable to assume that the higher results achieved by the experimental group is attributable to frequent testing.

At the end of the semester, student feedback survey results were collected and analyzed. The student feedback survey is intended to measure students' satisfaction with their instructors and their learning experiences. The survey consists of 15 questions to which students respond as follows: 4 = strongly agree, 3 = agree, 2 = disagree, and 1 = strongly disagree. Student feedback results for a class contain the averages (means) of

the students' responses. For the purposes of this experiment, differences between the means of the control and experimental groups on each item were calculated for each faculty member and each difference was assigned to the class with the higher mean. For example, if on a particular item, the control group's mean score was 3.25 and the experimental group's mean score was 3.38, then the difference (0.13) was assigned to the experimental group. Table 6 provides the weighted averages of these differences for all groups.

Table 6

Student Feedback Comparisons for the Frequent Testing Experiment

Student Feedback Table of Differences

Feedback item	Experimental Groups	Control Groups
1. The instructor encourages me to learn.	+ 0.16	
2. The instructor helps me see the purpose of this course.	+ 0.08	
3. The instructor is concerned with my progress.	+ 0.19	
4. The instructor informs me regularly about how I am doing in this course.	+ 0.14	
5. The instructor treats me with respect.	+ 0.15	
6. The instructor is available for individual help during office hours or by appointment.	+ 0.09	
7. The instructor creates an atmosphere that encourages me to learn.	+ 0.19	
8. The instructor makes this course interesting.	+ 0.18	
9. The instructor presents the subject matter clearly.	+ 0.17	
10. The instructor's assignments help me learn the material.	+ 0.14	
11. The instructor makes good use of class time.	+ 0.17	
12. The instructor discussed the grading policy at the beginning of the term.	+ 0.19	
13. The examinations are graded fairly.	+ 0.12	
14. The instructor responds effectively when asked questions about the subject matter of this course.	+ 0.14	
15. The instructor is prepared for class.	+ 0.20	

The table indicates that students in the experimental groups showed a higher level of agreement than students in the control groups on every feedback item. Therefore,

students in the experimental groups tended to have a more positive attitude about their instructors and their learning experiences than the students in the control group.

The Mathematics-Across-the-Curriculum Summer Institute

Since 2000, Edmonds Community College, with funding provided through a National Science Foundation grant, has sponsored a Summer Institute to promote the incorporation of mathematics into other disciplines. The participants generally attend in interdisciplinary teams. At the Institute, time and assistance are provided for faculty teams to develop interdisciplinary projects.

During April 2004, information about the QEP objective to develop a mathematics-in-other-disciplines program was sent to all faculty members at the College. They were invited to form teams, each consisting of one (or more) mathematics faculty and one (or more) faculty in another discipline, and submit a joint proposal to incorporate mathematics into another discipline. Ten proposals involving 11 mathematics faculty and 11 faculty in other disciplines were submitted. Eighteen of the 22 faculty also indicated a desire to attend the Summer Institute in Washington State August 17-20, 2004. All 18 were approved to attend. The proposals described projects to incorporate mathematics into a variety of disciplines, including computer programming, art history, biology, reading, writing, English as a Second Language (ESL), and nursing.

Committee Reports and Recommendations

Between October 2003 and April 2004, the various QEP committees held regular meetings to address their assigned charges. Each committee was asked to submit its final product to the QEP chairperson by April 27, 2004. The Literature Research Committee was to submit a literature review based on the QEP objectives defined during the initial meeting of the full QEP team. The role of the Steering Committee was to meet monthly to provide updates, to recommend modifications of the committee charges, and to maintain a sense of coordination among the committees. The minutes of all Steering Committee meetings are in the appendices. The remaining committees submitted reports that included specific recommendations related to their charges. Those reports and recommendations are summarized below.

Best Practices Committee

The charges assigned to the Best Practices Committee were:

- Conduct research (internet, ERIC, journal articles, etc.) to discover best practices in mathematics education at the beginning college level.
- Conduct research to discover best practices in accommodating needs of students with disabilities.
- Determine possible visitations to best-practice institutions.
- Interview selected Miami Dade College mathematics faculty to determine how they adapt to the varied abilities and learning styles of their students.

Recommendations

The Best Practices Committee reviewed 48 websites that contained information related to the QEP components of frequent assessment, mathematics in other disciplines, mathematics-based study skills courses (including mathematics anxiety), facilities, and computer-based testing (see Appendix A). Based on their website review, the Best Practices Committee recommended the following institutions for possible visitations.

- *Frequent Assessment*: University of Arizona, Ohio State University, Ball State University.
- *Mathematics in Other Disciplines*: Edmonds Community College, Dartmouth College.
- *Mathematics-Based Study Skills Course*: Manatee Community College, Glendale Community College.
- *Computer-Based Testing*: Ball State University, Iowa State University.
- *Facilities*: The Maricopa Colleges.

The committee also interviewed ten mathematics faculty members and one mathematics support center supervisor. The purpose of these interviews was to identify best practices in mathematics teaching strategies within the College. These interviews demonstrated that the most successful mathematics faculty use a variety of teaching strategies. The committee offers two recommendations.

1. In every targeted high risk mathematics class, faculty should administer a learning styles inventory to their students.
2. The College Training and Development (CTD) Department should sponsor a learning styles workshop specifically to assist mathematics faculty in identifying the different learning styles of their students, the characteristics of these learning styles, and classroom/study activities that can be used to accommodate the

different learning styles. Moreover, the committee recommends that faculty members who complete this workshop be awarded professional development credit.

Software Evaluation Committee

The charges assigned to the Software Evaluation Committee were:

- Develop rubrics to evaluate all software.
- Evaluate commercially produced mathematics testing software. The software may be produced by textbook publishers as ancillaries or by independent companies.
- Evaluate commercially produced mathematics tutorial software. The software may be produced by textbook publishers as ancillaries or by independent companies.

Recommendations

The committee recommends that all testing/tutorial software be evaluated on the basis of the rubric given in Table 7.

Table 7

Software Evaluation Rubric

Faculty Items

The scale for review is: 1-Excellent, 2-Good, 3-Satisfactory, 4-Unsatisfactory

	Item	1	2	3	4
1	Test/tutorial items meet the course competencies.				
2	Test items are of good quality.				
3	Faculty is able to add questions to existing test bank, and these questions can be algorithmically generated.				
4	The variety and volume of the questions in the test bank make the test bank algorithmically sound.				
5	Exams are not printable during assigned testing periods.				
6	Provider has good backup in place to handle network shutdowns associated with online components of software.				
7	Provider has good written documentation and provides support to train faculty in its use.				
8	Provider has good support to handle software bugs.				
9	Faculty is able to assign fixed time periods for test accessibility.				
10	Faculty is able to set the number of attempts available to students for each test/quiz.				
11	Faculty is able to assign weight of test grades.				
12	Faculty is able to change a grade in the online grade book.				

Student Items

The scale for review is: 1-Excellent, 2-Good, 3-Satisfactory, 4-Unsatisfactory

	Item	1	2	3	4
1	Student is able to answer free response questions with ease, and is not penalized for typographical errors.				
2	Student is able to go back and change an answer before leaving a test.				
3	Tutorial is of good quality.				
4	Student is able to access his/her grade after the test is submitted.				
5	Student is able to print the specific test he/she took after the test expiration date.				

The committee scheduled two days of software presentations by seven publishing/software companies. After listening to these presentations, the committee felt that five of the seven companies met the rubric criteria at an acceptable level. The committee recommends that Miami Dade College pilot the following five tutorial and assessment software packages before making a final decision on which packages would best suit its assessment and tutorial needs.

1. MyMathLab by Addison-Wesley
2. MyMathLab by Prentice-Hall
3. Math Zone by McGraw-Hill
4. EDUCO by EDUCO
5. I-Lrn by Thomson

System Requirements Committee

The charges assigned to the System Requirements Committee were:

- Determine hardware requirements for a mathematics assessment center.
- Resolve the issue of test security.
- Explore backup systems in case a server goes down or the system fails in any way.
- Accommodate the needs of students with disabilities.

Recommendations

With regard to the assigned charges, the committee recommends the following:

1. The computers installed in the computer-based testing area of a mathematics assessment center should meet the College standards. An adequate number of them should be reconfigured to accommodate the needs of students with disabilities.

2. Several steps should be taken to ensure test security. The system should work on a local network rather than the Internet to prevent information sharing among students. Test proctors should issue course color-coded scratch paper. Students with the same color scratch paper may then be seated apart from each other. The College should study the cost effectiveness of installing 3M security screens on each testing computer. Testing software should be selected on the basis of security as well as adequacy of content.
3. The system should have redundancy, including a backup server and power supply, to prevent the loss of data in case of a mechanical breakdown or electrical disruption.

Pilots will be conducted at the campus level. Decisions will be made by the Mathematics Discipline Committee by 2006.

Facilities Committee

The charges assigned to the Facilities Committee were:

- Determine the equipment and space requirements for a mathematics assessment center at each campus.
- Determine the requirements for a mathematics support center at each campus.
- Determine classroom needs for best mathematics instruction.
- Explore the feasibility of constructing dedicated mathematics buildings at North and Kendall Campuses.
- Be sure all facilities recommendations comply with national and state standards.
- Accommodate the needs of students with disabilities.

The members of the Facilities Committee and the QEP Chairperson visited the five Miami Dade College campuses that house mathematics support labs. The Medical Center Campus does not offer general education courses. The campus visits were two-fold: first, to observe what current facilities exist in order to sustain the present mathematics instructional and support services; second, to consider what could be established relevant to the focus of the QEP and the charge of the Facilities Committee. During each campus visitation, the mathematics support labs were toured, testing facilities were examined, classrooms were observed, and discussions were conducted with the Deans for Administration, facilities personnel, Deans of Academic Affairs, Mathematics Associate Deans and Chairpersons, and other Mathematics Department personnel. Discussions centered on currently existing mathematics services and facilities; current plans, if any, for facilities modifications; and the improvements and modifications needed for the facilities based upon those mathematics service changes being recommended. All campus

discussions mentioned a concern for increased resources for staffing given the fact that staff numbers will need to increase as space is enlarged and as testing areas are established. In some cases, facilities modifications for meeting the goals of the QEP are readily attainable. In others, facilities changes will present greater challenges.

Recommendations

Recognizing that each campus and permanent off-campus center has its own unique space and resource limitations, the committee recommends the following:

1. Each campus and permanent off-campus center should provide space to allow mathematics faculty to administer frequent assessments to their students outside of class in a quiet, proctored assessment center. The assessment center should have space for computer-based tests, paper and pencil tests, and other forms of assessment. This can be accomplished in various ways, depending on the space and resources available. Possibilities include reconfiguring existing space to create a stand-alone assessment center; rededicating portions of existing space, such as a computer courtyard; sharing existing space; or conducting assessments in a portion of the mathematics support center. All testing centers should accommodate the needs of students with disabilities.
2. Each campus and permanent off-campus center should design their existing mathematics support centers to include as many state-of-the-art features as feasible, given their limited space and resources. These features include quiet spaces for small group work, quiet spaces for individual study, computers with mathematical software and Internet access, a mathematics video area, U-shaped tables for tutoring, and sound baffles. All support centers should accommodate the needs of students with disabilities.
3. Each campus and permanent off-campus center should upgrade existing mathematics classrooms to incorporate as many state-of-the-art features as feasible, given limited space and resources. These features include white boards on every available wall, an overhead projector that can display computer screens and graphing calculators, permanent rectangular and polar grids on a portion of the board space, and in-class computers for student use. All classrooms should accommodate the needs of students with disabilities.
4. The College should explore the feasibility of constructing state-of-the-art, dedicated mathematics buildings at the larger campuses.

See Table 10, pp. 68-69 for the implementation schedule.

Student Support and Advisement Committee

The charges assigned to the Student Support and Advisement Committee were:

- Determine tutor training needs.
- Determine advisement strategies to ensure that students enroll sequentially in their mathematics courses, *i.e.*, that they take no major term breaks from mathematics.
- (Joint charge with the Mathematics Committee) Design an early intervention plan for students who are not making sufficient progress.
- Determine appropriate strategies for advising and orienting new students.
- Accommodate the needs of students with disabilities.

Recommendations

Recommendations for this report are based on research, subcommittee meetings, visitations to other colleges, student focus groups, faculty surveys, and interviews with Miami Dade College Student Services personnel. The committee recommends the following:

1. The mathematics support labs should establish a comprehensive tutor training program certified by the College Reading and Learning Association (CRLA).
2. The Mathematics Departments should provide mathematics sequencing information to the New Student Centers where incoming students receive their initial information and advisement. Each new student should receive a flow chart that clearly shows the recommended sequencing of mathematics courses from college entrance to graduation.
3. The College should institute an information campaign via flyers, academic advisors, faculty, and mathematics lab support personnel to reinforce the importance of mathematics course sequencing.
4. The Mathematics Departments should educate faculty and advisors that MGF 1107 or another mathematics course may better suit the interests or program requirements of Liberal Arts students than MAC 1105.
5. Mathematics faculty should take their students on a tour of the mathematics support lab early in the semester to acquaint them with the resources available.
6. Frequent testing allows faculty to identify quickly those students who are having difficulty with coursework. Following tests, faculty should generate individual learning prescriptions for these students. Students will take their prescriptions to the mathematics support lab where tutors will work with them. These prescriptions should be available on the faculty's office computer via the College or Campus network.

7. Mathematics faculty and support lab personnel should work closely with Access Services to ensure that instructional modalities, learning materials, and computer applications are appropriate for all students utilizing the learning support center. They should ensure that all students are welcome in the learning support center, and that all learning support staff demonstrate sensitivity to students with disabilities.

Mathematics Supplemental Instruction Committee

The charges assigned to the Mathematics Supplemental Instruction Committee were:

- Determine the content of the supplemental instruction component.
- Determine which students should be involved with the supplemental instruction component.
- Explore the possibility of providing mathematics tutoring as part of the supplemental instruction component.

Recommendations

The committee recommends the following:

1. The mathematics supplementary instructional component should be designated as a seminar and should address the following main topics:
    a. Student self awareness and the importance of mathematics
    b. Study skills for mathematics
    c. Addressing mathematics difficulties
    d. Use of available resources
2. Training should be made available to faculty who wish to teach this seminar.
3. All students repeating college preparatory mathematics courses should concurrently enroll in the seminar.
4. In-class tutoring should be a major activity in the seminar.

Mathematics in Other Disciplines Committee

The charges assigned to the Mathematics in Other Disciplines Committee were:

- Determine appropriate disciplines in which to incorporate mathematics and mathematical concepts.
- Design strategies to imbed mathematics in other disciplines.

Recommendations

The committee reached its set of recommendations on the basis of website reviews and a visit to Edmonds Community College in Lynnwood, Washington. Edmonds

Community College has an exemplary program in Mathematics Across the Curriculum. We offer the following recommendations:

1. It is possible to incorporate mathematics into virtually all college disciplines. We recommend that a standing collegewide committee be established to promote mathematics in other disciplines.
2. College faculty should be made aware of professional development activities related to mathematics in other disciplines. For example, Edmonds Community College, as part of a National Science Foundation grant, sponsors a Mathematics-Across-the-Curriculum Summer Institute in Washington State.
3. Reading faculty should include mathematical terms in their vocabulary lists. Writing faculty should require their students to write about the value of mathematics in the real world.
4. Three possible strategies should be utilized to incorporate mathematics into other disciplines. Each strategy requires that a mathematics faculty member and a faculty member in the other discipline (the primary subject) form a team. The three strategies are
    a. (Infusion model) The mathematics instructor serves as a guest lecturer in the primary subject instructor's class. The role of the mathematics instructor is to present the mathematical concepts as needed. Students do not earn any mathematics credits in this model.
    b. (Learning community model) The two instructors teach their own subjects, but in a coordinated fashion. The emphasis is on the applications of the mathematics course concepts to the primary subject. Students earn credit for both courses.
    c. (Mathematics enhancer model) A one- or two-credit mathematics course is linked to the primary subject. The mathematics course is specially designed to focus on the mathematics concepts that apply to the primary subject. Students earn credit for the primary subject and the appropriate number of mathematics credits.
5. A committee of mathematics faculty should be established to determine whether mathematics enhancers should count toward the mathematics graduation requirement or be included among the electives.

See Table 10, pp. 68-69 for the implementation schedule.

Mathematics Committee

The charges assigned to the Mathematics Committee were:

- Develop suggested syllabi that include frequent assessments for the targeted high risk courses.
- Determine possible grading criteria.
- Review textbooks associated with the software given a positive rating by the Software Evaluation Committee.
- (Joint charge with the Student Support and Advisement Committee) Design an early intervention plan for students who are not making sufficient progress.
- Determine the features of an ideal dedicated mathematics building.
- Recommend appropriate use of technology in the mathematics classroom.
- Accommodate the needs of students with disabilities.
- Serve as content-area resource persons to the other assigned committees.
- Promote the QEP to colleagues in the Mathematics Departments.

Recommendations

With regard to the charges above, the committee makes the following recommendations:

1. The committee wrote syllabi that incorporate frequent assessments and include grading criteria for the targeted high risk courses. The Mathematics Departments should keep these syllabi as models and create their own based on adopted textbooks. Although faculty should be free to select their own test items from the textbook's test bank, each department should create its own set of default items for each syllabus-scheduled test.
2. The committee reviewed the textbooks published by the companies with software approved by the QEP Software Review Committee. Among these were the textbooks published by Addison-Wesley, EDUCO, McGraw-Hill, Prentice-Hall and Thomson. The criteria for evaluation included (a) completeness of coverage according to specified course competencies, (b) readability, (c) sufficiency and quality of exercises, (d) ancillary resources, (e) accurate usage of mathematical vocabulary, and (f) inclusion of graphing calculator exercises for MAC 1105. The committee found textbooks from all of the publishers that adequately met the criteria. We recommend that a list of these textbooks be kept on file in the Mathematics Departments.
3. A permanent committee, consisting of mathematics faculty from all campuses, should be appointed to evaluate textbook/software combinations as they appear on the market.

4. Since frequent assessment implies early assessment, mathematics faculty should be able to identify students having difficulty with sufficient time to intervene. Faculty should provide these students with learning prescriptions to follow in the support center to correct their deficiencies.
5. Effective Fall 2004, every MDC student will be required to provide the College with an active email account in order to enhance communication and learning. The College should use email to send interim progress reports to all students.
6. The committee recommends that the College investigate the feasibility of constructing dedicated mathematics buildings at the largest campuses. The features of an ideal mathematics building should include state-of-the-art classrooms, a state-of-the-art support center, a state-of-the-art assessment center, private faculty offices, a faculty lounge, a conference room, and sufficient office space for adjunct faculty.
7. The committee recognizes that mathematics faculty have differing philosophies about the use of technology in the mathematics classroom. Nonetheless, this committee recommends that calculators not be allowed in the college-prep courses, a scientific calculator be allowed in Intermediate Algebra, and a graphing calculator be allowed in College Algebra and subsequent courses.
8. All recommendations that apply to facilities should be implemented with the needs of students with disabilities as an important consideration.
9. The Mathematics Departments, under the leadership of the department chairpersons, should take steps to ensure that all QEP recommendations pertaining to curriculum, instruction, support, and assessment are incorporated into the mathematics programs.

See Table 10, pp. 68-69 for the implementation schedule.

Goals and Strategies of the QEP

In the context of the QEP, student learning was previously defined as:

1. Improved mastery of competencies in the targeted high risk mathematics courses of College-Prep Mathematics, College-Prep Algebra, Intermediate Algebra, and College Algebra.
2. A positive attitude toward the learning of mathematics.

Based on the review of related literature, the QEP-related activities, and the recommendations submitted by the various QEP committees, the following learning goals, together with strategies to achieve these goals, were established.

Goal 1: To improve student mastery of competencies in the targeted high risk mathematics courses of College-Prep Mathematics (MAT 0020), College-Prep Algebra (MAT 0024), Intermediate Algebra (MAT 1033), and College Algebra (MAC 1105).

Goal 1 strategies:

1. A program of frequent assessment will be established in the targeted high risk mathematics courses.
2. Since frequent assessment implies early assessment, an early intervention program of providing learning prescriptions will be established for students who demonstrate need.
3. Faculty, advisors, and students will become more aware of the recommended sequencing of mathematics courses and alternatives that may be more suitable to student interests and/or program requirements.
4. Students who are repeating either College-Prep Mathematics (MAT 0020) or College-Prep Algebra (MAT 0024) will receive supplemental instruction.

Goal 2: To foster a positive student attitude toward the learning of mathematics.

Goal 2 strategies:

5. A tutor training program will be implemented to improve the quality of tutoring in the mathematics support labs.
6. As part of their supplemental instruction, all students who are repeating either MAT 0020 or MAT 0024 will receive mathematics success skills training to improve their attitudes toward the learning of mathematics.
7. Personalized interim progress reports will be sent to students' email accounts on file with the College.
8. Strategies that incorporate mathematics into other disciplines will be utilized to demonstrate to students in Liberal Arts programs how mathematics can be applied to other academic areas.
9. Faculty will acquire new teaching techniques to accommodate the various learning styles of their students.
10. Mathematics support labs will be upgraded, improved, and redirected to provide students with a more inviting and supportive environment.

Proposed Implementation

This section describes the processes that Miami Dade College will follow in order to implement, assess, evaluate, and document the QEP. A summary of projected costs is also included.

Assessment Plan

Ten strategies to achieve the learning goals of the QEP are identified. Each strategy will be assessed to determine its impact on student learning. Table 8 summarizes the plan to assess these strategies. MDC's Office of Institutional Research will provide the statistical analyses required to conduct the assessments. Where student grades are to be used to assess mastery of course competencies, existing course standards will not be compromised.

Table 8

QEP Assessment Plan

Learning Goal	Strategy	Assessment(s)	Comparison
To improve student mastery of competencies in the targeted high risk mathematics courses of College-Prep Mathematics (MAT 0020), College-Prep Algebra (MAT 0024), Intermediate Algebra (MAT 1033), and College Algebra (MAC 1105).	1. Establish a program of frequent assessment.	a. Pass rates b. Success ratios c. Withdrawal ratios d. Course progression and success data	Historical data
	2. Provide learning prescriptions for students who demonstrate need.	a. Pass rates b. Success ratios c. Withdrawal ratios	Experimental vs. control group
	3. Establish mathematics advisement procedures.	Enrollment data: accurate placement and continuous enrollment	Historical data
	4. Provide supplemental instruction for all students repeating MAT 0020 or MAT 0024.	a. Pass rates b. Success ratios c. Withdrawal ratios	Experimental vs. control group
To foster a positive student attitude toward the learning of mathematics.	5. Implement a CRLA-certified tutor training program.	Service excellence survey (see Appendix F)	Pre- and post-training ratings
	6. Provide mathematics success skills training for all students repeating MAT 0020 or MAT 0024.	Student feedback instrument (see Appendix G) or an attitudinal survey toward the learning of mathematics	Experimental vs. control group
	7. Send personalized interim progress reports to students through their email accounts on file with the College.	Student feedback instrument (see Appendix G) or an attitudinal survey toward the learning of mathematics	Experimental vs. control group

	8. Establish a program to incorporate mathematics into other disciplines.	Student feedback instrument (see Appendix G) or an attitudinal survey toward the learning of mathematics	Experimental vs. control group
	9. Provide mathematics faculty training on accommodating different learning styles.	Student feedback instrument (see Appendix G) or an attitudinal survey toward the learning of mathematics	Pre- and post-training ratings
	10. Upgrade the mathematics support labs.	Service excellence survey	Pre- and post-upgrade ratings

Assessment Details

Each of the ten strategies is intended to achieve one of the two QEP goals leading to enhanced student learning. The assessments are intended to measure whether or not the strategies achieved the desired goals. If an assessment repeatedly indicates that a particular strategy does not achieve the desired goal, then either the strategy or the method of assessment will be modified.

Strategy 1. (Establish a program of frequent assessment) Pass rates, success ratios, and withdrawal ratios of classes that utilize frequent assessment will be compared to historical data. Existing course standards will not be compromised. "Course progression and success" refers to the gap between the success rates of students who are placed in a course by virtue of a placement test score and the success rates of students who enroll in a course immediately after passing the prerequisite course. Current gaps are given in Table 2, which shows higher success rates among students who enroll through placement testing. An objective of this strategy (frequent assessment) is to reduce the gaps.

Strategy 2. (Provide learning prescriptions for students who demonstrate need) For the purpose of this strategy, "students who demonstrate need" are students who are underachieving in class. A prescription will indicate specific course content with which a student needs help. The help will be provided in the support lab. The pass rates, success ratios, and withdrawal ratios of an experimental group who receive the treatment (learning prescriptions) will be compared to the pass rates, success ratios, and withdrawal ratios of a control group who do not receive the treatment. Existing course standards will not be compromised. If the pass rates, success ratios, and withdrawal ratios of the experimental group are significantly higher than those of the control group, then, eventually, all students enrolled in the high risk mathematics courses and who demonstrate need will be given learning prescriptions.

Strategy 3. (Establish mathematics advisement procedures) Once the advisement program is established, enrollment data will be used to measure its effectiveness. These data will be compared to baseline data obtained prior to the establishment of the advisement program. Specifically, enrollment data will be used to answer the following:

- Are students beginning their mathematics early, *i.e.*, before they complete their 12th credit?
- Are students enrolling in the next mathematics course of their prescribed sequence immediately after completing the prerequisite course?
- Are the mathematics courses in which students enroll appropriate for their programs of study?

Strategy 4. (Provide supplemental instruction for all students repeating MAT 0020 or MAT 0024) The pass rates, success ratios, and withdrawal ratios of an experimental group who receive the treatment (supplemental instruction) will be compared to the pass rates, success ratios, and withdrawal ratios of a control group who do not receive the treatment. Existing course standards will not be compromised. If the pass rates, success ratios, and withdrawal ratios of the experimental group are significantly higher than those of the control group, then, eventually, all students who are repeating MAT 0020 or MAT 0024 will be provided supplemental instruction.

Strategy 5. (Implement a CRLA-certified tutor training program) The College has developed a service excellence survey pertaining to the services students receive in the mathematics support labs (see Appendix F). Survey items that address the services rendered by the support lab tutors will be analyzed. Survey results for tutors who complete a CRLA-certified training program will be compared to baseline results and to results for tutors who do not complete the training program.

Strategy 6. (Provide mathematics success skills training for all students repeating MAT 0020 or MAT 0024) The mathematics success skills training will include such concepts as study skills, test-taking skills, dealing with math anxiety, and time management. This training will be part of the supplemental instruction seminar intended for all students repeating either MAT 0020 or MAT 0024. Student feedback surveys, or an appropriate attitudinal survey, will be administered to an experimental group who receive the treatment (mathematics success skills training as part of supplemental instruction), a control group who receive no mathematics success skills training as part of their supplemental instruction, and to a control group who receive neither the supplemental instruction nor the mathematics success skills training. If the student feedback results of the experimental group are significantly higher than those of the control groups, then, eventually, all MAT 0020 and MAT 0024 repeaters will be given mathematics success skills training as part of their supplemental instruction.

Strategy 7. (Send personalized interim progress reports to students through their email accounts on file with the College) Student feedback surveys, or appropriate attitudinal surveys, will be administered to an experimental group who receive the treatment (personalized interim progress reports) and to a control group who do not receive the treatment. The results of these surveys will be compared. Eventually, all students enrolled in the high risk courses will receive personalized interim progress reports.

Strategy 8. (Establish a program to incorporate mathematics into other disciplines) Faculty who teach in disciplines other than mathematics will be selected to participate in a statistical study. Each faculty member will be teaching two sections of the same course. Mathematics will be incorporated into one section (the experimental group), but not the other (the control group). Student feedback results, or the results of an appropriate attitudinal survey, will be compared.

Strategy 9. (Provide mathematics faculty training on accommodating different learning styles) Mathematics faculty who participate in the learning styles workshop will be selected for a statistical study. Each faculty member will administer a student feedback survey or an appropriate attitudinal survey to their classes before participating in the learning styles workshop. They will also administer the student feedback survey or attitudinal survey to their classes after having completed the workshop. The pre- and post-workshop survey results will be compared.

Strategy 10. (Upgrade the mathematics support labs) The College has developed a service excellence survey pertaining to the services students receive in the mathematics support labs (see Appendix F). The items that pertain to those aspects of the support labs other than tutoring will be analyzed. Items may be added to the survey. Baseline data will be obtained prior to upgrading the support labs. The pre- and post-upgrade data obtained from these surveys will be compared.

Projected Costs

Table 9 provides projected costs necessary to implement the QEP.

Table 9

QEP Projected Costs

Activity	Year 1 (2005)	Year 2 (2006)	Year 3 (2007)	Year 4 (2008)	Total (Four years)
1. Faculty development: Summer Institute	$10,420	$10,420	$10,420	$10,420	$41,680
2. Faculty development: Learning Styles Workshop	$5,000	$0	$5,000	$0	$10,000
3. Faculty development: Supplemental instruction training	$6,000	$3,600	$3,600	$3,600	$16,800
4. Implement CRLA-certified tutor training program	$6,600	$5,760	$5,760	$5,760	$23,880
5. Committee members in-county travel	$580	$580	$580	$580	$2,320
6. Designate and equip mathematics assessment centers	$267,500	$0	$0	$0	$267,500
7. Staff the assessment centers (proctors)	$0	$219,067	$225,639	$232,407	$677,113
8. Staff the supplemental instruction seminar	$0	$47,022	$164,577	$235,110	$446,709
9. New facilities, remodeling, renovation	see p. 66				
TOTALS	$296,100	$286,449	$415,576	$487,877	**$1,486,002**

Projected Costs Details

The following paragraphs provide the rationale for the projected costs.

1. (Faculty development: Summer Institute) To attend the Mathematics-Across-the Curriculum Summer Institute in Washington State, each individual faculty participant would require $600 for airfare, $100 for registration, $300 for lodging, and $42 for meals (2 days @$21 per day). The total for each faculty participant is $1,042. Provisions will be made for 10 faculty participants, resulting in a total of $10,420 each year and a resulting four-year total of $41,680.
2. (Faculty development: Learning Styles Workshop) A consultant will be contracted to conduct a four-hour workshop during the 2005 and 2007 Mathematics Retreats. The standard payment for a consultant to conduct such a workshop is $5,000, resulting in a four-year total of $10,000.
3. (Faculty development: Supplemental instruction training) During 2005, a consultant will be contracted to train a team of facilitators. The facilitators will be MDC faculty volunteers. The consultant will be paid the standard $5,000 plus $1,000 for development of materials. Thus the first-year cost is $6,000. During 2006 through 2008, two MDC faculty facilitators will receive $300 each for conducting the workshops, a total of $600. Twenty faculty participants will be paid $150 each to attend, a total of $3,000. Thus, a total of $3,600 will be spent to offer the workshop during each of 2006 through 2008. The four-year total is $6,000 + (3 × $3,600) = $16,800.
4. (Implement CRLA-certified tutor training program) During 2005, a consultant will be contracted and paid $5,000 to train facilitators in a four-hour workshop. The facilitators will be the mathematics support lab managers. Twenty experienced tutors will be paid $80 each to attend, a total of $1,600. Thus the 2005 cost will be $6,600. During each of 2006 through 2008, the facilitators will conduct the training for 60 tutor trainees. Each trainee will receive $80 for attending, a total of $4,800 for the trainees at five MDC campuses. The facilitators will be assisted by a total of 12 previously trained tutors. Each of these trained tutors will be paid $80 to assist the facilitators. Thus, $960 will be spent on previously trained tutors. For each of 2006 through 2008, the total cost will be $4,800 + $960 = $5,760. The four-year total will be $6,600 + (3 × $5,760) = $23,880.
5. (Committee members in-county travel) The four QEP committees (Oversight, Software/Textbook Review, Mathematics Across Disciplines, and Mathematics Enhancer Review) will have a total of approximately 20 members. It is

estimated that each will travel a total of 100 miles annually to attend committee meetings at the various campuses. The Colleges reimburses employees 29¢ per mile for in-county travel. Thus, the cost will be 20 × 100 × 29¢ = $580 per year, or a four-year total of $2,320.

6. (Designate and equip mathematics assessment centers) During 2005, each campus will purchase computers and furniture to equip a mathematics assessment center. Each assessment station will require a computer, a table, and a chair. To prepare for the pilot year of 2006, there will be 30 stations at North Campus, 30 stations at Kendall Campus, 20 stations at Wolfson Campus, 20 stations at InterAmerican Campus, and 10 stations at Homestead Campus, *i.e.*, a total of 110 assessment stations. Each of the five campuses will also need a server to store the testing software. Each computer costs $1,800, each chair/table combination costs $550, and each server costs $1,800. The total cost for 2005 is (110 × $1,800) + (110 × $550) + (5 × $1,800) = $198,000 + $60,500 + $9,000 = $267,500. Each subsequent year, computers will be provided through the College's Technology Refresh Project, and furniture will be provided from existing stock. Thus, no additional funds will be required to expand the assessment centers beyond 2005.
7. (Staff the assessment centers with proctors) Computer-based testing in the mathematics assessment centers is scheduled to begin January 2006 (see Table 10). Thus no funds are needed to hire proctors for 2005. Starting January 2006, the mathematics assessment centers at North Campus, Kendall Campus, Wolfson Campus, and InterAmerican Campus will be open 60 hours per week. The assessment center at Homestead will be open 30 hours per week. Each assessment center will be open for the entire 48-week academic year. Because of differing mathematics enrollments at the campuses, North Campus, Kendall Campus, and Wolfson Campus will need 80 proctor hours per week, InterAmerican Campus will need 60 proctor hours per week, and Homestead Campus will need 30 proctor hours per week. Each proctor is paid $12 per hour. Thus the total cost of hiring proctors, not including fringe benefits, for 2006 is (3 × 80 × $12 × 48) + (60 × $12 × 48) + (30 × $12 × 48) = $190,080. An additional cost amounting to 15.25 percent of salary is paid by the College for fringe benefits. Thus, the College will pay an additional 0.1525 × $190,080 = $28,987 in fringe benefits. The total cost to the College during 2006 is $190,080 + $28,987 = $219,067. For each subsequent year, a raise of three percent is added to the previous year's base salary. Thus, the cost of maintaining the proctors during 2007 will be $225,639. The cost of maintaining

the proctors during 2008 will be $232,407. Thus, the four-year total for hiring and maintaining a sufficient number of proctors in the mathematics assessment centers will be $219,067 + $225,639 + $232,407 = $677,113.

8. (Staff the supplemental instruction seminar) The supplemental instruction seminars will be offered beginning January 2006 (see Table 10). Thus no funds are required for this activity during 2005. The program will be phased in over a three-year period as follows.
   - During the experimental year of 2006, a sufficient number of sections to accommodate half the repeaters of MAT 0024 will be offered. Based on historical enrollment data, this will require 12 sections at North Campus, 10 sections at Kendall Campus, eight sections at Wolfson Campus, and two sections each at InterAmerican and Homestead Campuses. Each section will meet for 32 hours. Each faculty member, assumed to be an adjunct, will be paid the standard wage of $37.50 per hour, *i.e.*, $1,200 per section. Adding 15.25 percent for fringe benefits, each section will cost the College $1,383 Thus, during 2006, the 34 seminar sections will cost the College 34 × $1,383 = $47,022.
   - During 2007, a sufficient number of sections to accommodate all the repeaters of MAT 0024 and half the repeaters of MAT 0020 will be offered, *i.e.*, a total of 119 sections collegewide – 42 sections at North Campus, 35 sections at Kendall Campus, 28 sections at Wolfson Campus, and seven sections each at InterAmerican and Homestead Campuses. Thus, the cost of staffing the seminar during 2007 is 119 × $1,383 = $164,577.
   - During 2008, 170 sections collegewide will be offered to accommodate all repeaters of both MAT 0020 and MAT 0024. Thus, the cost of staffing the seminar during 2008 will be 170 × $1,383 = $235,110.

   The four-year total for staffing the seminar will be $47,022 + $164,577 + $235,110 = $446,709.
9. (New facilities, remodeling, renovation) All new construction, remodeling, and renovation projects will consider the QEP needs for mathematical support labs, assessment centers, and classrooms. These considerations will be part of future Capital Improvement Program (CIP) and Public Education Capital Outlay (PECO) funding requests from the State of Florida.

Evaluation/Documentation Plan

In order to monitor the progress of the QEP, an Oversight Committee will be appointed by the College President. The committee will be responsible for the evaluation

and the documentation of the QEP. The evaluation/documentation plan will be multifaceted with attention given to the goals, the strategies, and the assessments of the QEP. The committee will be assigned two major responsibilities:

1. To evaluate the QEP on a regular basis and, if necessary, make adjustments in the plan in order to achieve the desired student learning goals.
2. To document the progress made in achieving the learning goals of the QEP.

The committee, consisting of 10 to 15 individuals representing a wide range of constituencies at the College, will meet at least three times a year. The members of this QEP Oversight Committee will receive regular input from individuals responsible for implementing various activities specified in the QEP implementation schedule.

The committee will determine its own charges. During the four-year implementation period, the committee will develop a document that will contain the following.

- Minutes of all Oversight Committee meetings.
- Results of the QEP assessments provided for by the QEP Assessment Plan.
- Recommendations for modifications of the QEP, including modifications of the planned assessments, projected costs, the implementation schedule, and the Oversight Committee charges.
- Reports on the achievement of student learning goals.
- Descriptions of other significant QEP-related activities at the College.
- QEP-related faculty development activities.
- Grant opportunities.

Implementation Schedule/Timeline

Table 10 provides a schedule for implementation of the QEP. It is expected that the individual(s) responsible for an activity may appoint a committee to perform the duties necessary to complete the activity.

Table 10

QEP Implementation Schedule/Timeline

Proposed date(s)	Activity	Responsible individual(s)
Summer 2004	Distribute information about the Mathematics-Across-the-Curriculum Summer Institute	College Provost for Education
Spring 2005	Appoint QEP Oversight Committee	College President
	Appoint Mathematics Enhancer Review Committee	Mathematics Department Chairpersons
	Appoint Mathematics Across the Disciplines Committee	College Provost for Education
	Appoint mathematics software/textbook review committee	Kendall Campus President
	Provide mathematics advisement information to advisors, all faculty, and mathematics lab personnel	Mathematics Department Chairpersons
Pilot Spring 2005; Fully implement by Fall 2005	Use student email accounts to send interim progress reports	Campus Student Deans
Summer 2005	Develop course syllabi with frequent testing	Mathematics Department Chairpersons
	Develop student prescription form	Mathematics Department Chairpersons
Fall 2005	Offer CRLA-certified tutor training programs	College Training and Development
	Offer Learning Styles Workshops	College Training and Development
	Offer Mathematics-Across-the-Disciplines courses	Appropriate Department Chairpersons
	Offer study skills training for faculty	College Training and Development

Spring 2006	Offer supplemental instruction seminars	Mathematics Department Chairpersons
	Pilot mathematics textbook/software combinations	Mathematics Department Chairpersons
Pilot Spring 2006 – Summer 2008; Fully implement by Fall 2008	Implement proctored computer-based frequent assessment programs	Mathematics Department Chairpersons; Campus Academic Deans; Campus Deans for Administration
Fall 2006 – Summer 2008	Designate and equip proctored assessment centers	Campus Deans for Administration; College Architect
Fall 2006 – Summer 2008	Upgrade mathematics support centers	Campus Deans for Administration; College Architect

Summary

Miami Dade College has identified a set of high risk courses, defined to be high enrollment courses with low pass rates. High risk courses are major obstacles for students and prevent a large number of them from completing their postsecondary programs.

The four high risk courses with the largest enrollments at the College are all mathematics: MAT 0020 (College-Prep Mathematics), MAT 0024 (College-Prep Algebra), MAT 1033 (Intermediate Algebra), and MAC 1105 (College Algebra). The College has supported a number of faculty-driven initiatives in an attempt to enhance student success in these courses. The Quality Enhancement Plan (QEP) extends these initiatives and complements the College's Learning Agenda, its Strategic Plan, and its mission.

The purpose of the QEP is to enhance student learning in mathematics using a variety of innovative curricular, instructional, support, and assessment strategies. These strategies include frequent assessment, supplemental instruction, additional student support, specialized advisement, faculty development, and incorporating mathematics into other disciplines. The goals of the QEP are as follows:

- To improve student mastery of competencies in the targeted high risk mathematics courses of College-Prep Mathematics (MAT 0020), College-Prep Algebra (MAT 0024), Intermediate Algebra (MAT 1033), and College Algebra (MAC 1105).
- To foster a positive student attitude toward the learning of mathematics.

The implementation of the QEP will be accomplished incrementally over the four-year period from fall 2004 through summer 2008. Throughout the implementation, specific strategies will be assessed to determine their impact on student learning. In addition, a QEP Oversight Committee will evaluate the various components of the plan, document the progress of the QEP, and make modifications to the plan as appropriate. The four-year total cost to implement the QEP is projected to be approximately $1.5 million. Once the QEP is fully implemented, it will impact approximately 45,000 students per year.

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Appendices

Appendix A: List of Websites Reviewed by the QEP Best Practices Committee

Frequent assessment

http://www.asee.org/prism/february/html/testing.html

http://wildcat.arizona.edu/papers/93/37/01_3_m.html

http://www.iupui.edu/it/stratdir/olsen2.html

http://www.stanford.edu/dept/CTL/teach/handbook/testing.html

http://www.ukans.edu/~cte/resources/teachingtips/general.html

http://www.gsu.edu/~dschjb/wwwtest.html

http://www.acs.ohio-state.edu/education/ftad/Publications/TeachingHandbook/chap-7.pdf

http://www.udel.edu/cte/TAbook/index.html

http://all.successcenter.ohio-state.edu/belgium-paper/BWT-belgium-paper.htm

http://www2.utmb.edu/ctf/Modailities_CTF.html

http://www.bsu.edu/web/mmohara/teachport/pedarts/mwera2000/sld001.htm

Computer-based testing

http://ts.mivu.org/?show=article&id=1013

Mathematics in other disciplines

http://mac.edcc.edu/

http://www.math.dartmouth.edu/~matc/index.html

http://www.dartmouth.edu/~chance/chance_news/current_news/current.html

http://www.gsu.edu/~mstlls/thurgood_files/frame.htm

http://matc.siam.org/

http://www.projectintermath.com/docs/fuller.pdf

http://www.mtholyoke.edu/courses/rschwart/mac/

http://math.whatcom.ctc.edu/content/Links.phtml?cat=11

http://www.biology.arizona.edu/raire/mac/links.html

http://www.math.dartmouth.edu/~matc/eBookshelf/index.html

Supplemental instruction

http://www.academicsuccess.com/

http://mtsu32.mtsu.edu:11064/anxiety.html

http://www.mathpower.com/index.htm

http://www.mathanxiety.net/

http://www.plu.edu/~aast/math.html

http://www.ipfw.edu/math/anx_materials.html

http://www.newtonswindow.com/math_anxiety.htm

http://www.oncourseworkshop.com/Emotions006.htm

http://www.mathgoodies.com/articles/math_anxiety.shtm

http://wc.pima.edu/~carem/MTHANXY.html

http://www.lemoyne.edu/academic_support_center/mathanx.htm

http://euler.slu.edu/Dept/SuccessinMath.html

http://www.swt.edu/slac/math/RedAnx.html

http://www.mathpower.com/tips.htm

http://mtsu32.mtsu.edu:11064/skill.html

http://www.scs.tamu.edu/selfhelp/elibrary/math_study_skills.asp

http://www.amatyc.org/OnlineResource/StudySkills.html

http://www.geosoc.org/schools/pass/math1.htm

http://www.smc.maricopa.edu/sub1/lac/study_math0001.htm

http://www.richland.cc.il.us/james/misc/testtake.html

http://www.academicsuccess.com/

http://www.ferris.edu/htmls/academics/sla/

Learning styles

http://www.ericfacility.net/ericdigests/ed301143.html

http://web.indstate.edu/ctl/styles/learning.html

http://www.ncsu.edu/felder-public/Learning_Styles.html

http://www.csrnet.org/csrnet/articles/student-learning-styles.html

http://www.usd/trio/tut/ts/stylest.html

http://www.usd.edu/tut/ts/styleunder.html

http://www.accd.edu/sac/history/keller/ACCDitg/SSLS.html

http://pss.uvm.edu/pss162/learning_styles.html

http://www.ldpride.net/learningstyles.MI.htm

http://www.chaminade.org/inspire/learnstl.htm

http://www.metamath.com/multiple/multiple_choice_questions.cgi

Assessment

http://www.maa.org/saum/

Support centers

http://www.pvc.maricopa.edu/~lsche/index.htm

Appendix B: Steering Committee Minutes, January 27, 2004
(Wolfson Campus, Room 5501-6, 1:00 P.M.)

Members present: Irene-Canel-Peterson, Charlotte Berceli, Rosemary Garcia-Pendleton, Jan Burlison, Dixie Lemons, Sol Maury, Joann McNair, Rosany Alvarez, Patrick Bibby.
Member absent: Chris Rogers
Guest: Gina Cortes-Suarez

1. Committee Progress Reports

Each committee chair in attendance provided a five- to ten-minute progress report.

Best Practices - Irene Canel-Peterson reported that she met with Norma Agras to discuss best practices reflecting the American Mathematical Association of Two-Year Colleges (AMATYC) standards. . Santa Fe Community College and the University of Jacksonville are possible visitation sites.

Literature Research – Rosemary Garcia-Pendleton reported that the Literature Research Committee has discussed the following.

- Research project.
- Computer-based testing.
- Best practices in mathematics programs.
- Learning styles.

Committee members are divided into three groups: Research, Writing, and Editing.

Software Evaluation – Charlotte Berceli reported that the Software Evaluation Committee has accomplished the following.

- Developed a rubric for evaluating testing and tutorial software.
- On January 21, all committee members attended software presentations by six vendors: McGraw-Hill, Thomson Learning, Prentice-Hall, Addison-Wesley, Houghton-Mifflin, and EDUCO.

Three more vendors are scheduled to make presentations on February 5th. Once the committee rates the packages based on their rubric, they will provide their ratings to the Mathematics Committee, who will review the accompanying textbooks. It is possible that we may decide to pilot more than one package sometime during 2005-2006.

System Requirements- No report.

Facilities – Jan Burlison reported that the Facilities Committee has discussed the following.

- Visitations to each campus to meet with Administrative Dean and plan for necessary facilities.
- Research of state-of-the-art facilities for students with disabilities, for example, Purdue University.
- Bringing in consultants.

Student Support and Advisement – Dixie Lemons reported that the Student Support and Advisement Committee has discussed the following.

- Specialized training for tutors.
- Student support after MAT 1033.
- Implementing study groups similar to PALS – Peer Advisor Liaison Program.

The committee has contacted the College Reading and Learning Association (CRLA) and requested an information packet for tutor certification.

Mathematics Supplemental Instruction – Sol Maury reported that the Mathematics Supplemental Instruction Committee has discussed the following.

- Possible visitations to institutions that have supplemental instruction programs, *e.g.*, the University of Central Florida and Manatee Community College.

- Study skills courses for Allied Health and Nursing are being developed at Medical Center Campus. A similar program has been implemented at the Wolfson and North Campuses.

Mathematics – Rosany Alvarez reported that the Mathematics Committee has discussed the following.

- Review of textbooks that are associated with approved software packages.
- Components of a state-of-the-art mathematics facility.
- Frequent testing outside of class in a proctored, computer-based testing facility.
- Allowing students to take exams within a designated time window.
- Tutor training.
- Tutors as coaches.
- Planning for an adequate number of computers in the support lab.
- Having videos available for students.
- Small study rooms.
- Having textbooks and supplementary materials at the support lab.

Mathematics in Other Disciplines – Joann McNair reported that the Mathematics in Other Disciplines Committee has discussed the following.

- Possible visitation to an exemplary program at Edmonds Community College in Lynnwood, Washington.
- Math Clubs.
- Developing a collegewide mathematics vocabulary list.

2. Travel Plans – February
   A. Edmonds CC, Lynnwood WA
      Member of Mathematics in Other Disciplines Committee
      Member of Mathematics Committee
      Pat Bibby
   B. Iowa State University
      Member of Facilities Committee
      Member of Systems Requirements Committee
      Pat Bibby
   C. Purdue University and Ball State University
      Member of Best Practices Committee
      Member of Facilities Committee
      Pat Bibby
   D. Glendale Community College and the Maricopa Community Colleges
      Member of the Mathematics Committee
      Member of the Student Support and Advisement Committee
      Pat Bibby

3. Funds for Travel
   Travel funds are available from Learning Innovations. Pat Bibby prepared narratives for the "Rationale" and "Desired Outcomes" sections of the application.

4. Professional Development Day
   The following individuals agreed to present various elements of the QEP during Professional Development Day on March 4th.
      Sol Maury (Mathematics supplemental instruction)
      Joann McNair (Mathematics in other disciplines)
      Dixie Lemons (Student support and advisement)
      Pat Bibby (Frequent testing and computer-based testing)

5. Review and modification of committee charges
   The Steering Committee agreed to add the following charges.
   A. Consider requirements for students with disabilities (Facilities, Student Support and Advisement, and System Requirements Committees).
   B. Develop an early intervention plan for students who demonstrate they need additional support (Mathematics and Student Support and Advisement Committees).
   C. Promote the QEP to all mathematics faculty (Mathematics Committee).

6. The Steering Committee agreed to meet once a month through April 2004.
The meeting was adjourned at 3:30 p.m.

Appendix C: Steering Committee Minutes, February 24, 2004
(Wolfson Campus, Room 5501-6, 1:00 P.M.)

Members present: Irene-Canel-Peterson, Rosemary Garcia-Pendleton, Alan Berkey (for Jan Burlison), Dixie Lemons, Sol Maury, Chris Rogers, Joann McNair, Rosany Alvarez, Patrick Bibby.
Members absent: Charlotte Berceli, Jan Burlison

1. Before the meeting began, Norma Agras distributed and discussed two items. The first was *Developmental Mathematics: A Plan for Florida's Community Colleges*. The second was the portion of the American Mathematical Association of Two-Year College's publication *Crossroads in Mathematics: Standards for Introductory College Mathematics Before Calculus* dealing with assessment.

2. Committee Progress Reports
Each committee chair provided a five- to ten-minute progress report.

Best Practices – Irene Canel-Peterson indicated that she and her committee would conduct research for future visitations. Possibilities include one out-of-state site and several in Florida.

Software Evaluation – Pat Bibby (substituting for Charlotte Berceli, who was attending to a family medical emergency) reported that the committee's work was essentially finished. They developed a rubric to evaluate software packages, and sat through seven one-hour presentations. Five companies made the shortlist: Addison-Wesley, EDUCO, McGraw-Hill, Prentice-Hall, and Thomson Learning. The committee sent the shortlist to the Mathematics Committee who will evaluate the accompanying textbooks.

Literature Research – Rosemary Garcia-Pendleton reported that the committee has been researching and continues to research studies on mathematics achievement, learning styles, computer-based testing, best practices, and accommodating the needs of students with disabilities.

System Requirements – Chris Rogers reported that the committee is considering issues related to student-identification security, test security, swipe cards, security screens, and accommodating the needs of students with disabilities.

Facilities – Alan Berkey (substituting for Jan Burlison) reported that the committee has met five times. In the first two meetings, the committee developed a set of questions to be answered on their site visits to the various campuses. The committee made site visits to Homestead Campus, Kendall Campus, and Wolfson Campus. At each site, they were given a tour of the support lab and then met with administrators, faculty, and staff to discuss plans for expanding the existing support lab and finding space large enough to accommodate a testing/assessment lab. There is disparity among the facilities at these sites. Upcoming visits are scheduled for North Campus, and InterAmerican Campus. Jan

Burlison and Pat Bibby made a presentation on behalf of the QEP Facilities Committee at the February meeting of the Campus Deans/Directors of Administrative Services.

Student Support and Advisement – Dixie Lemons stressed the importance of locating mathematics faculty offices near the support labs. She also proposed the idea that the college-prep and college-credit math labs should not be separated. Her committee believes that support labs should accommodate mathematical-based experiments and have a designated area for manipulatives. She recommended the article " Implementing Design in Learning Centers," and discussed the International Tutor Certification Program.

Mathematics Supplemental Instruction - Sol Maury reported that the committee is currently addressing the content of this supplemental instruction component. There has been discussion about which students should be required to participate in this component. On Friday, February 27, Dr. Paul Nolting will meet with the committee. He is the author of several books dealing with mathematics study skills, including Winning at Math.

Mathematics in Other Disciplines – Joann McNair reported that the committee has been researching related websites for exemplary programs. A visit to Edmonds Community College, near Seattle Washington, is scheduled for mid-March. The committee has been consulting with mathematics faculty from the North Campus. The other disciplines that seem to fit most naturally with mathematics include science, music, and art; but the challenge will be to find other areas in which to incorporate mathematics/quantitative literacy. Joann also reported that the QEP's focus on mathematics has caused controversy among some faculty in other disciplines. Alan Berkey responded that mathematics is the number one impediment to students' graduations. Sol Maury added that low CPT math scores are more highly correlated to non-completion of graduation requirements than any other area.

Mathematics – Rosany Alvarez reported that publishers will be making presentations on behalf of their textbooks during March. The publishers are those on the shortlist submitted by the Software Evaluation Committee. The committee developed a rubric on which to base their evaluations of the various texts. There has been a certain amount of negativity concerning the QEP among some mathematics faculty members. We agreed that it could be a lengthy process to get the endorsement of most mathematics faculty and that some would never endorse the plan.

4. Summary of Committee Meetings

So far, the committees have held 18 meetings.

5. Travel Plans

Visitations are scheduled as follows.

A. Edmonds Community College (Lynnwood WA) March 9 – March 12.
B. Iowa State University (Ames IA) March 17 – March 19.
C. Glendale Community College (Phoenix AZ) and the Maricopa circuit March 23 – March 26.
D. TBA March 31 – April 2.
E. The Florida Circuit April 5 – April 9.

The planned visit to Purdue University was cancelled for lack of an exemplary program.

6. Professional Development Day Presentation

Sol Maury, Joann McNair, Dixie Lemons, and Pat Bibby will make a QEP presentation at Professional Development Day, Thursday, March 4, from 10 am to 11am. The presentation will consist of five separate power point presentations (introduction, mathematics supplemental instruction component, mathematics in other disciplines, student support and advisement, and frequent testing) followed by a question and answer session.

7. Review/modification of Committee Charges
There were no modifications of the committee charges.

8. Other Items

Members agreed that the referral sheets used to send students to a prescriptive intervention activity should be as efficient and easy to use as possible.

Joann asked if students being tested by computer could get feedback on the items that they missed. Pat promised to find out. (They can.)

Sol stressed the importance of a training program for faculty teaching the mathematics supplemental instruction component.

Rosany asked about the Mathematics Committee's charge of designing syllabi that incorporate frequent testing. Pat suggested that they be kept as generic as possible. That particular charge may be revisited at a later date.

Most committee members indicated that they have heard some negativity toward the QEP on the part of faculty in mathematics and in other disciplines. Pat indicated that he is trying to deal with the mathematics faculty by addressing their concerns and offering them several options. Among faculty in other disciplines, the QEP seemed to come out of nowhere. Many are questioning the selection of mathematics as the focus of the QEP. We agreed that the SACS Leadership Team should put out information to all faculty about the process behind the selection of mathematics as the focus.

The next meeting of the QEP Steering Committee will be on Tuesday, March 30.

Committee products (a literature review or a set of recommendations) will be due at the April meeting of the Steering Committee.

Appendix D: Steering Committee Minutes, March 30, 2004
(Wolfson Campus, Room 5507, 1:30 P.M.)

Members present: Irene-Canel-Peterson, Charlotte Berceli, Rosemary Garcia-Pendelton, Jan Burlison, Dixie Lemons, Sol Maury, Joann McNair, Rosany Alvarez.
Member absent: Chris Rogers
Guest: Michelle Arman

1. Committee Progress Reports
Each committee chair, with the exception of System Requirements, presented a 10- to 15-minute progress report.

Best Practices – Irene Canel-Peterson reported that the committee is in the process of interviewing Miami Dade College mathematics faculty to find the best practices within the College. They are also looking at websites.

Literature Research – Rosemary Garcia-Pendleton reported that the research has been completed and the writing and editing have begun. Topics of the literature review will include best practices, learning styles, computer-based testing, frequent testing, mathematics achievement, math anxiety, and mathematics in other disciplines.

Software Evaluation – Charlotte Berceli reported that the committee has recommended that five companies be allowed to install their software packages at the College for pilot testing: Addison-Wesley, EDUCO, McGraw-Hill, Prentice Hall, and Thomson Learning. It was suggested that both faculty and students evaluate the software packages during the pilot program. It was noted that some companies provide test-taking tutorials in order to acquaint students with computer-based tests. Charlotte agreed to find this information.

Facilities – Jan Burlison reported that visits have been conducted on four of the five comprehensive campuses. A visit to InterAmerican Campus is scheduled for April 6. During each visit, members of the Facilities Committee were given a tour of the

mathematics support lab(s) and then met with the Campus Deans to map out plans to upgrade the lab(s) and to find space for a mathematics assessment center.

System Requirements – No report.

Student Support and Advisement – Dixie Lemons reported that her committee met with the various campus math lab managers. She suggested that the college strongly urge that all prospective tutors complete a College Reading and Learning Association (CRLA)-certified training program. She suggested that the college provide a salary increment for all tutors who complete this program. In order to improve the mathematics advisement of students, an information campaign should be conducted to remind students to register for their mathematics courses in sequence and to register for each course as soon as possible after completing the prerequisite. All faculty should receive some training in mathematics advisement. The new student orientation should emphasize sequencing in mathematics. The early intervention plan, which this committee is designing in conjunction with the Mathematics Committee, should include a component to contact students whose attendance is poor. Dixie made a report on the recent QEP visit to four of the Maricopa colleges.

Mathematics – Rosany Alvarez reported that the committee is in the process of preparing sample generic syllabi for MAT 0020, MAT 0024, MAT 1033, and MAC 1105. Each syllabus will incorporate frequent testing. They are also reviewing textbooks from the companies that made the Software Evaluation Committee's shortlist. Presentations have been made to the committee by McGraw-Hill, Thomson Learning, EDUCO, Prentice Hall, and Addison-Wesley. The committee has scheduled a meeting on April 7 to finalize their list of textbook recommendations. Their proposed intervention plan will contain the following features: (1) Students should be given a tour of the math lab(s) at the beginning of the term in order to allow them to get an idea of the services they can receive there, (2) the mathematics tutors should visit classes in order to introduce themselves, and (3) students who are referred to a math support lab for intervention should review previous topics and work on current topics. The committee will recommend that graphing calculators be introduced in MAC 1105 and that scientific calculators be introduced in MAT 1033.

Mathematics Supplemental Instruction – Sol Maury reported that the committee has completed a draft of the course content for the mathematics supplemental component. An issue still to be resolved is which students should be required to participate.

Mathematics in Other Disciplines – Joann McNair reported on the recent QEP visit to Edmonds Community College in Lynwood, Washington. Joann suggested that faculty who get involved in a partnership to incorporate mathematics in other disciplines participate in a College Training and Development workshop and earn maintenance-of-rank credits for completing the training. She also suggested that participants in the program apply for the Summer Institute sponsored by Edmonds Community College.

2. Summary of Committee Meetings So far, the various QEP committees have conducted 24 meetings as indicated in the following summary table.

The next meeting of the QEP Steering Committee will be on Thursday, April 29 at 2:00 in Room K-423 on Kendall Campus. Tom Benberg of SACS plans to attend. Each committee's final product is due to Pat Bibby no later than Tuesday, April 27.

Appendix E: Steering Committee Minutes, April 29, 2004
(Kendall Campus, Room K-423, 2:00 P.M.)

Members present: Irene Canel-Peterson, Charlotte Berceli, Rosemary Garcia-Pendleton, Jan Burlison, Dixie Lemons, Sol Maury, Joann McNair, Chris Rogers, Alina Coronel (for Rosany Alvarez), Patrick Bibby.
Members absent: Rosany Alvarez
Guests: Nancy Liu, Gina Cortes-Suarez, Tom Benberg.

1. Committee Final Reports.

Each committee chair provided a summary of the committee's final product.

Literature Research – Rosemary Garcia-Pendleton reported that the QEP literature review included research on Miami Dade's student body, student success in the high-risk mathematics courses, and placement criteria. The review also contains research data concerning QEP topics: Study skills for mathematics, incorporating mathematics into other disciplines, support centers, advisement, frequent testing, proctored mathematics assessment centers, and learning communities. The literature review includes an extensive bibliography.

Software Evaluation – Charlotte Berceli reported that several publishers presented their testing software over a two-day period. The committee evaluated each software package on the basis of a pre-developed rubric. Five companies made the committee's shortlist. This information was shared with the Mathematics Committee so that they could select the textbooks for their review.

System Requirements – Chris Rogers gave a highly technical report. He stressed accessibility for students with disabilities. Much of his report dealt with security issues, in securing the facility and correctly identifying students. The report recommended that computers for testing be equipped with security screens.

Facilities – Jan Burlison described the observation and planning visits made by committee members to each of Miami Dade College's five comprehensive campuses. Each visit dealt with the requirements to upgrade the mathematics support centers and classrooms and to establish a mathematics testing center. The report contains specific recommendations for implementation. The report also includes summaries of the facilities surveys conducted among mathematics faculty at all campuses.

Student Support and Advisement – Dixie Lemons described the final report. It includes recommendations for tutor training, advisement strategies, early intervention, new student orientation, and accommodating the needs of students with disabilities.

Mathematics Supplemental Instruction – Sol Maury reported that the committee recommends that the supplemental instruction component include topics such as self awareness, study skills, difficulties with mathematics, and locating resources. They recommended that, space permitting, all college-prep mathematics courses be linked to supplementary instruction. The committee also recommended that faculty who teach the course receive specific training.

Mathematics in Other Disciplines – Joann McNair submitted the report. This particular aspect of the QEP turned out to be much more significant than anyone imagined. The committee recommended that mathematics be incorporated into other disciplines by creating partnerships between mathematics faculty and faculty in other disciplines. There are three strategies to accomplish this:

1. The mathematics instructor could serve as a guest lecturer in the primary subject.
2. An existing mathematics course could be taught with the primary subject as a learning community.
3. A one-credit mathematics course, called a "math enhancer," could be taught together with the primary subject.

Mathematics – Alina Coronel reported that the committee evaluated several textbooks recommended by the Software Evaluation Committee using a pre-developed rubric. The committee also wrote sample syllabi, incorporating frequent testing, for each targeted high-risk course. Other recommendations included early intervention (a joint project with the Student Support and Advisement Committee), technology in the classroom, accommodating the needs of students with disabilities, and the features of the ideal mathematics building.

Best Practices – Irene Canel-Petersen reported that the committee located and reviewed several websites dealing with QEP components. The committee also conducted interviews with current Miami Dade mathematics faculty who are generally regarded to be student oriented and have high success rates.

2. Summary of Committee Meetings

There were no corrections to the chart of 31 committee meetings dating from December 3, 2003 to April 22, 2004.

3. QEP visitations

Pat Bibby reported that various members of the QEP made three off-site visitations. The first visit was to Edmonds Community College in Lynnwood, Washington, to investigate their program in mathematics across the curriculum. The second visit was to four of the Maricopa, Arizona colleges (Glendale CC, Phoenix College, Mesa CC, and Scottsdale CC) to look at their facilities. The third visit was to Iowa State University in Ames, Iowa to investigate their computer-based mathematics testing center.

4. The need for additional committees

The QEP Steering Committee recommended that two committees be established to follow up on the work done thus far.

1. A standing committee of mathematics faculty should be appointed to evaluate new software products and accompanying textbooks as they appear on the market.
2. A committee should be appointed to promote mathematics across the disciplines.

5. The MAT 1033 frequent testing experiment

During the Spring 2004 term, four mathematics faculty from Kendall Campus participated in a frequent testing experiment. Each had multiple sections of MAT 1033. Each faculty member taught a control group, which was given four exams and a final, and an experimental group, which was given 15 quizzes and a final. Nancy Liu and Alina Coronel were two of the faculty involved. Each reported that their experimental groups had more success.

6. Other items/updates

Pat Bibby provided information on the Mathematics Across the Curriculum Summer Institute scheduled for August 17-20 in Leavenworth, Washington. He reported that 18 Miami Dade faculty have submitted proposals to attend. Gina Cortes-Suarez indicated that the campus academic deans would evaluate the proposals on Thursday, May 6.

Pat reported that Gina and he had submitted a proposal to present the Miami Dade QEP at one of the sessions of the next SACS annual meeting in Atlanta. He was happy to report that the proposal was accepted.

Gina reported on the next steps in the process. First, the QEP itself will be written and reviewed over the summer. It must be submitted to SACS by August 28, 2004. During October 2004, an on-site SACS committee will visit Miami Dade to review the QEP and interview several individuals. That visit is extremely important and will require extensive preparation.

7. Feedback and suggestions from Tom Benberg

Tom had several observations to share and suggestions to make. He is convinced that we are committed to the success of the QEP. He is quite pleased with the amount of faculty involvement in the development of the plan. He is pleased that the focus is on student learning. He is also pleased that the QEP is based on research, visitations, and best practices. He observed that the structure of our committees implied that the process was comprehensive.

Tom made the following suggestions:

1. The purpose statement in the QEP Prospectus should read, "…to enhance student learning by developing innovative strategies…."
2. In the QEP document, we should indicate how each of the six goals would contribute to student learning.
3. The QEP should include provisions for continuous monitoring and evaluation.
4. We need to indicate how we intend to prove that the plan enhances student learning.
5. He suggested that we determine the differences between learning styles of successful students and those of unsuccessful students and how the plan addresses these differences.
6. Most of the strategies are outside the classroom. Should we address the issues of teacher behavior and curriculum?
7. We should conduct learning styles inventories in all college-prep mathematics classes and schedule faculty development sessions so that faculty would be able to respond to those different styles.
8. In the Reaffirmation document, there is a precise definition of student learning.
9. The evaluation of the QEP will be based on four criteria: Its focus, the institution's capacity to implement it, the College's procedures to assess the plan, and broad-based involvement.
10. The Reaffirmation document lists nine elements that the QEP must include.
11. The QEP should be reviewed by significant groups, including the Board of Trustees.
12. The cost of implementing the QEP should be specified.
13. The QEP should include a timeline for implementation.

Appendix F: Math Lab Service Excellence Survey

Miami Dade College
Evaluation of the Mathematics Support Laboratory

On the answer sheet, in the "subject" section, please write the mathematics course number for which you are enrolled this summer. If you are taking more than one mathematics course, you will have the opportunity to fill out an evaluation for each course that you are taking. As a reminder, here is the list of courses:
MAT 0002, MAT 0020, MAT 0024, MAT 1033, MAC 1105, STA 2023,
MAC 1114, MAC 1140, MAC 1147, MGF 1106, MGF 1107, MTG 2204,
MAC 2311, MAC 2312, MAC 2313, MAP 2302, MAC 2233

1. How often did you use the math lab this past term?
a) every day
b) almost every day
c) once or twice each week
d) hardly ever
e) never

2 The quality of assistance that you received in the math lab at the front desk when checking in or out, inquiring about an instructor, etc. is excellent.
a) strongly agree
b) agree
c) disagree
d) strongly disagree
e) does not apply or have not tried to use this assistance

3. If you received (or tried to receive) assistance from the tutors, you found that they were always, or almost always, very helpful.
a) strongly agree
b) agree
c) disagree
d) strongly disagree
e) does not apply or have not tried to use this assistance

4. If you received (or tried to receive) assistance from the tutors, you found that they were always able to answer your questions and generally understood the material of your course.
a) strongly agree
b) agree
c) disagree
d) strongly disagree
e) does not apply or have not tried to use this assistance

5. If you received (or tried to receive) assistance from the tutors, you found that they only made positive comments regarding your course, textbook, or instructor.
a) strongly agree
b) agree
c) disagree
d) strongly disagree
e) does not apply or have not tried to use this assistance

6. If you received (or tried to receive) assistance from the tutors, you found that they never seemed to favor some students over others and gave equal treatment to all.
a) strongly agree
b) agree
c) disagree
d) strongly disagree
e) does not apply or have not tried to use this assistance

7. If you received (or tried to receive) assistance from the tutors, you found that they always exhibited appropriate behavior (they never asked you or someone next to you for your or his/her phone number; they never solicited money for tutoring you outside the lab, etc.)
a) strongly agree
b) agree
c) disagree
d) strongly disagree
e) does not apply or have not tried to use this assistance

8. The quality of assistance that you received from the computer software related to your class as available in the lab's computers is excellent.
a) strongly agree
b) agree
c) disagree
d) strongly disagree
e) does not apply or have not tried to use this assistance

9. The quality of assistance that you received from the videos related to your class as available in the lab is excellent.
a) strongly agree
b) agree
c) disagree
d) strongly disagree
e) does not apply or have not tried to use this assistance

10. The quality of assistance that you received from the reference books found on the lab's bookshelves is excellent.
a) strongly agree
b) agree
c) disagree
d) strongly disagree
e) does not apply or have not tried to use this assistance

11. The quality of assistance that you received from the solutions manuals found in the lab is excellent.
a) strongly agree
b) agree
c) disagree
d) strongly disagree
e) does not apply or have not tried to use this assistance

On the back of this sheet, please write any comments regarding the lab, the lab staff, and any tutors who have been particularly helpful to you.

Thank you for giving us the opportunity to evaluate and improve our services.

Math Lab Staff

Appendix G: Student Feedback Instrument
(Scoring: strongly agree = 4, agree = 3, disagree = 2, strongly disagree = 1)

	Strongly Agree	Agree	Disagree	Strongly Disagree	Unable to Comment
1. The instructor encourages me to learn.					
2. The instructor helps me see the purpose of this course.					
3. The instructor is concerned with my progress.					
4. The instructor informs me regularly about how I am doing in this course.					
5. The instructor treats me with respect.					
6. The instructor is available for individual help during office hours or by appointment.					
7. The instructor creates an atmosphere that encourages me to learn.					
8. The instructor makes this course interesting.					
9. The instructor presents the subject matter clearly.					
10. The instructor's assignments help me learn the material.					
11. The instructor makes good use of class time.					
12. The instructor discussed the grading policy at the beginning of the term.					
13. The examinations are graded fairly.					
14. The instructor responds effectively when asked questions about the subject matter of this course.					
15. The instructor is prepared for class.					

Glossary

College preparatory (College-Prep) Developmental/remedial.

Course progression The process of moving from one course to the next course in a sequence.

Frequent assessment The practice of assessing students early and often, providing both students and faculty with early and regular feedback.

High risk course A course with more than 300 students enrolled in a semester and a pass rate less than 60 percent.

Learning community A cohort of students enrolled together in two or more courses, providing an opportunity for students and faculty to discuss academic content within and across courses, themes, and issues.

Learning style A preference for learning new concepts; specifically, auditory, kinesthetic, and visual.

Miami Dade College's Learning Agenda An effort by the College to identify and implement initiatives that focus on every aspect of student learning.

Pass rate Number of passing grades (A, B, C, or S) divided by the total number of grades.

Performance-based funding A state higher education funding program in which a portion of a college's annual state allocation is based on the number of its program completers and graduations.

S grade A passing grade in college preparatory courses.

Student feedback survey MDC's 15-item questionnaire administered to assess students' satisfaction with their instructors and their learning experiences.

Student focus groups MDC groups of students at each campus responding to a survey for analysis of what contributes to student success in high risk mathematics courses.

Student Life Skills (SLS) course A course that assists students in the development and achievement of their academic, vocational, and personal goals.

Success ratio Number of passing grades divided by the total number of grades excluding withdrawals.

Technology Refresh Project An MDC program to replace or upgrade 20 percent of its technology, including, but not limited to, microcomputers, every year.

Withdrawal ratio Number of withdrawals divided by the total number of grades.