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ABSTRACT

Florida's Miami-Dade County Public Schools (M-DCPS) is preparing all children for success in the mathematics and science, technology-dependent 21st century. Ongoing National Science Foundation funding catalyzed substantial changes in the systemic reform movement of mathematics and science education from 1994-99. The Miami-Dade USI produced significant growth in student achievement, particularly among minority students. There was major policy change attributable to the USI and substantive development of an enhanced infrastructure capable of supporting and sustaining reform. There was also broadened and deepened collaboration with universities, local agencies, private sector interests, and informal science organizations. M-DCPS is implementing Miami RISE (Rising to International Standards in Science/Mathematics Education) Urban Systemic Program. Its goal is to accelerate the school and community infrastructure that ensures student success in mathematics and science via refined curriculum, aligned assessments to improve instruction, deepened teacher content knowledge, supportive environments, community partnerships, and policy changes to enable systemic reform. Each school has an instructional improvement team intended to implement a transformative learning model of professional development. This paper presents data on the impact of the Miami RISE USP for 2000-01 related to student achievement; standards based curriculum implementation; hands-on, inquiry based instruction; quality of professional development; assessment; and student support. (SM)

Urban Systemic Reform: A Discussion Among Policy Makers, Implementators, and Evaluators Interactive Symposium

Cross-Site Evaluation of the Urban Systemic Program

An Evolution from Miami-Dade USI to Miami RISE USP

Presented by

Constance Thornton and Yuwadee Wongbundhit
Miami-Dade County Public Schools

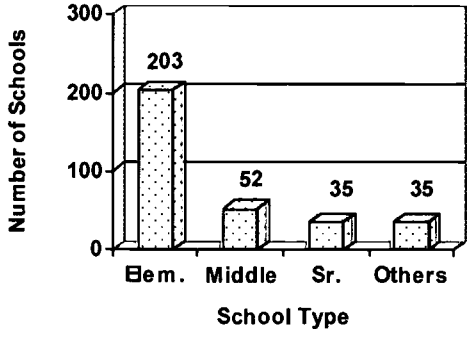
AERA 2002, New Orleans, LA
April 3, 2002

Miami-Dade County Public Schools
Urban Systemic Program funded by the National Science Foundation

Overview of the Demographics of Miami-Dade County Public Schools

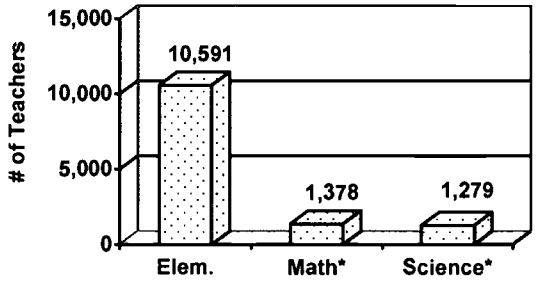
Miami-Dade County Public Schools (M-DCPS), the fourth largest school district in the nation, enrolled over 360,000 students in 325 schools. The student population is 56% Hispanic, 31% Black, 11% White non-Hispanic and the remaining 2% are Asian and Native American. In addition, 17% are classified as limited English proficient (LEP) and 56% of all students receive free or reduced-priced meals. M-DCPS is seeking to prepare all children for success in the mathematics and science, technology-dependent world of the twenty-first century.

Number of K-12 Schools, 2000-01



Total Schools: 325

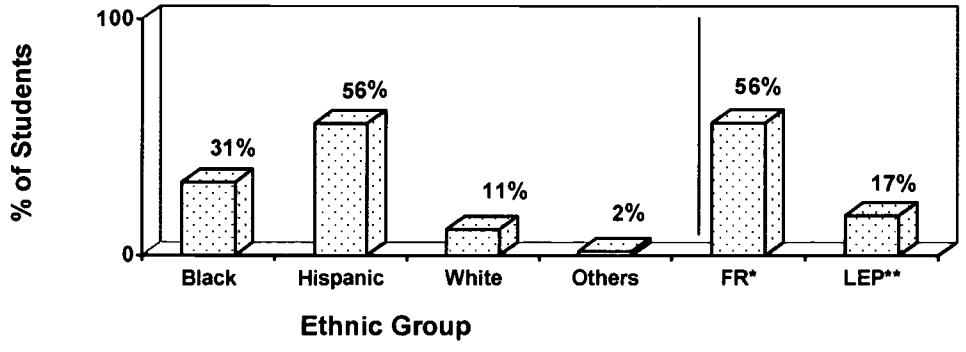
Number of Math and Science Teachers, 2000-01



*Teachers in secondary schools

Total Teachers: 13,248

Student Population, 2000-01



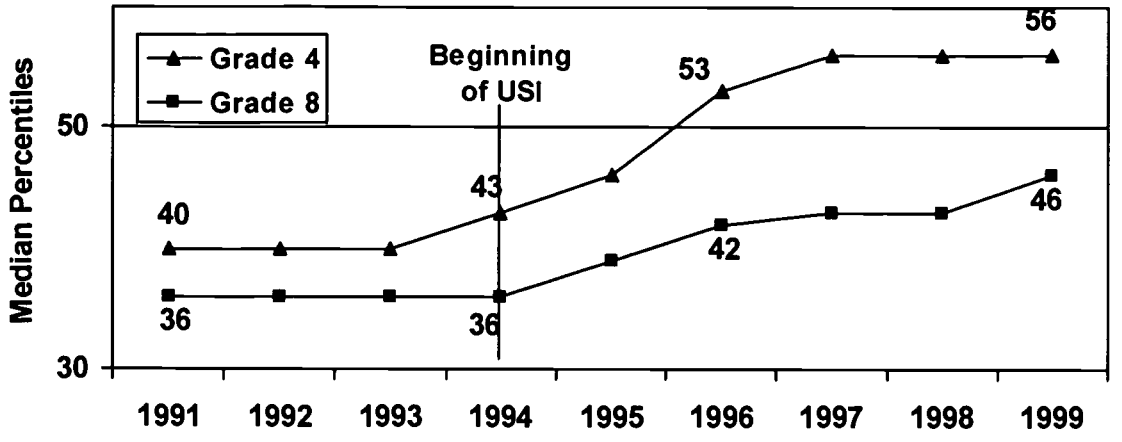
*FR refers to "Free and Reduced Price Lunch;**LEP refers to Limited English Proficiency

Total Students: 368,453

An Evolution from Miami-Dade USI to Miami RISE USP

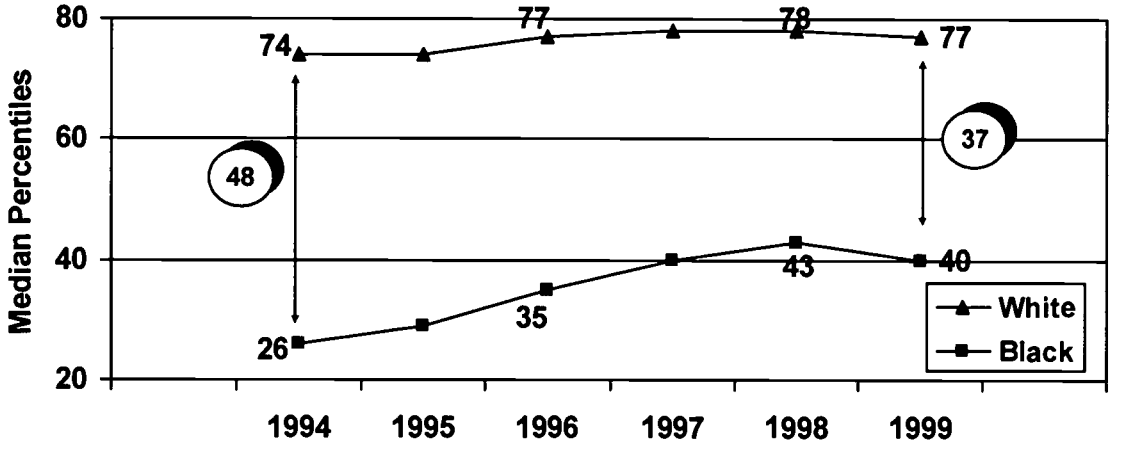
- Miami-Dade USI (1994-1999):
  The National Science Foundation funding of $15,000,000 to Miami-Dade entitled "Improving Mathematics and Science for All Students," has catalyzed substantial changes in the systemic reform movement of mathematics and science education from 1994-95 to 1998-99. The Miami-Dade USI produced clear and compelling evidence of significant growth in student achievement, particularly in the achievement of minority students.

Graph 1
Mathematics (Stanford 8) District Results in Grade 4 and 8



In general, student performance improvement in mathematics has been substantial in all grade levels 2 to 8. In 1998-99, students in grades 2 to 5 scored above the national median (50th percentile). Graph 1 illustrates the longitudinal improvement for students in grades 4 and 8 in the area of mathematics. In addition, Graph 2 displays the longitudinal achievement results between Black and White students from the beginning of USI to the end of USI.

Graph 2
Grade 4 Mathematics (Stanford 8) District Results for Black and White Students



Achievement in science also increased at grades 3 and 5, although less substantially. Science median percentile scores increased for all grade 3 students from 28 to 37 and for all 5th grade students from 33 to 41.

M-DCPS has benefited from five years of support from NSF. Compelling evidence of major policy changes attributable to the USI and substantive development of an enhanced infrastructure capable of supporting and sustaining reform efforts. Also evident are broadened and deepened collaboration with universities, local agencies, private sector interests and informal science organizations, as well as the steadily enhanced implementation of standards-based curriculum, instruction and assessment. Examples of compelling changes:

- Implemented the standard-based curriculum, "Competency-Based Curriculum (CBC)," district-wide.
- Eliminated all "fundamentals" or "low-track" courses in math and science areas.
- Required middle school students to earn 3 credits in math and 3 credits in science prior to promotion to grade 9.
- Required Algebra I for graduation.

- Provided early release time, once a month, for secondary teachers and once a week for elementary teachers to receive professional development at school sites.
- Trained more than 600 teacher leaders as expert advocates for systemic reform at the classroom and school levels – teacher consultants, lead teachers, and FSU graduates.
- Conducted conferences for school-site leaders (principals, counselors and department heads) in order to extended the knowledge base of school leaders regarding critical issues of systemic reform.

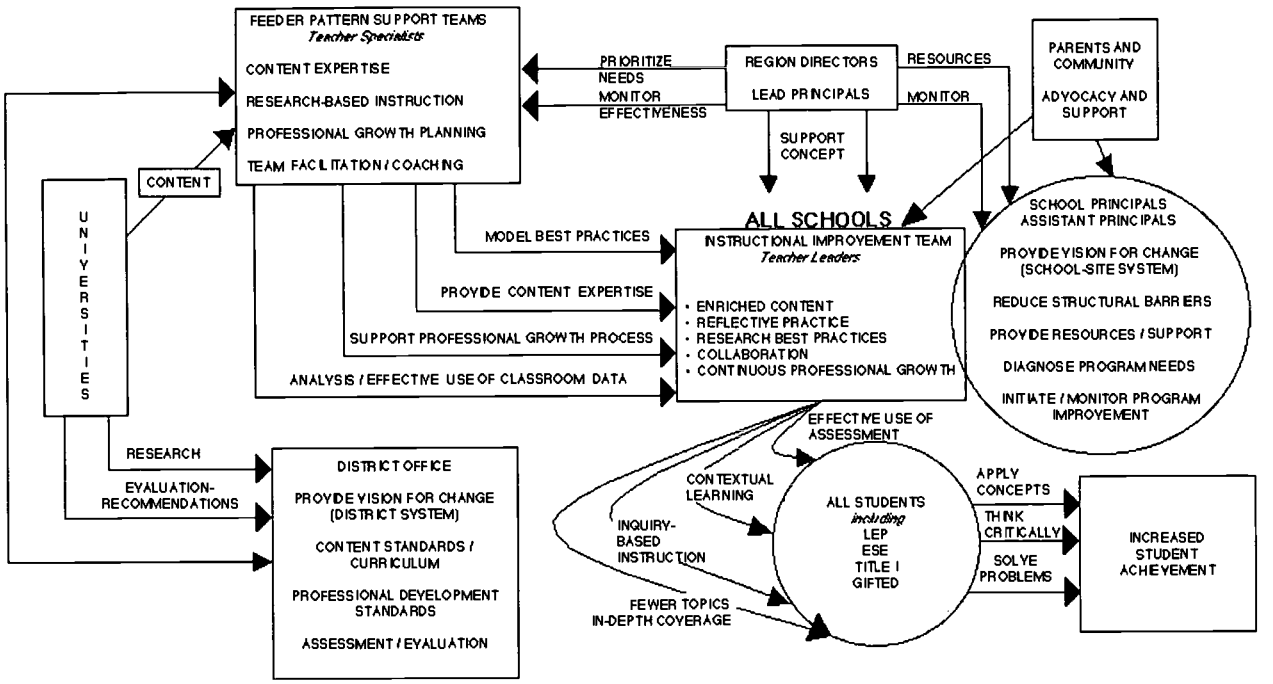
- District Mathematics and Science Comprehensive Plan (2000-2003):
  In 1999-2000, the Division of Mathematics and Science Education was charged to develop the Comprehensive Mathematics and Science Plan, entitled ***"Mathematics and Science Literacy – Bridges to Careers".*** This plan is designed to assist with mathematics and science reform within M-DCPS. Specific sections of the plan provide the district's vision and proposed actions for building a solid bridge. The goals are to: 1) strengthen the quality of content in mathematics and science, 2) improve teaching practices in mathematics and science, and 3) accelerate student achievement in mathematics and science. The plan was approved by the School Board for $12 million over three years.

- Miami RISE USP (2000 to 2005):
  M-DCPS is implementing the second year of Miami RISE (Rising to International Standards in Science/Mathematics Education) USP (funding of $11.8 million by the National Science Foundation over five years). The Miami RISE USP integrates the District Comprehensive Mathematics and Science Plan. The ultimate goal of the Miami RISE USP is to accelerate the school and community infrastructure that ensures student success in mathematics and science. Systemic reform of mathematics and science education in Miami-Dade County is centered on the belief that all students can learn mathematics and science, and on a commitment that all students must acquire higher thresholds of mathematics and science literacy in order to be productive members of the emerging society of the 21st Century. Fundamental and sustainable transformation of the system requires defined and expanded capacities for teachers, principals, senior management, board members, parents, the community, and business leaders.

  The Miami RISE USP has focused on the school as the unit of change. Change in individual mathematics and science classrooms, while desirable and necessary, will not produce long-term, renewable change unless and until there is cultural transformation of the system at the school level. School-site based professional developments activities are subsumed under a more holistic systemic philosophy that has focused on the school as the unit of sustainable change.

  Implementation components of the Miami RISE USP are:
  - Refinement of curriculum
  - Using aligned assessments to improve instruction
  - Teacher capacity: deepening content knowledge and enriching pedagogy
  - Building a learning organization – supportive environments for improved teaching practice.
  - Utilizing partnerships with the community to support and extend mathematics and science
  - Coherent policy changes that enable systemic reform

Figure 1. Miami-Dade USP: Systemic Implementation Model



Instructional Improvement Teams: At each school, a school-site Instructional Improvement Team (IIT) has been established to implement the "Transformative Learning Model" of professional development for mathematics and science. This team serves as teacher leaders for improved teaching and practice, advocates of continuous, school improvement, and mentors of other teachers. Members of the IIT assist the principal in making important data-driven decisions about the mathematics and science instruction that will impact student achievement.

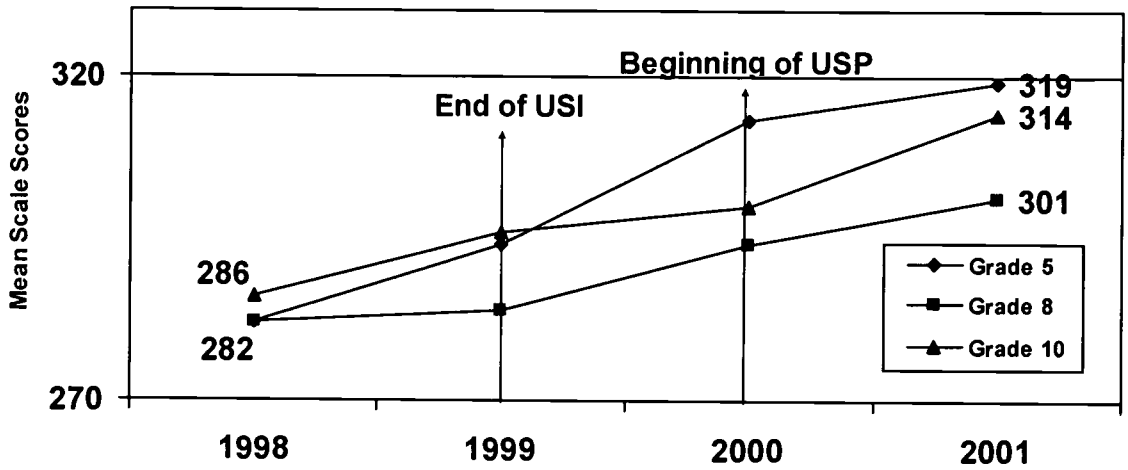
The Feeder Pattern Support Teams consisting of 48 educational specialists (30 elementary specialists and 18 secondary) were hired to work with the school-site IIT for specific elementary and secondary schools that are clustered by feeder patterns. Throughout the year, they provided extensive mentoring, coaching, and modeling within their assigned schools and feeder patterns that emulated effective mathematics and science teaching.

Impact of the Miami RISE USP, first year (2000-01)

Student Achievement:

- Mathematics achievement increased at each grade level tested. The improvement rates are greater than their peers statewide.

Florida Comprehensive Assessment Test
Mathematics Results in Grades 5, 8, and 10
1998 to 2001



- Science achievement increased in grade 5 by 4 median percentile points, from 37 in 2000 to 41 median percentile points in 2001 as measured by the Science subtest of the Stanford Achievement Test, 9th Edition, while the performance for students in grades 7 and 9 remained the same.

Standards-Based Curriculum Implementation:

- All mathematics and science teachers are required to implement the District's Competency-Based Curriculum (CBC) which is directly aligned to the Florida Sunshine State Standards.
- An extensive curriculum project was implemented in the spring of 2001 to ensure that the number of topics, topical coverage, and rigor are evident throughout the science and mathematics CBC. To further refine alignment with local, national, and international standards, statistical comparisons are being made between the District Mathematics and Science Curricula and the most successful countries reported by the TIMSS Benchmarking Study.

Hands-On, Inquiry-Based Instruction:

- All professional development provided by the Division of Mathematics and Science Education staff utilizes an inquiry approach, incorporates the use of manipulatives, technology, and kit-based instruction according to local, state, and national mathematics and science standards.

Quality of Professional Development:

- The Division's mathematics and science educational specialist teams provide extensive professional development within their assigned schools on a regular basis.
- District-wide professional development activities occurred throughout the year, during the summer months, and on weekends. These inservices also included the use of effective assessment strategies, including strategies to infuse technology throughout the curriculum *(i.e., Alliance Plus* program). The number of teachers attending professional development activities are:

  8,480 Elementary teachers; 1,128 Mathematics secondary teachers; and 925 Science secondary teachers.

- Funds ($277,500) were allocated by the District to provide substitutes and stipends to teachers who participated in professional development and IIT activities. Some examples of these inservice activities are the following:
  - SECME Summer Institute – A total of 40 elementary and middle school teachers participated in this 12-day instructional-content activity delivered by the University of Arizona, College of Education and Engineering.
  - Texas Instruments (T^3) Summer Institute -- Over 200 teachers were schooled in the effective use of technology and probeware in the teaching of mathematics and science.
  - Statewide Mathematics and Science Institute Professional Development – Approximately 200 science and 200 mathematics teachers of grades 3-5 from Miami-Dade participated in this summer 2001 inservice. The mathematics section focused on proportional reasoning; the science section, on force and motion.
  - Teachers are currently being inserviced on the *Test Item and Performance Task Specifications for Mathematics* which has been disseminated by the Florida DOE.

Assessment:

- The Mathematics Florida Comprehensive Assessment Test (FCAT) is directly aligned to the Florida Sunshine State Standards (SSS) and the CBC. This annual assessment test benchmarks across the five NCTM strands in grades 3-10, impacting all students.
- An FCAT science assessment has been developed and is scheduled to be field-tested in the spring of 2002.
- M-DCPS has developed an assessment item bank in mathematics for grades 3-10 that is aligned to the CBC and to the Florida SSS. The M-DCPS Division of Mathematics and Science Education is currently augmenting its science assessment item bank, which also meets the required curriculum standards. These item banks represent the knowledge and skills that students need to acquire in order to become creative and critical thinkers.

Student Support:

- Schools are providing before and after-school tutorial programs, including Saturday school and summer school, for students who are in the 25% lowest academic quartile.
- School-wide and district-wide science-fair competitions and pre-engineering Olympiads encourage inquiry-based and standards-based exploration in both mathematics and science.
- Parent involvement activities have been scheduled throughout the year.
- Several resources work with M-DCPS to provide contributions to the mathematical and science knowledge and experience for teachers and students, such as Fairchild Tropical Gardens, Parrot Jungle, Miami Museum of Science, Environmental Center, Everglades National Park, Biscayne Nature Center, Florida International University, University of Miami, etc.

Policy Changes that enhance systemic reform:

- Changed the District's Pupil Progression plan to require 100 minutes of science instruction of grades K-2, and 150 minutes per week for grades 3-5.

Summary:

Miami-Dade County Public Schools (M-DCPS) and the National Science Foundation's (NSF) Urban Systemic Program (USP) are increasing the achievement for all students in mathematics and science. The performance of minority students has improved. As a companion to the NSF funds, the Miami-Dade County School Board funded the Comprehensive Mathematics and Science Plan entitled *Mathematics and Science Literacy–Bridges to Careers* for all District schools. All of the accomplishments of Miami RISE USP would not have been possible without the support of the School Board Members; the Superintendent and his cabinet members; and school-site personnel.

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