A Comprehensive System of School Improvement using Evidence-Based Practices in Mathematics

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Session Outcomes:

• To present a conceptual framework and current research related to comprehensive school reform maximizing federal and state resources;
• To describe evidence-based instructional practices (EBP) within a comprehensive model of professional development in mathematics,
• To share results of student learning through statewide implementation of this model in mathematics, and
• To describe 325T project within statewide research and development context of reform.
The ultimate purpose of professional development and evaluation that takes place in schools is to improve student learning.

The purpose of school reform is to impact student learning. All innovation should produce positive results.

(Brownell, M., Sindelar, P., Kiely, M. T., & Danielson, L., 2010; O'Shea, D., Hammitte, D., Mainzer, R., & Crutchfield, M., 2000)
Critical Questions to Focus Reform

• How do we create and implement an explicit, comprehensive framework of mandated policies, procedures, and research related to student needs that maximize local, state, and national resources? (Context)

• What evidence-based instructional practices meet the diverse needs of all students within schools in mathematics? (Content)

• How will teachers learn about, implement, and continuously monitor student progress? (Process)

• What supports are necessary within the school to address reforms related to current accountability and management systems? How are they aligned? (Context)
Conceptual Framework of Comprehensive Educational Reform
(Little & Houston, 2003a; 2003b)

• Work Design
  – Administrative and bureaucratic roles, responsibilities, policies, and mandates

• Organization and Governance
  – Accountability and decision-making structures and procedures

• Core Technology
  – Classroom instructional resources, techniques, strategies, materials, etc.
Work Design: Policies and Systems Promoting Change

• Effective Schools Research and School Reform
  – e.g., Fullan, 2003; Hargreaves & Fink, 2004
• Florida Continuous Improvement Model (FCIM)
  – Florida Department of Education (2008)
• Professional Development Standards
  – National Staff Development Council’s Standards for Staff Development (1995)
• Current Legislation
  – No Child Left Behind (US DOE 2002)
  – Middle Grades Reform Act (2004)
  – Continuous Improvement Model (Davenport & Anderson, 2002)
Organization & Governance: Issues to consider for policy implementation at school level

- What are the major policies and research impacting school improvement in Florida?
- What are the responsibilities of each of the policies, regulations, and procedures?
- How do each of these impact educators, teachers and students?
- Once identified, how do each of these policies provide a framework for quality implementation within a system of change (classroom, school, district, and state)?
- What are the relationships of each within the coordinated and comprehensive framework?
- How and to whom will these policies be shared and supported?
Core Technology: Issues from Research and Practice

How do we bridge the gap between research and practice?

How do we collaborate to successfully and appropriately meet the needs of students with disabilities and other students at risk?

How do we comprehensively provide initial and sustained professional development as identified to meet needs of students through their teachers?
Why is this Important?

Most systems have enacted accountability policies in the absence of conceptualizing and investing in policies that would increase the capacity of educators to perform in new ways. The system is crucial if we want large-scale, sustainable reform (Fullan, 2005).
Mission of State of Florida

“It is the responsibility of every educator, organization, and parent to actively engage in collaborative efforts to meet Florida’s goals. In the unified effort, all schools in Florida should ensure evidence-based practices, instructionally relevant assessments, systematic problem-solving to meet all students’ needs, data-based decision making, effective professional development, supportive leadership, and meaningful family involvement. These are the foundation principles of a system which provides us the framework to elevate the efficacy of our statewide improvement efforts.”

Dr. Eric J. Smith
Commissioner of Education
June 2008
Developing Comprehensive System to Maximize Resources

Florida has established an infrastructure of support that includes partnerships organized around identified personnel and stakeholders for various purposes that ultimately support the statewide consensus building, infrastructure development, and implementation of evidence-based practices, problem solving and response to instruction/intervention (RtI).

~Heather Diamond, 2010
What evidence-based instructional practices in mathematics meet the diverse needs of all students? (Content)

• Given student performance data, evidence-based instructional practices and resources, and disaggregated local data of student performance, how do we select and implement evidence-based instructional practices?
Next Generation Sunshine State Standards

You can search for benchmarks in the following methods: Browse, Keyword Search or List All. Please select one of the methods or click on "Help" to get started. Click here to print or download reports with all the Next Generation Standards.

Browse for Benchmark
* Please choose an option from the drop down menu to display the next step.

Subject Area:  
- Select one -
Our Goal, as Math Leaders in Florida

To continue to plan, build understanding, and make or adjust implementation decisions regarding curriculum, instruction, and assessment of the Next Generation Sunshine State Standards (NGSSS) in Mathematics.

New State Standards:
- Grade-level specific
- Measurable
- Leveled appropriately vertically to move students through multiple representations
- Mastery expected in each grade level
- Less topics more time for greater depth

So, how do we meet these challenging and changing goals?
Development Process

• Curriculum-based teams of professionals were selected representing:
  – National researchers (e.g., Montague, Allsopp, Witzel, Foegen, etc.)
  – State Department of Education (e.g., policy, professional development, etc.)
  – School district curriculum specialists

• Overviews of needs assessment data and recent research provided framework for research and development for content

• Dissemination for continuous process of professional development and support for fidelity using multiple venues was completed

• Multiple products and resources of evidence-based instructional practices, programs and interventions were identified, developed, implemented, and evaluated within context of state policies
Four Methods Identified by the National Math Panel (2008) as Evidence-Based Practices

• **Systematic and explicit instruction**: a detailed instructional approach in which teachers guide students through a defined instructional sequence. Within systematic and explicit instruction students learn to regularly apply strategies that effective learners use as a fundamental part of mastering concepts.

• **Self-instruction**: students learn to manage their own learning with specific prompting or solution-oriented questions.

• **Peer tutoring**: an approach that involves pairing students together to learn or practice an academic task.

• **Visual representation**: uses manipulatives, pictures, number lines, and graphs of functions and relationships to teach mathematical concepts.
Effective, Evidence-Based Instructional Practices (EBP)

FDOE CRITERIA FOR EBP:
The EBP:
1. is based on educational theory.
2. can be supported with prior research.
3. has a clear purpose.
4. has an appropriate target population.
5. has well-defined anticipated outcomes.
6. implementation results in positive student outcomes.
7. is replicable.
8. has face validity.
9. has social validity.

SAMPLE RESOURCES from USDOE:
1. Center on Instruction
   http://www.centeroninstruction.org
4. Intervention Central
   http://www.interventioncentral.org
5. Access Center: Improving Outcomes for All Students K-8 http://www.kbaccescenter.org
6. National Center on Student Progress Monitoring
   http://studentprogress.org
9. IRIS Center for Faculty Enhancement
   http://iris.peabody.vanderbilt.edu
The Center on Instruction, a partnership of five organizations, provides resources and expertise to the Regional Comprehensive Centers in reading, mathematics, science, special education, and English language learners.

http://www.centeroninstruction.org/
The What Works Clearinghouse was established in 2002 by the U.S. Department of Education's Institute of Education Sciences to provide educators, policymakers, researchers, and the public with a central and trusted source of scientific evidence of what works in education. The What Works Clearinghouse (WWC) collects, screens, and identifies studies of effectiveness of educational interventions (programs, products, practices, and policies).

http://ies.ed.gov/ncee/wwc/
## Effectiveness Ratings For Elementary School Math: Mathematics achievement

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Improvement Index</th>
<th>Evidence Rating</th>
<th>Extent Of Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odyssey Math</td>
<td>17</td>
<td>+</td>
<td>Small</td>
</tr>
<tr>
<td>Everyday Mathematics</td>
<td>6</td>
<td>+</td>
<td>Medium to Large</td>
</tr>
<tr>
<td>Progress in Mathematics © 2006</td>
<td>3</td>
<td>0</td>
<td>Small</td>
</tr>
<tr>
<td>Scott Foresman-Addison Wesley Elementary Mathematics</td>
<td>-2</td>
<td>+‒</td>
<td>Medium to Large</td>
</tr>
<tr>
<td>Saxon Elementary School Math</td>
<td>Not Rated</td>
<td>0</td>
<td>Small</td>
</tr>
<tr>
<td>Houghton Mifflin Mathematics</td>
<td>Not Rated</td>
<td>0</td>
<td>Medium to Large</td>
</tr>
</tbody>
</table>

### Evidence Rating Key

<table>
<thead>
<tr>
<th>++</th>
<th>Positive Effects: strong evidence of a positive effect with no overriding contrary evidence.</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>Potentially Positive Effects: evidence of a positive effect with no overriding contrary evidence.</td>
</tr>
<tr>
<td>+‒</td>
<td>Mixed Effects: evidence of inconsistent effects.</td>
</tr>
<tr>
<td>0</td>
<td>No Discernible Effects: no affirmative evidence of effects.</td>
</tr>
<tr>
<td>‒</td>
<td>Potentially Negative Effects: evidence of a negative effect with no overriding contrary evidence.</td>
</tr>
<tr>
<td>‒‒</td>
<td>Negative Effects: strong evidence of a negative effect with no overriding contrary evidence.</td>
</tr>
</tbody>
</table>
How will teachers learn about, implement, and continuously monitor student progress in mathematics? (Process)

• Given the identified student needs, selected research-based instructional materials, and identified teacher needs, how is an efficient and effective system of continuous, standards-based professional development created and sustained?
Seven Guidelines for Professional Development

1. Involve all stakeholders
2. Focus on leadership development
3. Make explicit the theory of change
4. Emphasize the school and team level
5. Review and reflect on the research
6. Monitor progress
7. Be an advocate for quality professional development

NSDC, 1995; 2008
Standards-based Professional Development

- Planning
- Learning
- Implementing
- Evaluating

(NSDC, 1995; Florida Professional Development System Evaluation Protocol, 2010)
Effective Instructional Practices
Model of Professional Development: A Systems Approach

PLANNING:
Selection of Research-Based Effective Instructional Practices

EVALUATION:
Evaluation of Student Learning

DELIVERY:
Standards Based Professional Development

FOLLOW-UP:
High Quality Classroom Implementation

Professional Development to Improve Student Learning
What supports are necessary within the school to sustain the necessary reforms related to our current accountability and management systems? (Context)

• How do we sustain a complex system of reform within a complex educational society?
If it were easy, everyone could do it!!!
Building a Comprehensive System of Sustained School Reform

- Develop a continuum of evidence-based resources (e.g., instruction, programs, courses) aligned with state standards to meet needs assessment data
- Allocate resources (fiscal, personnel, professional development, evidence-based instruction, time, etc.)
- Provide continuous professional development, aligned with student/teacher needs
- Use multiple methods for initial, follow-up, and impact professional development
- Continuously monitor and adjust
Building a Comprehensive System of Sustained School Reform

- Create a cohesive framework for reform
- Align data sources, program/course competencies, accountability measures, reporting requirements, fiscal and evaluation measures and responsibilities
- Develop and continuously support action/implementation plan (classroom, school, district, state levels)
- Locate, learn, and use student disaggregated data from multiple sources
Student Data

- Disaggregated student data must drive the school improvement process. Therefore, it must be shared, understood, and used as a basis for program development, implementation, and continuous monitoring through applied/action research by teachers, mathematics coaches, administrators. (Bernhardt, 1998; Torgesen, 2002).
7th Grade/Hamilton
Distributive Property and Factoring Monomials
✓ Levels of Learning CRA
✓ Manipulative - Algebra Tiles
✓ Virtual Manipulatives
✓ Discussion and Journaling
✓ Think Link Data Assessment
2nd Grade / Taylor
Problem Solving
✓ Compute Fluently
✓ Reasonable Estimates
✓ Whole-Number computation
FCAT Mathematics by Achievement Level
Students With Disabilities
Grades 3-10

Achievement Level 3 and Above
(On Grade Level and Above)

Achievement Level 1
Trends
Rationale: From The Nation’s Report Card

Percentages at NAEP Achievement Levels and Average Score

<table>
<thead>
<tr>
<th>Florida (public)</th>
<th>Percent below Basic</th>
<th>Percent at Basic, Proficient, and Advanced</th>
<th>Average Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1992a</td>
<td>48*</td>
<td>38*</td>
<td>12* 1*</td>
</tr>
<tr>
<td>1996a</td>
<td>45*</td>
<td>40*</td>
<td>14* 1*</td>
</tr>
<tr>
<td>2003</td>
<td>24*</td>
<td>45</td>
<td>27* 4*</td>
</tr>
<tr>
<td>2005</td>
<td>18*</td>
<td>46</td>
<td>31* 5</td>
</tr>
<tr>
<td>2007</td>
<td>14</td>
<td>46</td>
<td>34 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nation (public)</th>
<th>Percent below Basic</th>
<th>Percent at Basic, Proficient, and Advanced</th>
<th>Average Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>19</td>
<td>43</td>
<td>33 5</td>
</tr>
</tbody>
</table>

* Accommodations were not permitted for this assessment.

NOTE: The NAEP grade 4 mathematics achievement levels correspond to the following scale points: Below Basic, 213 or lower; Basic, 214–248; Proficient, 249–281; Advanced, 282 or above.

Florida’s NAEP Math Performance-2009

• Florida’s students (grade 4) scored three points above the national average, which represents an eight point increase since 2003.
• Florida’s students (grade 8) scored equal to or greater than the national average for every student group.
• Since 2003, Florida's African-America students narrowed the achievement gap in mathematics by 12 points, compared to the nation’s 3 point narrowing.
• Students with disabilities increased their average math score to 230 this year, a seven point increase since 2007 and a 16 point increase since 2003. This year’s average score is 10 points above the national average of 220.

Bridging Schools & Universities to Improve Math & Science

PURPOSE: To enhance existing, approved initial certification programs to prepare highly-qualified teachers of students with high incidence disabilities (HID) within the Masters program. The major content focus will be math and science instruction for students with HID, including CLD students, in co-taught and resource settings within urban middle school that have not met AYP targets.

Mary Little, PhD
Suzanne Martin, PhD
Martha Lue-Stuwart, PhD
Continuous Improvement at UCF:

- Most programs now lead to ESOL endorsement.
- Additional competencies and revised courses added.
- Additional classes developed and taught to EL ED majors.
- Endorsement programs written, approved, and external federal funding received to support teachers in these areas.
- Knowledge and skills to teach diverse students, especially CLD.
- Classroom and behavioral management skills.
- Knowledge and skills to teach ESE students in inclusive classes.
- Knowledge and skills to teach students with autism, severe and profound learning needs.

The critical question for our 325T grant:
How do we, at the preservice level, create and implement an explicit, comprehensive framework of mandated policies, procedures, and research related to student needs that maximize local, state, and national resources in mathematics using EBP?
Logic Model Activity

Program Plan

**Inputs**

What inputs are needed to do this?

**Activities**

What activities need to be carried out by our organizations and partner organizations to meet the outcomes?

**Outputs**

What services need to be delivered to external participants to achieve the outcomes?

**Outcomes**

What changes in a target audience’s skills, attitudes, knowledge, behaviors, status, or life condition will be brought about by experiencing the program?

**Resources:**

- Staff
- Supplies
- Facilities
- Funding

**Planning/Develop:**

- Recruitment
- Staff Activities and Assignments
- Marketing
- Course Materials Development

**Implementation:**

- Training course materials
- Train the trainers workshops
- Workshop sessions for clients
- Follow-up Support
## Bridges Logic Model

<table>
<thead>
<tr>
<th>Resources</th>
<th>Activities</th>
<th>Outputs</th>
<th>Outcomes</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>UCF Faculty,</td>
<td>Establish Bridge Program Team</td>
<td>Model Exceptional Education Graduate Program</td>
<td>Increase in teachers’ confidence integrating technology in classroom</td>
<td>Increase in the number of SES HQT knowledgeable in EBP-Math,Science</td>
</tr>
<tr>
<td>Bridges Program Staff &amp;</td>
<td>Assemble Stakeholders &amp; Solicit Input</td>
<td>Curriculum modules aligned with state/federal standards</td>
<td>Increase in teachers’ understanding of math/science concepts</td>
<td>Increase in the retention rate of SES HQT in education</td>
</tr>
<tr>
<td>UCF Students</td>
<td>Review and Revise ESE Graduate Curriculum –</td>
<td>UCF ESE Students prepared to teach using EBP</td>
<td>Increased knowledge of EBP in math/science content</td>
<td>Increase the placement of highly qualified SES teachers into schools</td>
</tr>
<tr>
<td></td>
<td>Integrate New Technologies</td>
<td>Math/Science</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle/High schools-Districts HQ/NBCT Teachers, Students, Counselors Parents</td>
<td>Recruit ESE Graduate Students &amp; Gather Baseline Data</td>
<td>UCF ESE Students prepared to use technology in classroom</td>
<td>Improved Mentoring and Induction Activities</td>
<td></td>
</tr>
<tr>
<td>Community Partners – CEC, NMTE, NSTE Industry, Volunteers</td>
<td>Establish data collection system to analyze/revise program</td>
<td>Virtual Classroom Instruction, Peer-Coaching/Mentoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>USDOE Cooperative Funding &amp; Resources</td>
<td>Develop Virtual Activities – Mentoring, Instruction, Collaboration</td>
<td>Dissemination &amp; Presentations</td>
<td>Effective use of technology to support overall program effectively</td>
<td></td>
</tr>
<tr>
<td>Technology - Lab facilities &amp; equipment ATEN</td>
<td>Activities – Mentoring, Instruction, Collaboration</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
Use of Logic Model

A program logic model provides a roadmap of your program, highlighting how it is expected to work, what activities need to come before others, and how desired outcomes are achieved.


• Curriculum-based teams of professionals were selected representing:
  – National researchers (e.g., Montague, Allsopp, Witzel, Foegen, etc.)
  – State Department of Education (e.g., policy, professional development, etc.)
  – School district curriculum specialists in mathematics

• Overviews of needs assessment data and recent research provided framework for research and development for content

• Dissemination for continuous process of professional development and support for fidelity using multiple venues was completed

• Multiple products and resources were identified, developed, implemented, and evaluated within context of university, state and school district policies
Collaborative Next Steps

• Finalize courses, demonstration sites, field experiences, and virtual learning to meet program requirements for endorsements in math and science within Masters degree and certificate programs.

• Collaborate with school district partnerships-authentic projects, clinical experiences, and internships.

• Enhance mentorship experiences.

• Continue program evaluation across 325T indicators.

• Conduct research and evaluation within accountability networks of FDOE, NCATE, and UCF to assure sustainability and continuous improvement of program to meet goals and objectives.

• Continue to enhance and evaluate use of technology throughout program development, delivery, and evaluation, and

• Enhance collaboration with SEA and other IHEs with activities to sustain enhancements through program and policy revisions.
“Never doubt that a small group of thoughtful committed people can change the world: indeed it is the only thing that ever has.”

Margaret Mead
References


References


Resources from Florida:

Florida Department of Education
http://www.fldoe.org
http://www.msml.florida-rti.org

Florida Center for Interactive Media
http://www.fcim.org

Florida’s Response to Intervention Problem Solving Project
http://www.florida-rti.org
http://floridarti.usf.edu

RtI Teaching Learning Connections
http://rtitlc.ucf.edu
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