



Partnership to Rejuvenate and Optimize Mathematics and Science Education in Florida

## *Math and Science Matters*

A Newsletter for Florida's Educators

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### **Enhancing Mathematics and Science Education in Year 3**

The purpose of Florida PROMiSE is to support the implementation of the Next Generation Sunshine State Standards (NGSSS) by enhancing the mathematics and science knowledge of teachers so that they are better able to support student learning.

Florida PROMiSE is a three-year partnership among the three Florida Public Research Universities (USF, FSU, & UF), four large school districts (Miami-Dade, Hillsborough, Duval, & Seminole), educational consortia (Heartland Educational Consortium (HEC), North East Florida Educational Consortium

(NEFEC), & Panhandle Area Educational Consortium (PAEC)), Florida Virtual School, and Horizon Research, Inc.

In Year 3, PROMiSE is continuing to make strides in its ongoing projects. PROMiSE will hold another round of 2-week Summer Institutes and four days of follow-up training in the fall for teachers of mathematics and science. These Summer Institutes will deliver a revised version of the professional development program that was designed and implemented the previous year. For detailed information about the Summer Institutes

please see pages 2-3.

CPALMS has also had many recent developments in areas such as resources for teachers, new technology updates and helpful user information on their website. For additional information about the CPALMS project and its ongoing developments, please see the CPALMS section on page 3.

For any additional information on Florida PROMiSE and its ongoing efforts, please visit our website at [www.flpromise.org](http://www.flpromise.org).

### **Promoting Inquiry Teaching and Learning in Math and Science Classrooms**

*Explain, justify, interpret, compare and contrast, evaluate, apply, construct, analyze, graph, distinguish, formulate, predict, create, translate, validate, demonstrate, organize, investigate, describe, generate, model, represent, relate*—these are some of the verbs in the Next Generation Sunshine State Standards for Mathematics and Science. There is a noticeable absence of verbs like *recite, understand, know, memorize*. The Next Generation Sunshine State Standards uses action verbs in setting the standard for how students will be assessed for proficiency in mathematics and science. It is, therefore, imperative, that teaching and learning be active as well.

#### **What is Inquiry Learning?**

Inquiry learning refers to a classroom environment where students do more than simply listen to a teacher lecture. Students are DOING mathematics and science, including discovering, processing, and applying information. Active or inquiry learning "derives from

two basic assumptions: (1) that learning is by nature an active endeavor and (2) that different people learn in different ways" (Meyers and Jones, 1993).

Inquiry methods require students to 'make their own meaning'; that is, develop their own conceptualizations of what they are learning. Inquiry learning includes a range of teaching and learning activities. These strategies create an environment that engages students who might not otherwise be engaged in their own learning in meaningful ways. These strategies include involving students in well-structured question and answer sessions in lecture classes, individual and group project-based assignments, cooperative learning groups, and problem-based learning. Each strategy contributes to the total picture of making learning a deeper, more engaging, meaningful, active and effective process.

It is important to note that not just any activity will do. Activities need to require the learner to make sense of important concepts and to think about the experience. Students must

explain the concepts to themselves, to each other, and to the teacher. Reflection gets students to form concepts, to change their ideas about them as necessary, and to connect the ideas so that the subject makes sense.

#### **Choosing a Rich Task**

In order to create an environment that engages students both physically and mentally, learning activities should:

- Be accessible to everyone
- Invite decision making
- Encourage 'what if' questions
- Encourage students to use their own methods
- Promote discussion and communication
- Be replete with patterns
- Be aligned with benchmarks and assessment
- Have an element of surprise
- Be enjoyable
- Be extendible

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## Promoting Inquiry Teaching and Learning in Math and Science Classrooms (continued)

### Hands On and Minds On

It is important for teachers to remember that fun, hands-on activities, while entertaining, are **not necessarily** effective inquiry learning techniques. Just because students are actively DOING something does not mean that they are actively LEARNING something. In order for students to learn what you want them to learn, hands-on activities must be embedded in an effective lesson. Inquiry is a multifaceted activity that includes the formulation of investigable questions, construction of investigations into those questions, collection of appropriate data, evaluation of the meaning of those data, and the communication of this evaluation.

#### Essential Features of Classroom Inquiry

When learning through inquiry, learners:

- Are engaged by science and mathematics questions.
- Give priority to evidence as they plan and conduct investigations.
- Develop descriptions, explanations, and predictions using collected evidence.
- Engage in critical discourse with others about procedures, evidence, and explanations.

(Carin, Bass, Content, 2005)

### Three Levels of Inquiry

#### (1) Structured or Bounded

Students engage in a hands-on activity and draw conclusions, but follow specific teacher instructions.

#### (2) Guided or Directed

Students may assume responsibility for determining procedure, but the teacher chooses question for investigation.

#### (3) Open or Free

Students generate their own questions from a teacher-selected topic and design their own investigation.

(Bell, Smetana, & Binns, 2005).

As we move from guided inquiry to more open and free inquiry the locus of control moves from that of the teacher to that of the student. With open or free inquiry, although students have greater control or independence over the actual investigation, the teacher is still available to provide coaching and guidance. Sophistication of the metacognitive skills and intellectual processes used, as well as engagement in the task, increases as we move from guided inquiry to more open inquiry. It should be noted that a classroom activity that is done to confirm a principle, and where the results are known in advance, is not considered inquiry.

### Preparing Teachers to Engage their Students in Inquiry Learning

In order to effectively deepen students' understanding of math and science through inquiry learning, teachers themselves must have a deep understanding of math and science. Teachers with strong conceptual understanding of the content they teach are more likely to engage students in inquiry-based activities (Ma, 1999). The Florida PROMiSE Summer Institutes strive to increase teachers' conceptual knowledge of mathematics and science by providing participants with experiences that allow them to make sense of and reason about mathematics and science in ways that make them question current understandings, identify misconceptions, build upon prior knowledge, and make connections among mathematics or science ideas. During these two-week Institutes, teachers are engaged in the type of learning that is expected of their students – inquiry-based mathematics problem solving and science investigation activities. These experiences help teachers create a vision for what can be implemented with their own students.

For additional information about PROMiSE, please visit our website at [www.flpromise.org](http://www.flpromise.org).

## 2010 Summer Institutes

### Summer Institute Overview

In order to deepen the content-specific knowledge and skills of teachers of mathematics and science in order for them to effectively deliver the Next Generation Sunshine State Standards (NGSSS), PROMiSE will again hold 2-week Summer Institutes that will take place at various schools and campuses in partner districts throughout Summer 2010.

Teachers of mathematics and science will participate in 2-week Summer Institutes and 4 days of follow-up training that will address key concepts in mathematics and science. There will be a total of 25 institutes (13 mathematics and 12 science). Throughout Summer 2010, experts from Colleges of Arts and Sciences (CAS), Colleges of Education (COE), and school districts will deliver a revised version of the professional development program that they designed and implemented the previous year.

Topics for the 2-Week Institutes include the following: Number and Operation (K-5), Rational Number and Proportional Reasoning (3-8), Geometry & Measurement (3-8), Algebra (6-12), Matter (K-8), Scientific Theories (6-12), Force and Motion (6-12), and Earth & Space Science (6-8). For exact dates and locations of the mathematics and science Institutes, please see below.

### 2010 Mathematics Institutes

#### Duval Institutes—Facilitated by UF

*Rational Number & Proportional Reasoning* (3-8): June 16–29

*Algebra* (6-12): June 21–July 2

#### HEC Institutes—Facilitated by USF

*Number and Operation* (K-5): July 19–30

*Geometry & Measurement* (3-8): June 21–July 2

#### Hillsborough Institutes—Facilitated by USF

*Rational Number & Proportional Reasoning* (3-8): June 21–July 2

*Geometry & Measurement* (3-8): June 21–July 2

*Algebra* (6-12): July 19–30

#### Miami-Dade Institutes—Facilitated by FIU

*Number and Operation* (K-5): June 21–July 2

*Rational Number & Proportional Reasoning* (3-8): June 21–July 2

*Algebra* (6-12): June 21–July 2

#### NEFEC Institutes—Facilitated by UF

*Algebra* (6-12): July 12–23, 2010

#### PAEC/Seminole Institutes—Facilitated by FSU

*Geometry & Measurement* (3-8) : June 14–25

*Algebra* (6-12): June 21–July 2

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## 2010 Summer Institutes (continued)

### 2010 Science Institutes

#### Duval Institutes—Facilitated by UF

Matter (K-8): July 19–30

Scientific Theories (6-12): July 19–30

#### HEC Institutes—Facilitated by USF

Matter (K-8): July 26–August 6

#### Hillsborough Institutes—Facilitated by USF

Matter (K-8): July 19–30

Scientific Theories (6-12): July 19–30

#### Miami-Dade Institutes—Facilitated by FIU

Matter (K-8): June 21–July 2

Force and Motion (6-12): June 21–July 2

#### NEFEC Institutes—Facilitated by UF

Matter (K-8): July 12–23

#### PAEC/Seminole Institutes—Facilitated by FSU

Matter (K-8) - Seminole: June 21–July 2

Matter (K-8) - PAEC: July 12–23

Earth / Space Science (6-8) - PAEC: July 12–23

Force & Motion (6-12) - PAEC: July 12–23

For additional information, please visit [www.flpromise.org](http://www.flpromise.org) and click on *Mathematics* or *Science* under the *Professional Development* link.

## CPALMS

### What is CPALMS?

CPALMS is a statewide infrastructure project to build information systems and tools to support the implementation of the Next Generation Sunshine State Standards (NGSSS). CPALMS is collaboration between K–12 teachers, researchers, the Florida Department of Education, universities, district curriculum specialists, and many others.

CPALMS increases the access of teachers and instructional leaders to high-quality information and resources aligned with the new mathematics and science standards. CPALMS also supports the delivery of teacher professional development and the teacher application of new content and pedagogical knowledge in the classroom.

CPALMS is composed of three main information systems:

1. Standards Information System
2. Course Information System
3. Standards-Based Resource Information System

CPALMS will integrate these three systems and provide free tools for educators, professional development, and day-to-day teaching activities. The goal is to provide a platform for collaboration and sharing between Florida's educators.

### What's New with CPALMS?

CPALMS has been making many new developments in areas such as resources, technology and user applications. CPALMS recently updated the peer-review process for

instructional resources to make the process faster and build in more input from teachers.

Currently, the CPALMS team is redesigning the pages of the [www.floridastandards.org](http://www.floridastandards.org) site with the goal of providing more streamlined and clearer access to information by enhancing search features, adding tutorials, and adding Spanish translations of benchmarks. CPALMS is also working with the Florida Department of Education to provide more information on teacher certifications, test-item specifications, example test items, and course information.

#### Resource Developments:

- Over 1,700 mathematics and science resources have been submitted to the CPALMS repository by state educators.
- Over 400 resources have been approved and are now available on the appropriate benchmark pages on [www.floridastandards.org](http://www.floridastandards.org).
- 70+ original lessons have been submitted using the CPALMS lesson-planning tool. The first release of the lesson-planning tool was during year 3 of the project.
- CPALMS now has more than 55 resource reviewers that include CPALMS staff, DRTs, and volunteers. All reviewers are trained by the CPALMS team.

#### Technology Updates:

- All available FCAT Test Item Specification and Sample Test Items for Reading/ Language Arts and Mathematics are now accessible via benchmarks at [www.floridastandards.org](http://www.floridastandards.org).

- Version 1 of a tool to guide teachers through the development of standards-based formative assessment tasks in K-3 mathematics was recently released.

- Version 6 of [www.floridastandards.org](http://www.floridastandards.org) was designed and partially programmed, and it features: benchmarks in Spanish; developer information for APIs and Web Services; pathways for: teachers, parents, students, administrators, developers, user and resource statistics; tips and tutorials throughout the site; personal notes for each benchmark, and enhanced search features.

- The Lesson Planning Tool was released for teachers to build standards-based lesson plans using multiple templates.

#### User Updates:

- 7,500+ people have registered for an account on CPALMS and 4,500+ have signed up for the email list.
- QuickConnect, the first CPALMS desktop application, was installed on 13,000+ computer desktops.
- FloridaStandards.org has received more than 17.7 million hits since its launch in 2008.
- Approved resources have been viewed by more than 250,000 visitors, and the most viewed resource was accessed by more than 2,000 visitors.

For additional information about CPALMS and its many beneficial features for educators, please visit their site at [www.floridastandards.org](http://www.floridastandards.org)

## Partner Organizations

### Universities

University of South Florida

Florida State University

University of Florida

### School Districts

Duval County

Hillsborough County

Miami-Dade County

Seminole County

### Educational Consortia

Heartland (HEC)

North East Florida (NEFEC)

Panhandle Area (PAEC)

### Others

Florida Virtual School

Horizon Research, Inc.

## Program Components and Coordination

### Florida PROMiSE

- Overall Project Management and Oversight: USF

### Tier 2 Summer Institutes for Teacher Professional Development

- Mathematics: Development facilitated by USF
- Science: Development facilitated by UF
- Regional Development & Implementation Teams: UF, FSU, USF and FIU

### CPALMS

- Development facilitated by FSU

### Program Evaluation

- Internal Evaluation—Coalition for Science Literacy at USF
- External Evaluation—Westat

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## PROMiSE Mission Statement

To improve Florida student achievement in mathematics and science through professional development for Florida's educators and to build capacity to sustain quality implementation of the Next Generation Sunshine State Standards (NGSSS).

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## Contact Florida PROMiSE

### University Contact Information:

**USF:** Flpromise-USF@coedu.usf.edu

**UF:** FloridaPROMiSE\_UF@coe.ufl.edu

**FSU:** Florida\_PROMiSE\_FSU@lsi.fsu.edu

### Florida PROMiSE

4202 E. Fowler Ave, EDU105

Tampa, FL 33620

Phone: 813-974-9131

Fax: 813-974-1249

For additional information about the Florida PROMiSE Project please visit:

<http://flpromise.org>

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