NCSM President
2013-2015

Valerie L. Mills

Ypsilanti
Michigan

National Council of Supervisors of Mathematics

N - Network and collaborate with stakeholders in education, business, and government to ensure growth and development of mathematics education leaders.

C - Communicate current and relevant research to mathematics leaders.

S - Support and sustain student achievement through the development of leadership skills

M - Motivate mathematics leaders to maintain a lifelong commitment to provide equity and access for all learners.

JUMP START
Formative Assessment

National Council of Supervisors of Mathematics

JUMP START Formative Assessment Webinar

Ana Floyd

K-5 Mathematics & Science
Lead Teacher
Randolph County School District
Randolph, North Carolina

Wendy Rich

Director of Elementary Curriculum
& Instruction
Asheboro City Schools
Asheboro, North Carolina

JUMP START
Formative Assessment

National Council of Supervisors of Mathematics

JUMP START Formative Assessment Webinar

Connections to Formative Assessment

What are your teachers doing well related to formative assessment?	What are your needs related to formative assessment?

AMTE
Association of Mathematics Teacher Educators

LEADERSHIP IN MATHEMATICS EDUCATION
NCSM
NETWORK
COMMUNICATE
SUPPORT
MOTIVATE

JUMP START

Formative Assessment Our Position

The National Council of Supervisors of Mathematics (NCSM) and the Association of Mathematics Teacher Educators (AMTE) affirm the centrality of research-based, mathematically focused, formative assessment—a key element in the national effort to improve mathematics proficiency. Formative assessment needs to be intentionally and systematically integrated into classroom instruction at every grade level. This requires adequate attention in the preparation of new teachers of mathematics and in the continuing education and professional development of current teachers.

Audience for "Jump Start" Series

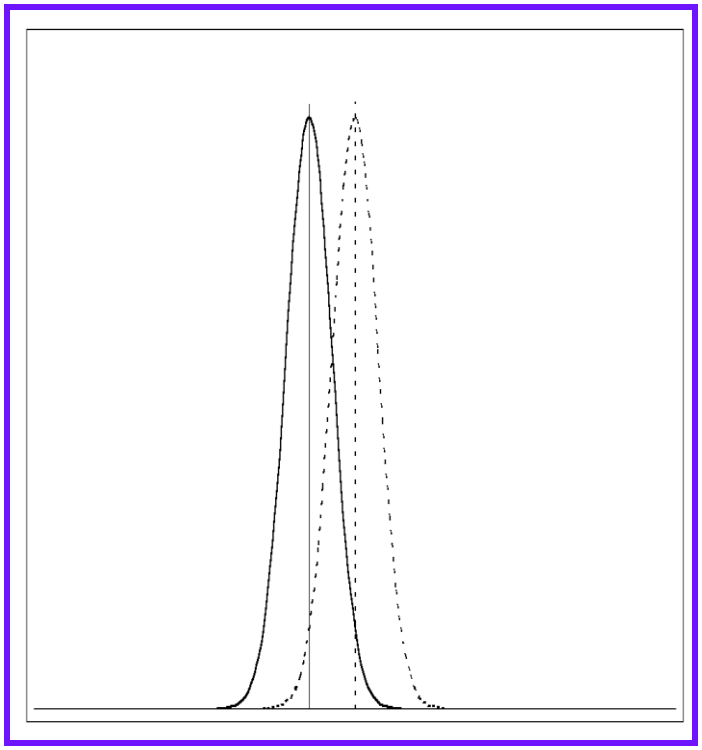
- Math coaches, math specialists, faculty who teach mathematics education courses, teacher leaders might use the series with professional learning communities and informal gatherings of colleagues
- Ultimately, classroom teachers and students will implement and benefit from the strategies
  - Teachers will know more about their students' thinking and reasoning and students' misunderstandings
  - Teachers will use this knowledge to modify instruction to better meet students' needs
  - Students will be supported in taking greater responsibility for their own learning

Overarching Goals for "Jump Start"

- To provide teachers with understanding that formative assessment is a *process* of gathering evidence about what students know and understand, their misconceptions, and their incomplete knowledge
- To support teachers in using strategies that inform teaching and learning and shape their instructional decisions "in the moment" and in short and long-term planning
- To suggest strategies for encouraging greater involvement of students

Formative Assessment Makes a Difference!

Black and Wiliam (1998) report, based on their extensive review of research, typical effect sizes of formative assessment experiments are between 0.4 and 0.7



Effect Size = The number of standard deviations between the means of the experimental and control groups

A positive effect size indicates that the experimental group performed better than (that is, outscored) the control group

(Dynamic Classroom Assessment 2004)

Formative Assessment Makes a Difference!

- According to Black and Wiliam (1998), these gains are
  - Larger than most instructional innovation strategies,
  - Particularly helpful to pupils who have previously struggled,
  - Consistent across countries (i.e., US, Canada, England, Israel, and Portugal), across age brackets, and content areas, and
  - Sustained over extended periods of time (Wiliam, 2005)
- *It's really not surprising that formative assessment works so well. What is surprising is how few U.S. teachers use the process. (*Popham, 2013)

Defining Formative Assessment

Formative assessment has three key elements:

- Elicit evidence about learning to close the gap between current and desired performance
- Adjust the learning experiences to close the performance gap through useful feedback
- Involve students in the assessment learning process

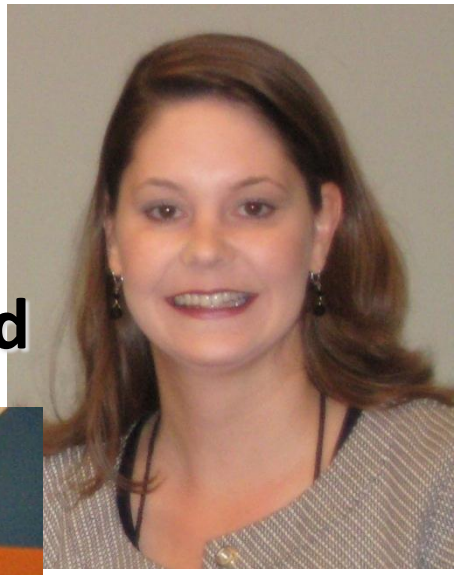
Adapted from Margaret Heritage, 2008

Description of JUMP START Sessions

JUMP START

Authors

Jeane Joyner



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Katherine Mawhinney

"Jump Start" Modules

- Module 1: Overview
- Module 2: Identifying Learning Targets
- Module 3: Activating Prior Knowledge
- Module 4: The Answer is Wrong
- Module 5: Feedback to Students
- Module 6: Asking Productive Questions

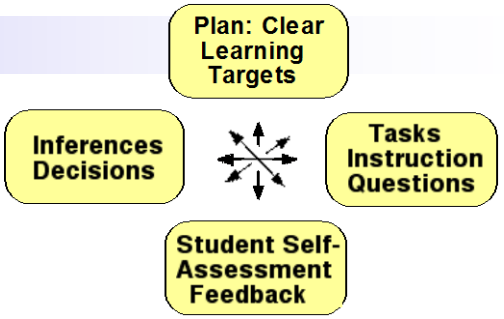
Structure of JUMP START Series

- PowerPoint presentations with discussion notes, activities, and suggestions for follow-up
- Single-topic focus for each session
  - Grade-level groups, department meetings, faculty discussions, PLCs
  - Web search ideas for further information
- Technology requirements: computer and projection device; internet connection
- Leader notes for each session and discussion ideas for each slide; participant alerts (e.g., alternative ways to implement strategies, cautions)

NCTM Research Brief: Five Key Strategies

National Council of Teachers of Mathematics (2007) Five "Key Strategies" for Effective Formative Assessment

- Clarifying, sharing, and understanding goals for learning and criteria for success with learners
- Engineering effective classroom discussions, questions, activities, and tasks that elicit evidence of students' learning
- Providing feedback that moves learning forward
- Activating students as owners of their own learning
- Activating students as learning resources for one another

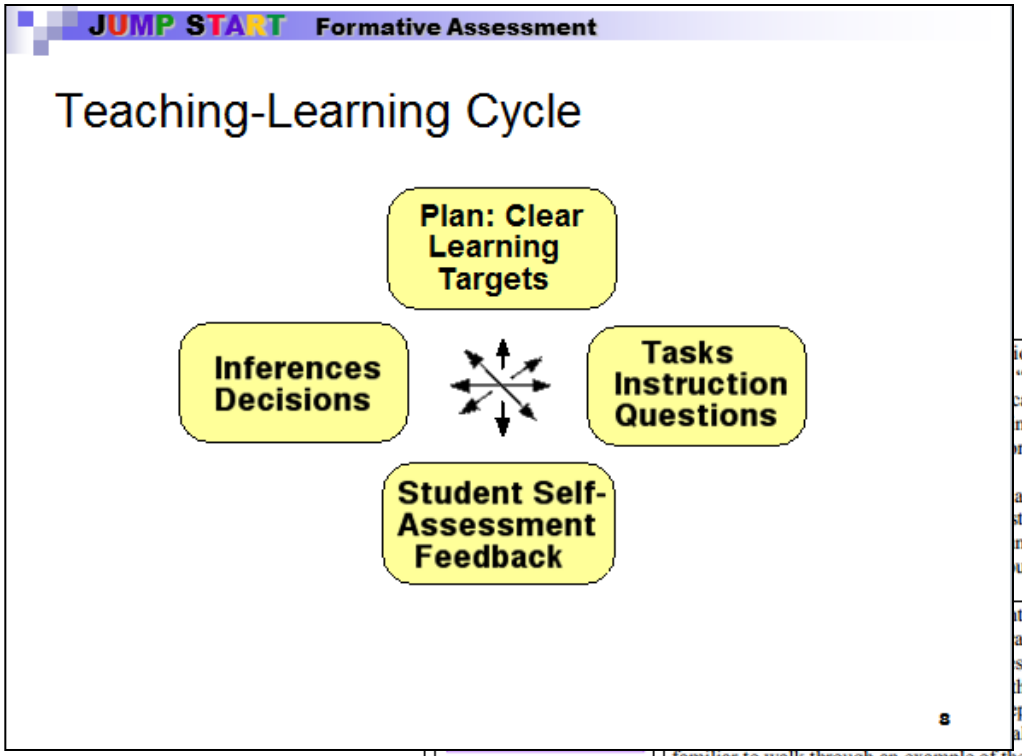


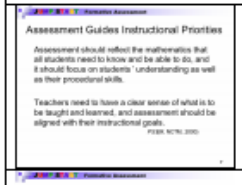
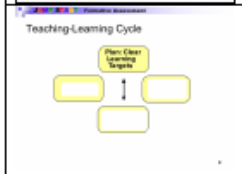
Identifying and Planning Clear Learning Targets

Teaching begins with clear learning targets

- What do we expect students to learn?
- How are they going to learn it?
- How will we know when they have learned it?
- How will they know when they have learned it?
- How will we respond when they don't?
- How will we respond when they do?

Learning takes place as students make sense of the mathematics in their lessons



	ion has always been part of instructional planning. What this session "At the end of the day, what do I want my students to get out of the lesson?" cal issues that are not addressed are (1) including the students as informed ng-learning cycle, and (2) how learning targets might be shared with and r these to be addressed in other sessions. and be able to do? Learning targets allow us to specifically define what t do with that knowledge. If we don't begin with clear statements of nd assessments. And without sound assessments, we cannot create the ur students to achieve the targets. (Marzano, 2004)
	tent that students are expected to learn and teachers are expected to teach. ain sizes" depending upon the authors. Examples of such terms are essential s, and objectives. Knowledge of learning trajectories or learning he standards and goals for their particular year or course fit into a bigger pending upon the time available for this session, you may wish to have alogy or use curriculum and text materials with which your audience is familiar to walk through an example of the information in this chart. This slide is an effort to be clear about how daily learning targets fit into the broader picture and how teachers go about determining their instructional priorities.
	7. It is imperative that teachers imbed assessment into their instructional programs so that adjustments to plans reflect what students are learning and attend to what still needs to be learned. Assessment is not an add-on; rather it is a tool for making decisions. NCTM's *Principles and Standards for School Mathematics* continues to be a resource for teachers.
	8. There are many variations of a model such as this one as authors attempt to illustrate the interactions that are involved in teaching and learning. The points to be made here are that each of these cells involve teachers with content and students, that students should be heavily involved in the teaching and learning cycle, and that instruction begins with a clear understanding of the goals with adjustments made throughout the teaching-learning cycle to support students' attainment of the learning targets. Each of the parts of the teaching and learning cycle are platforms for formative assessment. Teaching-Learning Cycle develops the cyclic nature of teaching and learning and how formative assessment drives the cycle. The cycle highlights clear learning targets as a point of entry and develops the notion of teaching as a practice that teachers can reflect upon and improve.

Another Prior Knowledge Strategy

Pose a multiple choice discussion prompt

- There are four dogs. One of the dogs weighs 50 pounds. What is true? Explain

  A. The median could be 12, but the mean could not be 12

  B. The mean could be 12, but the median could not be 12

  C. Both the median and the mean could be 12

  D. Neither the median nor the mean could be 12

  E. There is not enough information to know

What might you infer when students choose each of these answers?

Task from INFORMative Assessment: Formative Assessment to Improve Math Achievement, Middle and High School

Example: “Quick Writes” As a Strategy

- Students often approach lessons involving fractions as if they had no prior knowledge
- Quick writes can get students thinking about what they learned in previous years
  - Model 3/4 in three different ways
  - Give an example to show that one-fourth is not always smaller in size than one-half
  - What do you know about whole number operations that will help you compute with fractions?

Activating Students' Prior Knowledge

- The focus is "in the moment" assessment
- Students recall what they know about a topic
- Teachers have immediate feedback on "where the group is"
- Begins the lesson with students thinking about the topic and what they already know
- Is usually short (4-6 minutes)
- Can be introductory in nature as a launch or a quick review

When the Answer Is Wrong…

This session has two main goals:

- To consider strategies that support what is correct in students' thinking yet address misconceptions, incomplete understanding, and wrong answers

- To identify one or more strategies that fit with each participant's instructional practices and to plan ways to implement the strategy

What Would You Say?

Scenario: Students are working on this problem; you call on Cary

- [18 ÷ 2 - (3 x 2) - 5] + 3 =

Cary has written

  - [9 - 6 - 5] + 3 =
  - [9 -11] + 3 =
  - 2 + 3 = 5

- What does Cary understand? What does Cary not understand? What might you say when Cary answers “5” to offer support but acknowledge that the answer is incorrect?

What Would You Say?

Students are working on this problem; you call on a student

- 4x(2x - 9) - 2(5x - 6)

The student has written

4x(2x - 9) - 2(5x - 6)

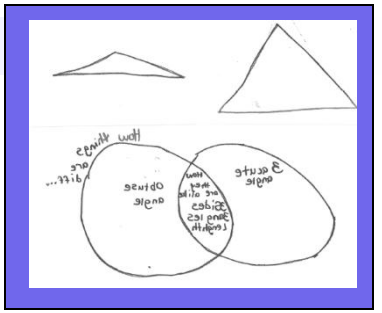
8x - 36x -10x + 12

-38x + 12

- What does the student understand? What does the student not understand? What would you say to this student to offer support but acknowledge that the answer is incorrect?

Feedback to Students

- Timely, actionable feedback helps students know what is correct and what they need to rethink
- Either oral or written, quality feedback moves student learning forward
- In this session there are opportunities to identify feedback that is not very helpful and turn it into comments that support student learning

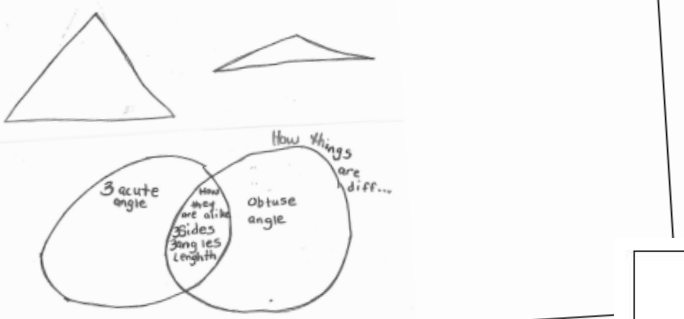


Examining Student Work

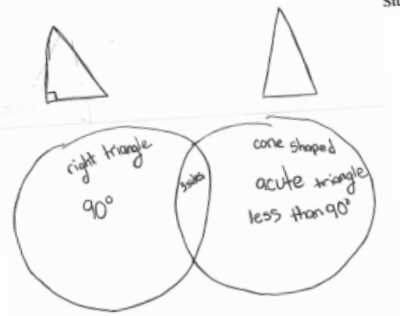
- *Students' Task*: Draw two different triangles. Use a Venn diagram to show how they are alike and how they are different
- With your partner discuss the student work
  - What information would you expect in a strong response?
  - What is the nature of the misconceptions or mistakes on the students' papers?
  - Which students do you want to question?
  - What "next steps" instructionally would you plan for this class?

Student samples: JUMP START Feedback session

Student A



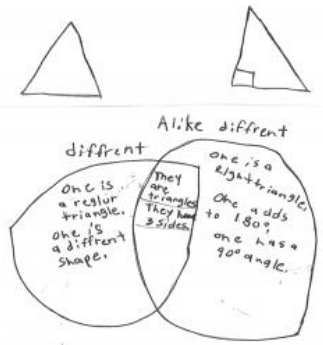
Student B



Triangle Task Student Work JUMP START Feedback Session

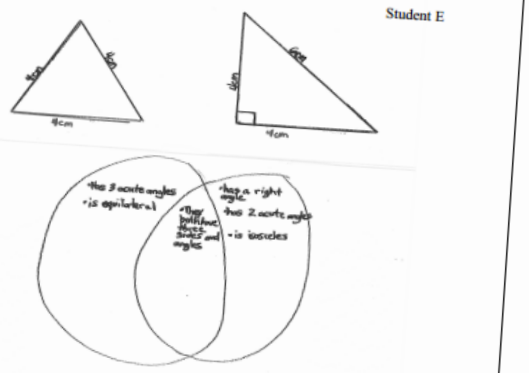
Student C

Student D

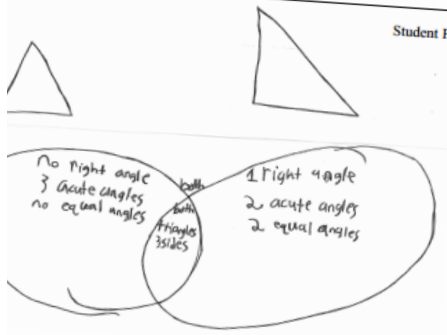


Triangle Task Student Work JUMP START Feedback Session 2

Student E



Student F



Work JUMP START Feedback Session 3

Writing Helpful Feedback

- After examining the student samples, consider what feedback you might give to the class
- Would you divide the students into groups?
  - If yes, how would you group them?
  - What would you say to the different groups?
- Divide the student examples so each person has at least 2 samples
- Write feedback to these students
- Share your feedback examples with others

Asking Productive Questions

- To examine different purposes for classroom questions
- To differentiate types of questions that support student learning and inform instruction
- To reflect on personal use of questions in the classroom

Conjecturing About Functions

- Video is of an 8th grade class
- Content is making conjectures about functions
- Teacher is Audra McPhillips
- URL for future viewing and reading web discussion is https://www.teachingchannel.org/videos/conjecture-lesson-plan
- Directions: Pay particular attention to the questions that the teacher asks and her comments about why she does different things

Reaction: Conjecturing About Functions

- What did you notice about the classroom environment?
- How did this lesson build on previous work?
- What evidence do you have that the teacher is using her knowledge of students' thinking in moving this particular lesson forward?
  - Her depth of knowledge of the mathematics content?
  - Her general knowledge about students' as they learn this content (difficulties or possible misconceptions)?
  - Real time interactions with the students?

Plans Call For Additional Topics

- Inferences About Students' Thinking
- Student Self-Assessment
- Intentional Listening
- Using Student Data To Make Instructional Decisions
- Students Becoming Resources

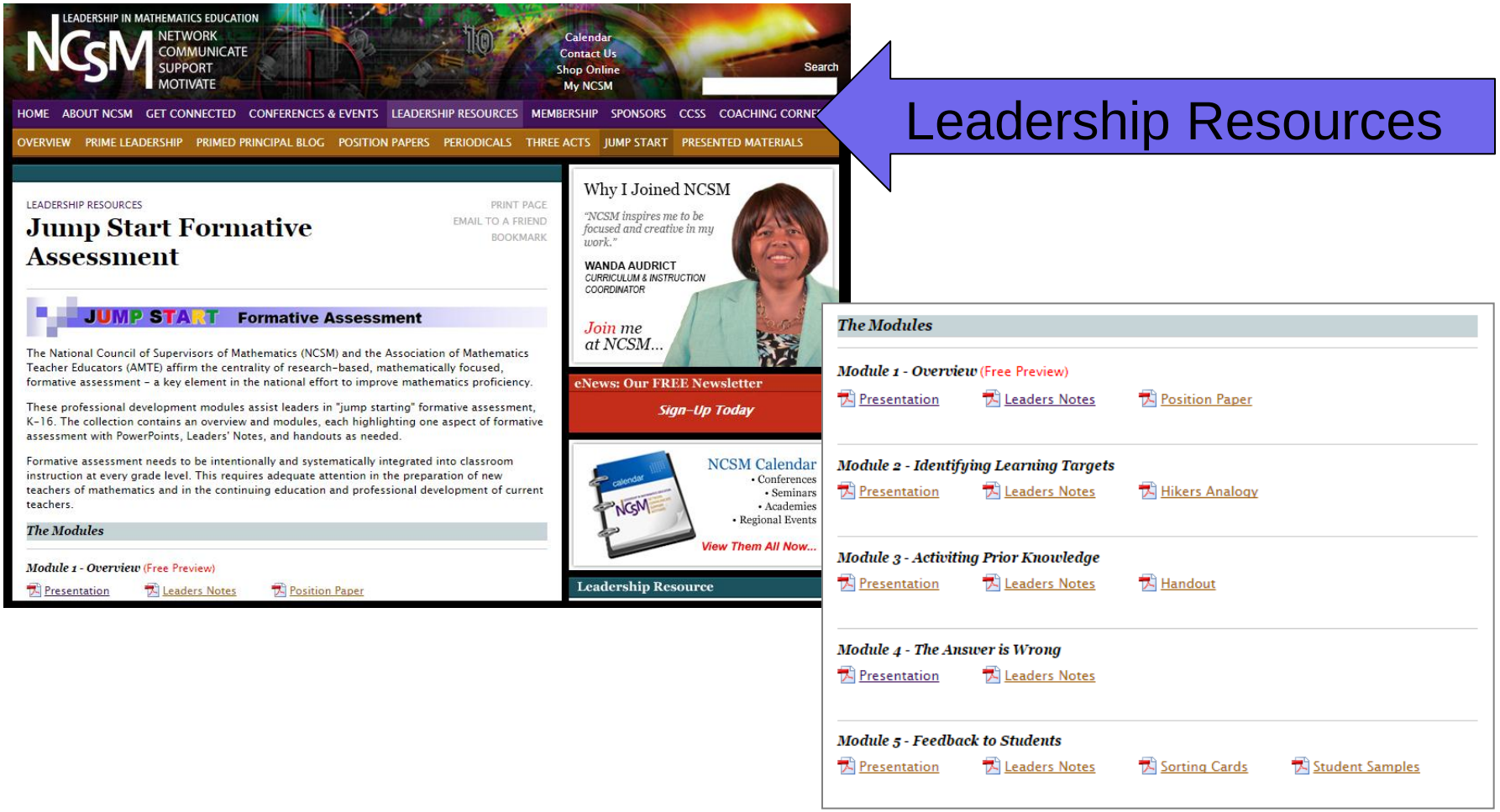
Connections to Formative Assessment

What are your teachers doing well related to formative assessment?	What are your needs related to formative assessment?

Feedback

- Please share your feedback and suggestions with the writing team
  - https://www.surveymonkey.com/s/3BQ2H8M

JumpStart Modules



Leadership Resources

http://www.mathedleadership.org/resources/jumpstart/index.html

References

- Black, P., Harrison, C., Lee, C., Marshall, B., & Wiliam, D. (2004) Working inside the black box: Assessment for learning in the classroom. *Phi Delta Kapan*, 86(1), 8-21.

- Heritage, Margaret (2008). Learning Progressions: Supporting Instruction and Formative Assessment

https://www.k12.wa.us/assessment/ClassroomAssessmentIntegration/pubdocs/FASTLearningProgressions.pd

- Leahy, S., Lyon, C., Thompson, M., and Wiliam, D. (2008). Classroom Assessment: Minute by Minute, Day by Day. *Educational Leadership*, 63(3), 19-24.

- National Council of Teachers of Mathematics (2007). Five “Key Strategies” for Effective Formative Assessment.

- Popham,J. (2013) Formative assessment’s advocatable moment. *Education Week*, 32(15), 29.

JUMP START

Formative Assessment

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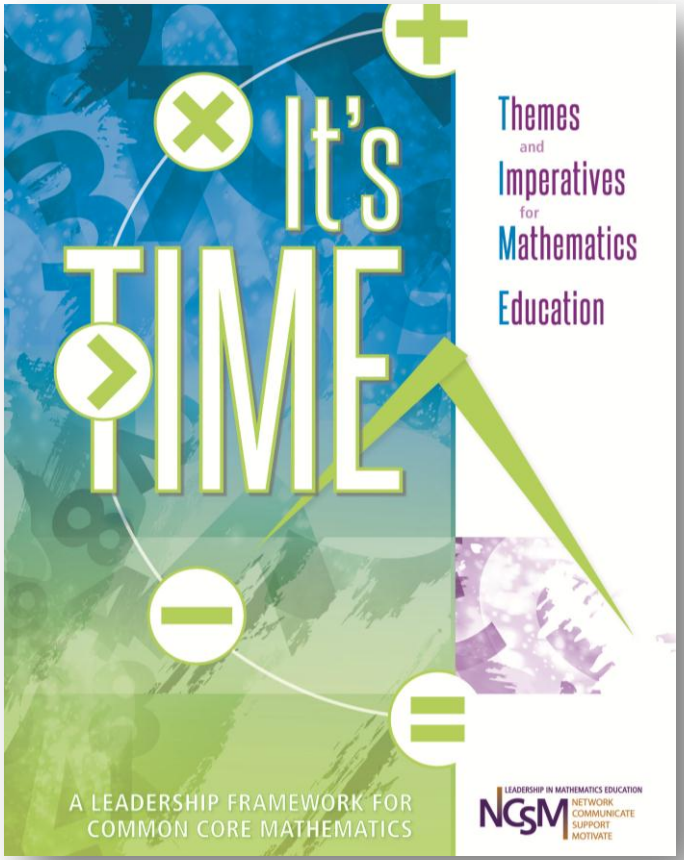
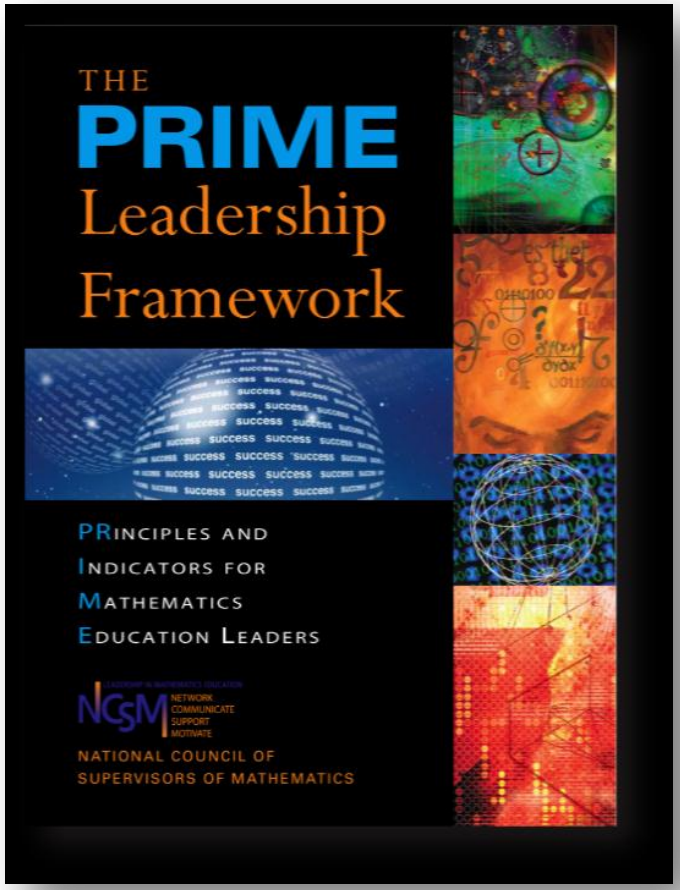
NCSM's PRIME companion….



It's TIME:
Themes and Imperatives for Mathematics Education

LEADERSHIP IN MATI
NCSM

Leadership Training for Mathematics Leaders



PRINCIPLES AND
INDICATORS FOR
MATHEMATICS
EDUCATION
LEADERS

2014 NCSM FALL LEADERSHIP SEMINAR:

It's TIME:
Using Imperatives to Support and Motivate Leaders in Mathematics Education

Join Steve Leinwand, Valerie Mills, Catherine Fosnot, and other leaders in mathematics education at these one-day seminars!

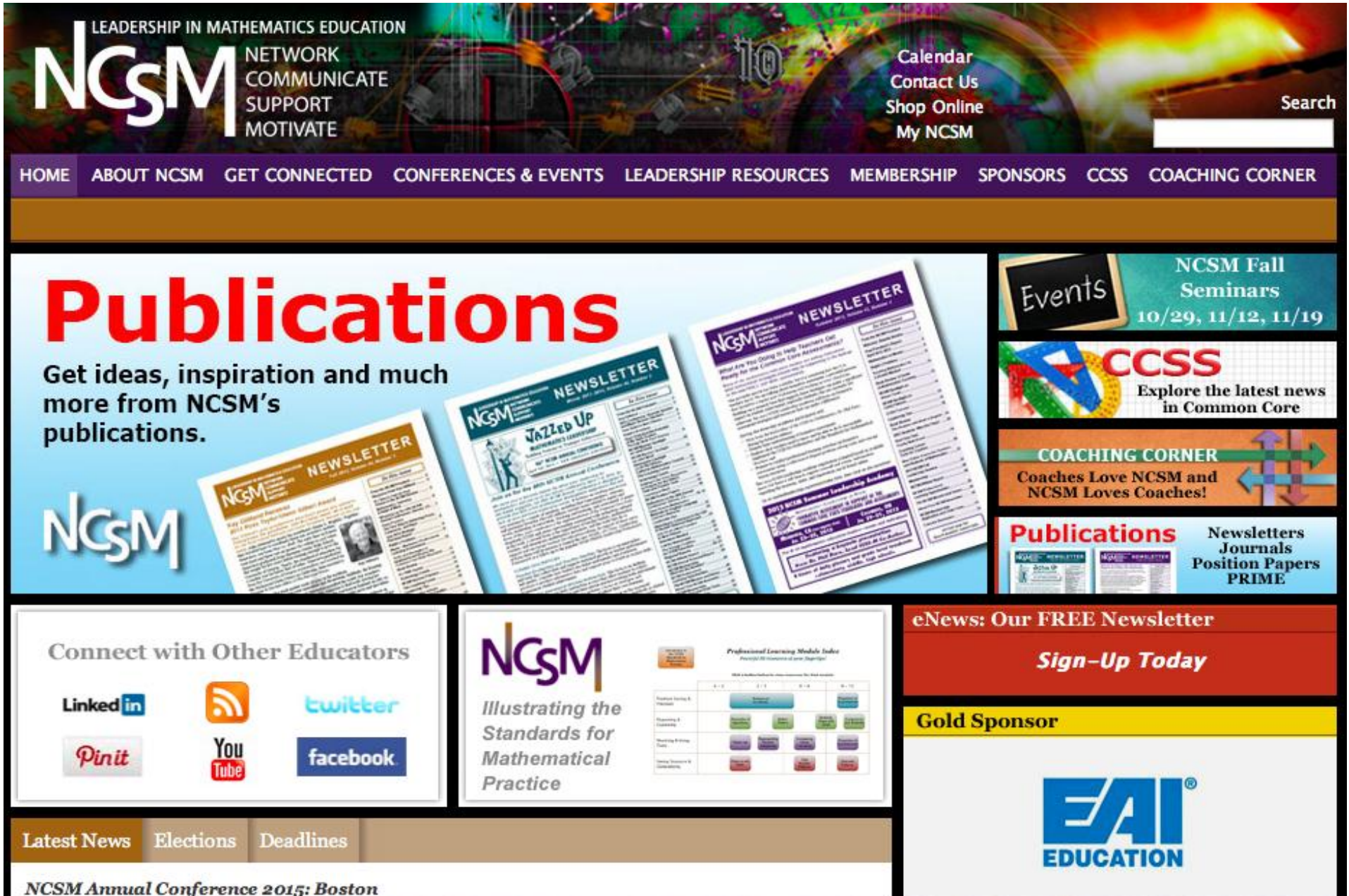
THREE DATES AND LOCATIONS

The NCSM Leadership Seminar is held on Wednesday in conjunction with the NCTM Pre-Conference Meeting from 8:00AM–4:00PM

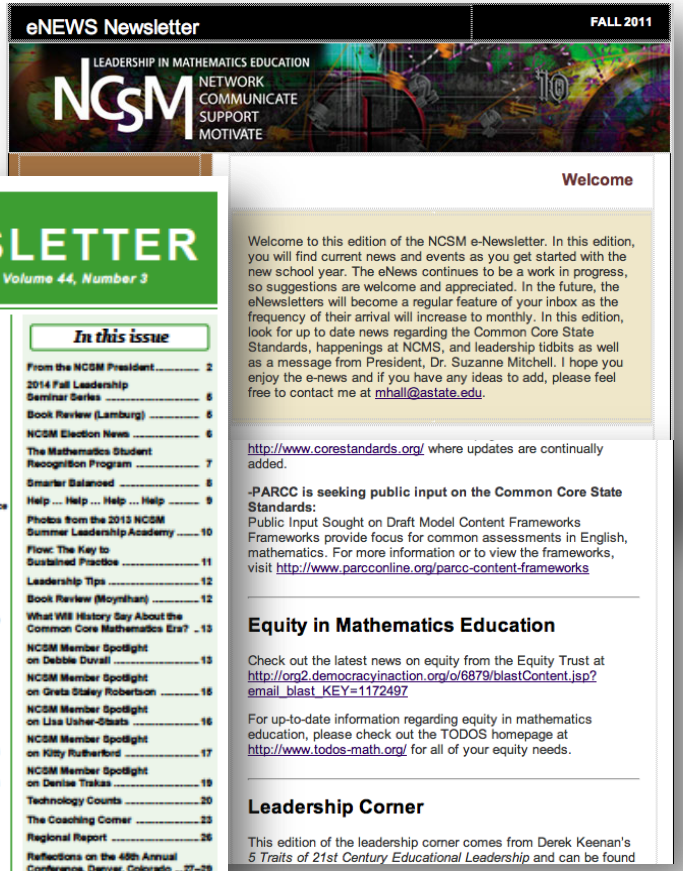
One Value-Packed Day

OCTOBER 29, 2014	**INDIANAPOLIS, IN**
NOVEMBER 12, 2014	**RICHMOND, VA**
NOVEMBER 19, 2014	**HOUSTON, TX**

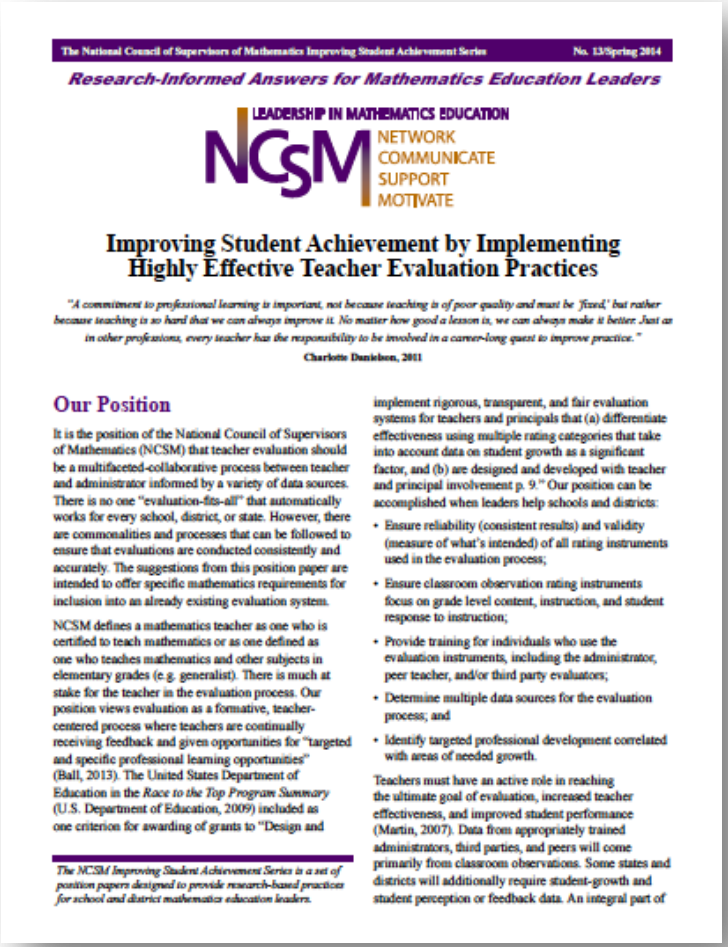
www.MathEdLeadership.org



NCSM Mathematics Leadership Publications



New Position Papers:



The National Council of Supervisors of Mathematics Improving Student Achievement Series — No. 13/Spring 2014

Research-Informed Answers for Mathematics Education Leaders

LEADERSHIP IN MATHEMATICS EDUCATION
NCSM
NETWORK
COMMUNICATE
SUPPORT
MOTIVATE

Improving Student Achievement by Implementing Highly Effective Teacher Evaluation Practices

"A commitment to professional learning is important, not because teaching is of poor quality and must be 'fixed,' but rather because teaching is so hard that we can always improve it. No matter how good a lesson is, we can always make it better. Just as in other professions, every teacher has the responsibility to be involved in a career-long quest to improve practice."
Charlotte Danielson, 2011

Our Position

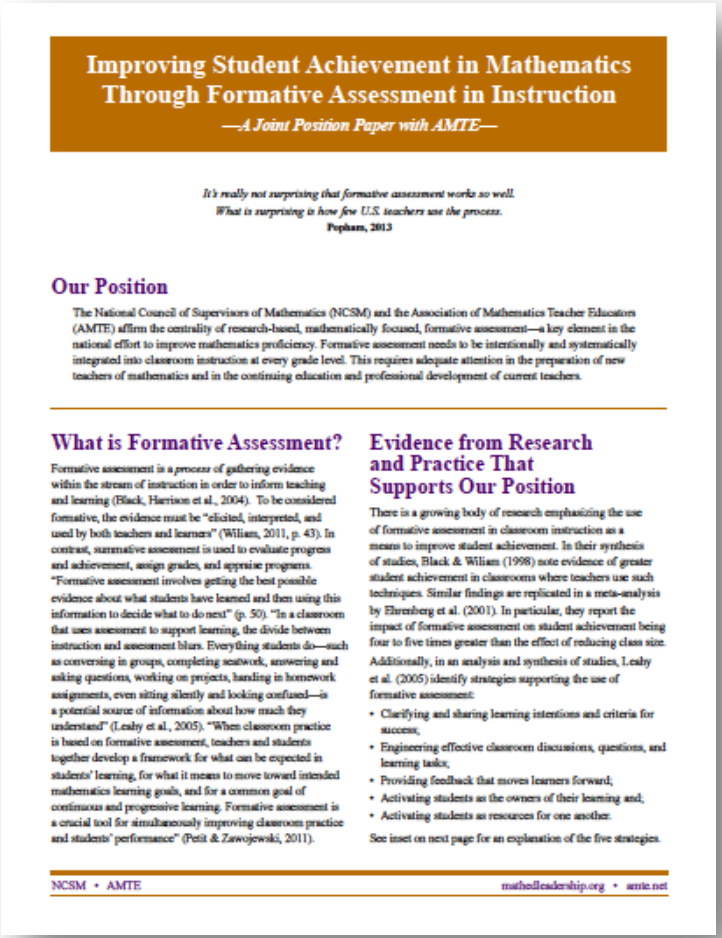
It is the position of the National Council of Supervisors of Mathematics (NCSM) that teacher evaluation should be a multifaceted-collaborative process between teacher and administrator informed by a variety of data sources. There is no one "evaluation-fits-all" that automatically works for every school, district, or state. However, there are commonalities and processes that can be followed to ensure that evaluations are conducted consistently and accurately. The suggestions from this position paper are intended to offer specific mathematics requirements for inclusion into an already existing evaluation system.

NCSM defines a mathematics teacher as one who is certified to teach mathematics or as one defined as one who teaches mathematics and other subjects in elementary grades (e.g. generalist). There is much at stake for the teacher in the evaluation process. Our position views evaluation as a formative, teacher-centered process where teachers are continually receiving feedback and given opportunities for "targeted and specific professional learning opportunities" (Ball, 2013). The United States Department of Education in the *Race to the Top Program Summary* (U.S. Department of Education, 2009) included as one criterion for awarding of grants to "Design and implement rigorous, transparent, and fair evaluation systems for teachers and principals that (a) differentiate effectiveness using multiple rating categories that take into account data on student growth as a significant factor, and (b) are designed and developed with teacher and principal involvement p. 9." Our position can be accomplished when leaders help schools and districts:

- Ensure reliability (consistent results) and validity (measure of what's intended) of all rating instruments used in the evaluation process;
- Ensure classroom observation rating instruments focus on grade level content, instruction, and student response to instruction;
- Provide training for individuals who use the evaluation instruments, including the administrator, peer teacher, and/or third party evaluators;
- Determine multiple data sources for the evaluation process; and
- Identify targeted professional development correlated with areas of needed growth.

Teachers must have an active role in reaching the ultimate goal of evaluation, increased teacher effectiveness, and improved student performance (Martin, 2007). Data from appropriately trained administrators, third parties, and peers will come primarily from classroom observations. Some states and districts will additionally require student-growth and student perception or feedback data. An integral part of

The NCSM Improving Student Achievement Series is a set of position papers designed to provide research-based practices for school and district mathematics education leaders.



Improving Student Achievement in Mathematics Through Formative Assessment in Instruction

—A Joint Position Paper with AMTE—

It's really not surprising that formative assessment works so well. What is surprising is how few U.S. teachers use the process.
Popham, 2013

Our Position

The National Council of Supervisors of Mathematics (NCSM) and the Association of Mathematics Teacher Educators (AMTE) affirm the centrality of research-based, mathematically focused, formative assessment—a key element in the national effort to improve mathematics proficiency. Formative assessment needs to be intentionally and systematically integrated into classroom instruction at every grade level. This requires adequate attention in the preparation of new teachers of mathematics and in the continuing education and professional development of current teachers.

What is Formative Assessment?

Formative assessment is a *process* of gathering evidence within the stream of instruction in order to inform teaching and learning (Black, Harrison et al., 2004). To be considered formative, the evidence must be "elicited, interpreted, and used by both teachers and learners" (Wiliam, 2011, p. 43). In contrast, summative assessment is used to evaluate progress and achievement, assign grades, and appraise programs. "Formative assessment involves getting the best possible evidence about what students have learned and then using this information to decide what to do next" (p. 50). "In a classroom that uses assessment to support learning, the divide between instruction and assessment blurs. Everything students do—such as conversing in groups, completing seatwork, answering and asking questions, working on projects, handing in homework assignments, even sitting silently and looking confused—is a potential source of information about how much they understand" (Leahy et al., 2005). "When classroom practice is based on formative assessment, teachers and students together develop a framework for what can be expected in students' learning, for what it means to move toward intended mathematics learning goals, and for a common goal of continuous and progressive learning. Formative assessment is a crucial tool for simultaneously improving classroom practice and students' performance" (Petit & Zawojewski, 2011).

Evidence from Research and Practice That Supports Our Position

There is a growing body of research emphasizing the use of formative assessment in classroom instruction as a means to improve student achievement. In their synthesis of studies, Black & Wiliam (1998) note evidence of greater student achievement in classrooms where teachers use such techniques. Similar findings are replicated in a meta-analysis by Ehrenberg et al. (2001). In particular, they report the impact of formative assessment on student achievement being four to five times greater than the effect of reducing class size. Additionally, in an analysis and synthesis of studies, Leahy et al. (2005) identify strategies supporting the use of formative assessment:

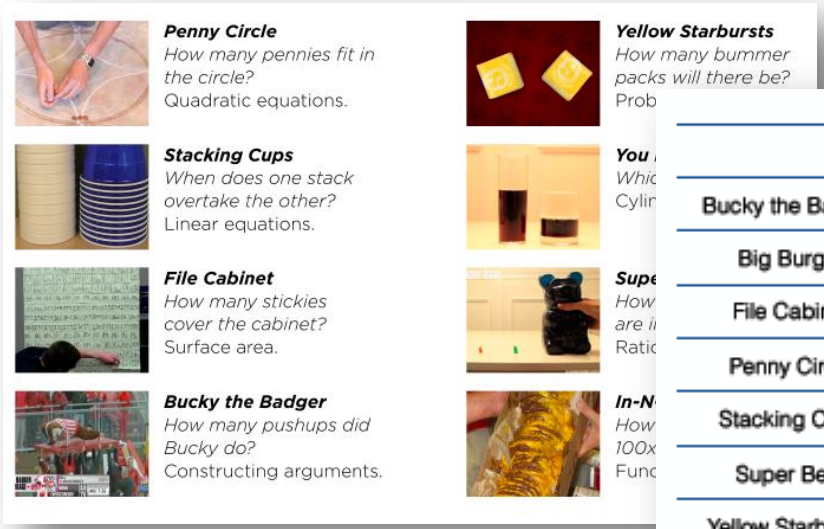
- Clarifying and sharing learning intentions and criteria for success;
- Engineering effective classroom discussions, questions, and learning tasks;
- Providing feedback that moves learners forward;
- Activating students as the owners of their learning and;
- Activating students as resources for one another.

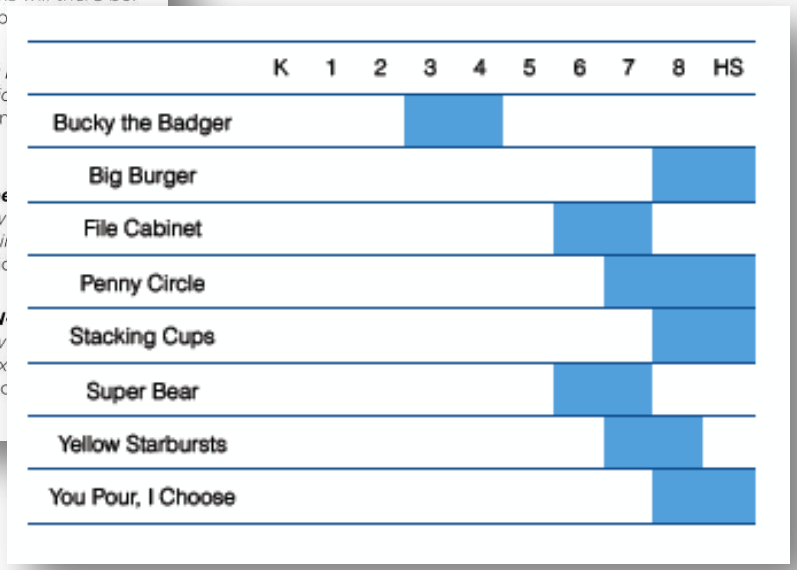
See inset on next page for an explanation of the five strategies.

LEADERSHIP IN MATH
NCSM

New

Great Modeling Tasks in Three Acts





- Photos & videos
- PowerPoint slides
- Lesson plans
- Teaching notes
- Extension tasks
- Student work

Andrew Stadel, Dan Meyer, Eric Milou, Gwen Zimmermann, *and* ***Robert Kaplinsky***

NCSM

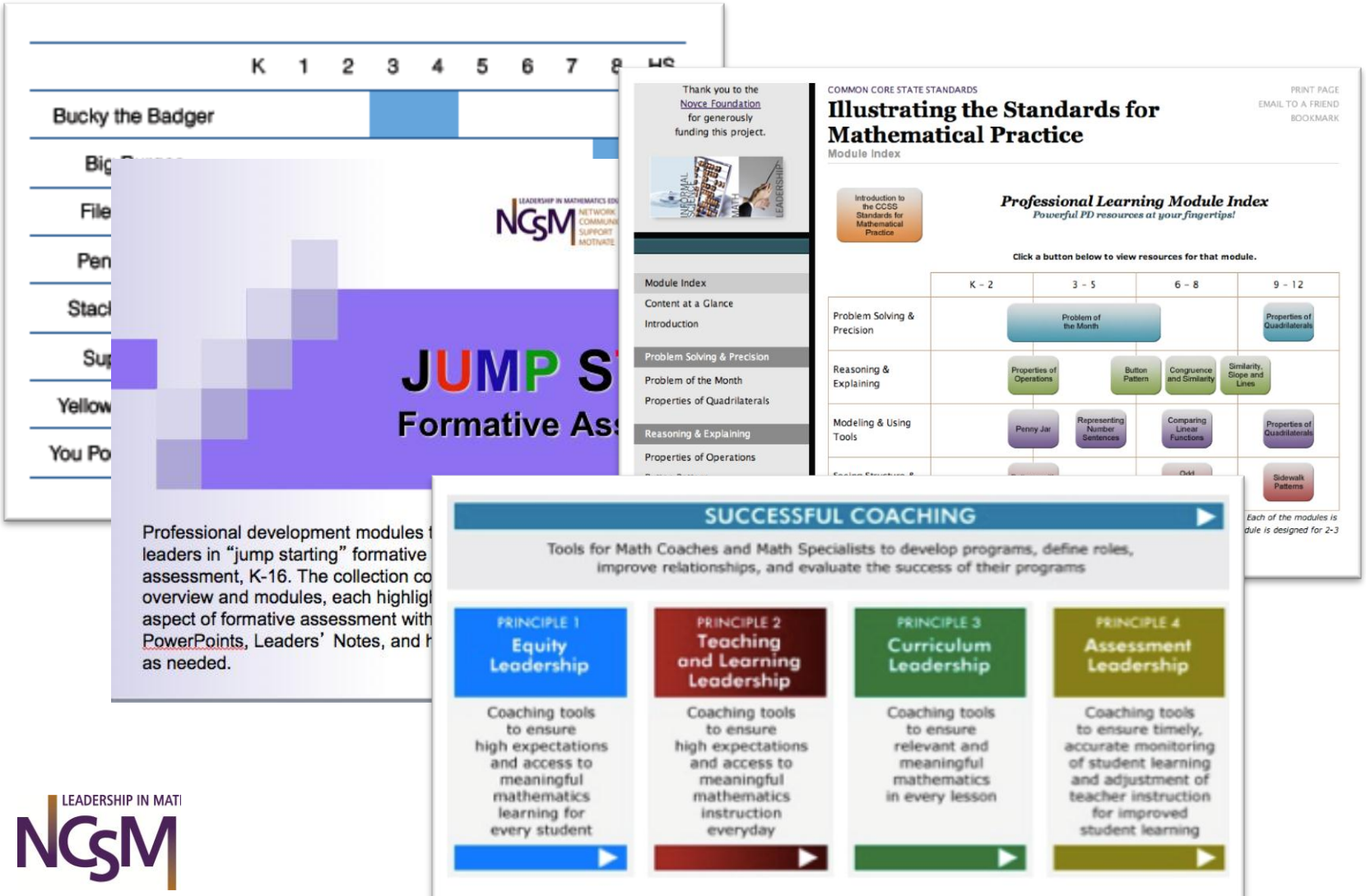
New!

JUMP START
Formative Assessment

Professional development modules to assist leaders in "jump starting" formative assessment, K-16. The collection contains an overview and modules, each highlighting one aspect of formative assessment with PowerPoints, Leaders' Notes, and handouts as needed.

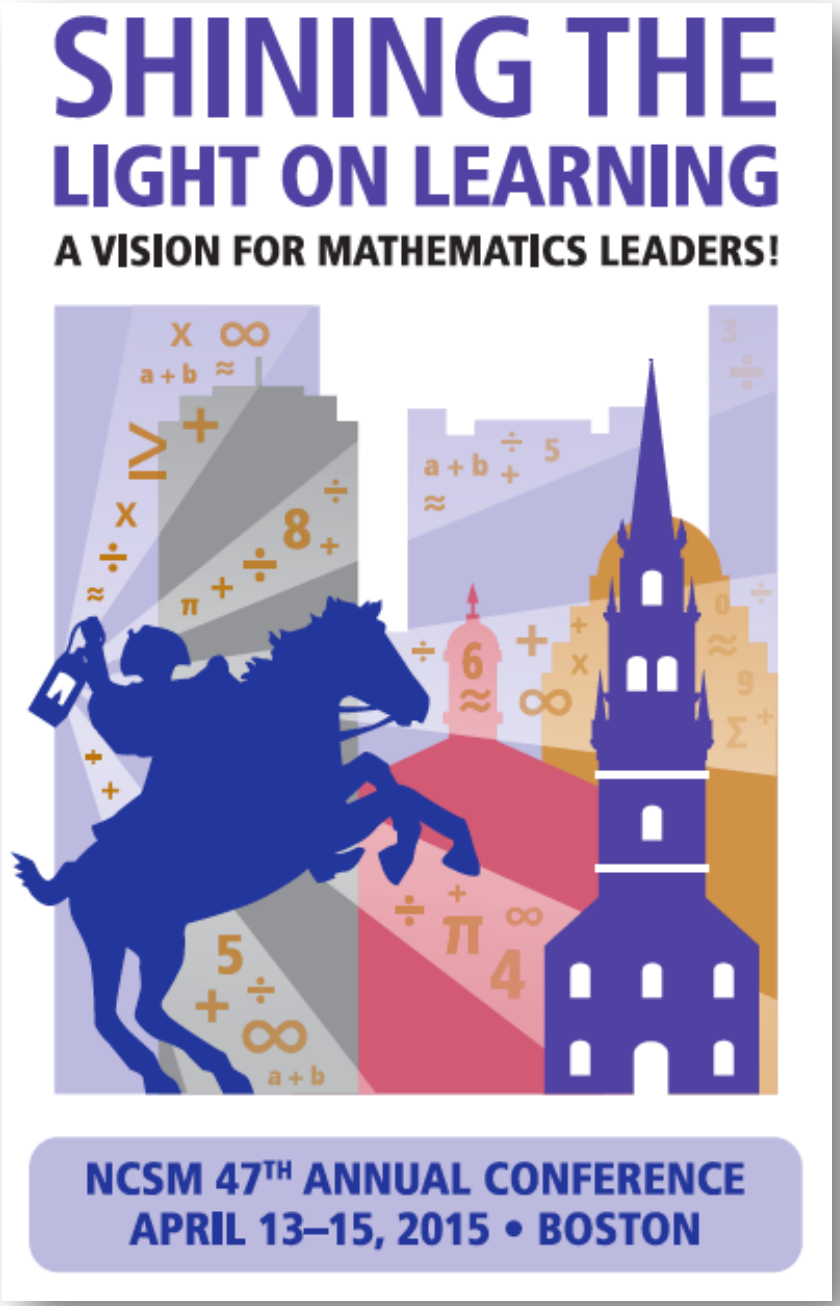
1. Overview
2. Identifying Learning Targets
3. Activating Prior Knowledge
4. The Answer Is Wrong
5. Feedback to Students

ePublications
www.mathedleadership.org



LEADERSHIP IN MATH
NCSM

New NCSM Webinars!



Plan *now* to join us!

Leading speakers presenting over 300 sessions

- ✓Leading instruction
- ✓Leveraging technology in support of teaching and learning
- ✓Advancing formative assessment
- ✓Exploring strategies and tools for coaches
- ✓Shifting practices to effectively implement the CCSS

Get Involved - Volunteer

- ✓ State Team Leader
- ✓ Disseminate NCSM member materials
- ✓ Present a PRIME and/or CCSS leadership session(s)
- ✓ Write/Review for NCSM Journal or Newsletters
- ✓ Conferences: review proposals; help onsite; submit speaker proposal
- ✓ Join a committee: Awards, Nominations, Publications, Projects

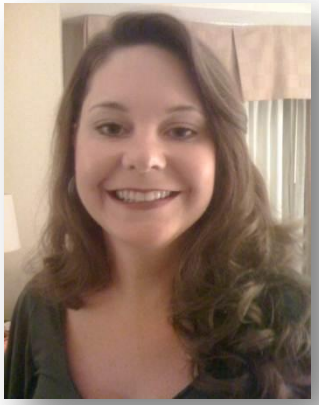
2014 NCSM
Fall Leadership Seminars

It's TIME: Using Imperatives to Support and Motivate Leaders in Mathematics Education

October 29th	Indianapolis, IN
November 12th	Richmond, VA
November 19th	Houston, TX

Jump Starting Formative Assessment: A Resource for Leaders

http://www.mathedleadership.org/events/webinars.html



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