Strengthening Instructional Leadership in Mathematics

Flagstaff Unified School District

NORTHERN ARIZONA UNIVERSITY

Flagstaff Unified School District
Mathematics Department

E = MC²

Excellence = Mathematics × Collaboration × Community

12/1/2014
Flagstaff Unified School District
Mathematics Department

Vision Statement:
The FUSD Mathematics Department envisions a comprehensive mathematics system where all students are successful and have access to a high quality and equitable mathematics program, which utilizes course/grade level collaborative teams as the building blocks for improving teaching and learning.
Goals of the Project

1. Examine the research-affirmed foundation of mathematics content and process standards to deepen understanding of the AZCCRS in mathematics

2. Examine the instructional shifts necessary to implement the AZCCRS in mathematics

3. Examine evidence-based practices for effective observation, coaching and evaluation of AZCCRS in mathematics

4. Examine effective practices to develop an understanding of the AZCCRS in mathematics for the parent/guardians, community members and other stakeholders
Outcomes for Today

• Examine the Mathematical Teaching Practice “Facilitate meaningful mathematical discourse.”

• Understand where the mathematical teaching practices are represented/evaluated in our TPEC tool.

• Provide evidence of Strengthening Instructional Leadership at your site/department
Facilitate meaningful mathematical discourse

One of the 8 Mathematical Teaching Practices identified by the National Council of Teachers of Mathematics in “Principles to Actions: Ensuring Mathematical Success for All.”
Mathematics Teaching Practices

• Establish mathematics goals to focus learning

• Implement tasks that promote reasoning and problem solving

• Use and connect mathematical representations

• Facilitate meaningful mathematical discourse

• Pose purposeful questions

• Build procedural fluency from conceptual understanding

• Elicit and use evidence of student thinking

• Support productive struggle in learning mathematics
What is mathematical discourse?

Why is it an important mathematical teaching practice?

Discourse brainstorm produced by MIST team on the following slide.
Mathematical Discourse

Effective teaching of mathematics facilitates discourse among students to build shared understanding of mathematical ideas by analyzing and comparing student approaches and arguments.
Discourse Brainstorm

**Teacher Skills Needed**
- Strong content knowledge
- Classroom management
- Know misconceptions
- Very prepared
- Intentional probing questions
- Know students' abilities
  - 100% participation
  - General scaffolding

**Is**
- Thoughtfully discussing subject matter
- Justifying
- Clarifying
- Exchange of ideas
- Listening
- Visual and written communication
- Sequenced
- Focused
- Intentional
- Equitable

**Is Not**
- Show & tell tangents
- Just answer getting sitting in groups quiet lecture watch and repeat just thinking you are a leader

**?s**
- How do you teach students to clarify thinking through discourse?
- How do you help teachers understand the importance of discourse?
- How to help teachers feel comfortable in a less "rigid" "controlled" classroom?
- How do we find an engaging task to promote discourse?
- How to address "mouth breathing"?
- How do we address time to find tasks that promote discourse?
- What models/resources do we have to incorporate discourse?
The theory

• Underlying the use of discourse in the mathematics classroom is the idea that mathematics is primarily about reasoning not memorization.

• Mathematics is not about remembering and applying a set of procedures but about developing understanding and explaining the processes used to arrive at solutions.
The theory

• Discourse stems from constructivist views of learning where knowledge is created internally through interaction with the environment.

• It also fits in with socio-cultural views on learning where students working together are able to reach new understandings that could not be achieved if they were working alone.
Five Practices for Orchestrating Discussion

Setting goals for mathematics talk and supporting student thinking can help teachers better plan for and facilitate purposeful discussions.

1. Anticipate student responses
2. Monitor students’ actual responses to tasks
3. Select particular students to present their work
4. Sequence the student responses that will be displayed/shared
5. Connect different students’ responses and connect the responses to key mathematical ideas
Discourse: Student Roles

- Perseverance
- Students focus on explanations - not just correct answers
- Everyone has responsibility for learning - Students have a responsibility to make sense of the math, and if they don’t make sense of it, they are responsible for asking questions so they do understand
- Students need to understand, share, and utilize tools used to make sense of tasks
- Students need to communicate their thinking and listen to the thinking of others so they can help others make sense of and make progress on tasks
- Students are open to revising their thinking
“Setting goals for mathematics talk and supporting student thinking can help teachers better plan for and facilitate purposeful discussions.”

Goals help teachers;
- decide what to listen for
- which ideas to pursue
- which ideas to highlight
- prepare for student misconceptions
- prepare for leading questions

Purpose: Generate many different ideas
Strategy: Open sharing
Students make sense of strategies, analyze other ideas and compare and contrast solutions to their own

Purpose: Focus discussion on a particular idea
Strategy: Targeted Sharing
Students listen for and make contributions to other student ideas

Information from: Alison Hintz and Elham Kazemi  *Talking About Math*
Classroom Culture to Promote Discourse

- Safe classroom atmosphere
  - physical and emotional
- Balanced challenge
  - not too hard or easy
- Authentic participation
  - accessible to all students
- Student driven
  - teacher facilitated

* May look and sound different across separate settings/classrooms based on student needs.
Classroom Culture

- Expecting students to explain and justify their answers, whether they are correct or not;
- Emphasizing the importance of contributing to the discussion by explaining their strategy rather than producing correct answers;
- Expecting students to listen to and attempt to understand others' explanations;
TPEC 3.0

• Where is “facilitate meaningful mathematical discourse” represented in the TPEC tool?

• Where is “use and connect mathematical representations” reflected in the TPEC tool?

12/1/2014
Google Form tomorrow

Thank you and have a great day.