The Mathematics Studio Classroom

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Presentation Plan

- Intro and background
- Overview of Studio Program
- Emerging issues in the work
- Thoughts from YOU

Two Main OMLI Goals

- Increase Teachers' Mathematical and Pedagogical Content Knowledge
- Focus on Promoting High-Level Student Discourse in Classrooms

OMLI as Catalyst for the Studio Work

- OMLI Oregon Mathematics Leadership Institute (2004 – 2009)
  - 10 School Districts: 180 K-12 teachers, 100 building principals & district administrators
  - 40 Instructional Staff: teacher leaders, supervisors, 2 and 4 year college math and math ed faculty)
  - 3-week intensive summer math institutes for 3 consecutive years, in-school, year-long academic year follow-up

Evidence-Based Fundamental Beliefs

- Focus on the big mathematical ideas, and how students learn mathematics:

  Do the Math!
- Engage in discourse that promotes mathematical justification and generalization
- Maintain high cognitive demand when implementing math tasks
- Promote reflection and metacognition
- Provide opportunities to encounter disequilibrium

Intellectual Framework

- Professional Learning Community and Student Achievement. *Boaler, 2006; McLaughlin & Talbert, 2001, 2006; Little, 1990, 2000; Louis et al, 1996; DuFour, 2009*
- Mathematical Discourse. *Leahy, Lyon, Thompson, and Wiliam, 2005; Yackel & Cobb, 1996; Hufferd-Ackles & Sherin, 2004; Stein, Engle, Hughes & Smith, 2008*
- Cognitive Demand. (*Stein et al, 2000*)
- Lesson Study. (*Stigler & Hiebert, 1999; Lewis, 2006; Watanabe, 2003*)
- Generative Learning. (*Franke, Carpenter, Levi, & Fennema, 2001*)

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My Role in OMLI

- Member of 4-person Instructional Team
- Teams planned and co-taught summer institute
- Experienced same best-practices training as K-12 teachers
- Established classroom interaction norms
- Promoted discourse in our own classes
- Provided transparency in our teaching moves

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OMLI RESULTS

- **Teacher Content Knowledge**
  - K-12 teachers, statistically significant gains on the overall score and on all subscales
- **Student Achievement**
  - The degree to which schools implement OMLI's school-based professional learning practices is a significant positive predictor of student performance
  - This predictor is above and beyond what can be explained by socioeconomic factors, as indicated by the percentage of students who qualify for free and reduced lunch.

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Key Elements for Success that Began to Emerge from the OMLI Work

- ***Quality of the Action Plan***
- ***Implementation of the Action Plan***
- ***School Priority of Mathematics***
- ***Professional Development Responsibilities***
- ***Scope of Professional Development***
- ***Use of Project's Discourse-Based Professional Learning Tasks and Protocols***

As You Hear about Studio Classrooms, Keep in Mind …

- *Mathematics* is at the center of all Studio work.
- Student thinking and teachers helping students grow are the foundation for Studio work.
- All students are capable mathematics learners.
- What would help to move this work forward? What do we need to know in order to better help the field?

Linda Steps in here

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Some Issues on Our Minds

- ***All* students need effective instruction *all* of the time.**
- **As a field, we are not YET serving all students well.**
- Teachers participate in many hours of professional development
- Yet they still struggle to substantively change their teaching practices
- So…

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Studio

The school is the first order unit of change…

- Transform a school's culture of professional learning
- Institutionalize professional structures, policies, and practices that –
  - Transcend the people who come and go in a school
  - Are never "done"

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Big Picture: The Studio **Program**

- Summer Math Institutes
  - Best Practices in Teaching Mathematics
  - Mathematical Knowledge for Teaching
  - Instructional Leadership
- **Mathematics Studio Work**
  - 5 "Studio Cycles" per year
- Online Math Collaboratives

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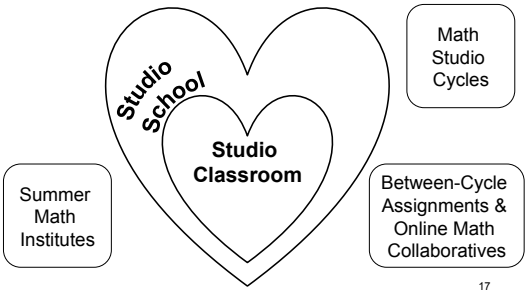
At the heart of the Studio Program…



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The Studio School

- Committed to developing **– and sustaining –** a shared vision for powerful math teaching, learning, and professional learning

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The Studio Participants

- Studio Teacher
- Consultant
- One Cohort of Residents
  - Studio Principal
  - One or more cohorts of up to 12 other teachers
  - District Office Administrator (sponsors the work)
  - Math Coach (if there is one)
- Each cohort of Residents meets 5 times per school year for a "Studio Day" in the Studio Classroom

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The Studio Day

- Three Parts:
  - Planning
  - Enacting
  - Debriefing

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A Studio Day: Part 1

Planning:

- Do the Math
- Anticipate student conceptions.
- Design a plan to teach the math
- Prepare to implement *one or more* "***mathematically productive teaching routines***"

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The Studio Day Part 1: Planning
Do the Math!

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The Studio Day Part 1: Planning
Anticipate Student Conceptions

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The Studio Day
Part 1: Planning

Preparing to implement a **Mathematically Productive Teaching Routine** – building shared images and understandings of practice

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Mathematically Productive Teaching Routines

Specific, well-detailed practices that:

1) Engage students in activity that aligns with research re: how students learn mathematics HSLM
2) Recur regularly in the everyday work of teaching mathematics
3) Typically involve one or more challenging aspects of mathematics teaching
4) Enable mathematical access and challenge for *all* students
5) Grounded by research from the field

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A Fundamental Premise of Studio Work

- Everyday use of **Mathematically Productive Teaching Routines** will:
  - leverage mathematical reasoning, sensemaking and proficiency by all students
  - carry over into other aspects of the teacher's practice
- Naming, detailing, and studying these routines is a focus of our current work.

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Jill Steps in here

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A Studio Day: Part 2

***Enact the plan in the Studio Classroom*:**

- The Studio Teacher and consultant enact the plan and rehearse one or more Mathematically Productive Teaching Routines in "real-time" time with students
- Residents observe and collect student discourse data

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The Studio Teacher and Consultant enact the plan, in "real-time" time with students. Residents observe and record student discourse data.

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The Studio Teacher receives in-the-moment coaching while the Residents listen in

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The Studio Teacher receives in-the-moment coaching while the Residents listen in

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The Studio Teacher receives in-the-moment coaching while the Residents listen in. The Studio Teacher rehearses the MPTR in "real-time" time with students.

Residents collect student discourse data

Residents collect student discourse data

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A Studio Day: Part 3

Finally, the Studio Teacher and Residents ***debrief the plan***

- Examine and analyze the discourse data
- Reflect about the impact of the plan and teaching moves on student learning
- Rehearse/Set action steps for individual and collective practices.
  - Individual commitments
  - Assignments

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The Studio Day Part 3: Debrief
Analyze Discourse Data & Classroom Artifacts

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The Studio Day Part 3: Debrief

Residents reflect deeply and critically about results, and generalize about the impacts of particular teaching moves …

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The Studio Day Part 3: Debrief

Residents receive coaching while they rehearse the MPTR, CONFERRING (based on data from the lesson)

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The Studio Day Part 3: Debrief

Residents make commitments to work on the individual and collective practices … in particular, to continued rehearsals of the Mathematically Productive Teaching Routines.

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Mathematically Productive Teaching Routine

Example:

Conferring with Student Mathematicians

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Why Tools and Protocols?

- **"Carriers of knowledge"** (Smith, 2009) about our work
  - Provides details that otherwise can get lost or distorted
- **Fidelity of implementation**
  - Leverage quality between-cycle applications (where the real learning happens)
  - Baseline for conversations about other strategies
- Focuses attention on **"mathematically productive"** practices

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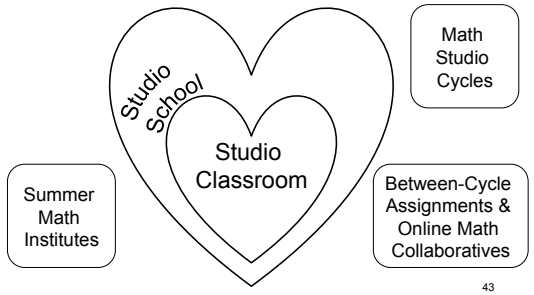
How the Studio Day Fits in the Studio Cycle



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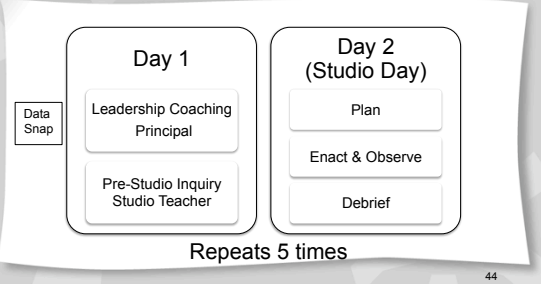
Studio Cycle (minimum)



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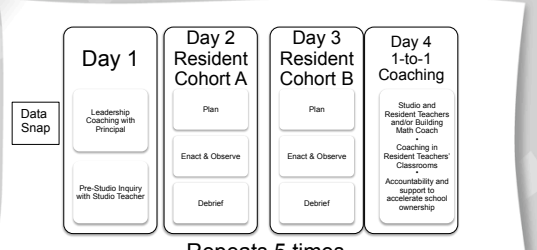
Studio Cycle (K-5)



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Data Snap

- Walk-through with the principal
  - Resident & Studio Teachers' classrooms
- To what extent is the work taking root in the school?
- Leadership coaching for the principal
  - build ownership of the work
  - develop leadership voice: "powerful opening"
  - Rehearse use of tools, structures, practices
- Informs the consultant's work

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A District Administrator Says…

- *"It is really important to note the increase in learning around math content, pedagogy, and instructional leadership being developed in our principals. They have indicated that the Studio model has been the best training in instructional leadership that they have ever participated in and that what they are learning transcends mathematics."*

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What Happens Between Studio Cycles?

Studio teacher and Resident teachers and admins

- Role-specific assignments
- Rehearsal of specific routines/practices by all
- Collegial inquiry and interaction
- Online Math Collaboratives

Consultant

- Online communication with Studio and Resident teachers and administrators
- Ongoing conferencing with other project consultants
- Plan, plan, plan

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Fostering System-wide Mathematics Learning

➜***School***
➜***Feeder pattern***
➜***All Schools***

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Studio Residue: What Could Be Evidence of Success?

Kids are:

Teachers are:

Principals are:

The system is:

Questions—Yours and Ours

- Yours….
- Ours…
  - What evidence does the field need? Scalability? Sustainability?
  - After hearing about Studio work, how would *you* complete the following:

    "In order to move the field forward, we need to know _____.

Thank you!

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Questions? Teachers Development Group Booth #541

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Studio Purposes

- Bring Summer Institute learning to life (in real-time!)
- Increase accountability and level/quality of implementation
- Develop shared images and understandings
- Deepen teachers' mathematical knowledge for teaching
- Foster new norms and habits-of-practice (individual & collective)
  - ✓ productive planning
  - ✓ in-the-moment reflection
  - ✓ relentless curiosity and inquiry about student thinking
- Deprivatize practice to build professional community and increase all students' achievement

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Outcomes of Studio Activities

- Increased Professional Development Capacity (school-/practice-based)
- Increased Specialized Content Knowledge
- Established Studio Classrooms
- Professional Learning Communities
- Improved Teaching for Understanding
- Increased Mathematical Discourse

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Long-Term Impacts of Studio

- Sustainable Infrastructure
  - The studio classroom model as an institutionalized means of continuous improvement
  - Transcends the people who come and go in a school
- Increased Student Achievement
- Decreased Achievement Gap
  - Equity in the math achievement levels attained by students of differing ethnicity, gender, language, and socioeconomic status.

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Other Studio Settings

- Coaching Studio
  - High-leverage coaching practices
- Leadership Studios
  - High-leverage leadership practices

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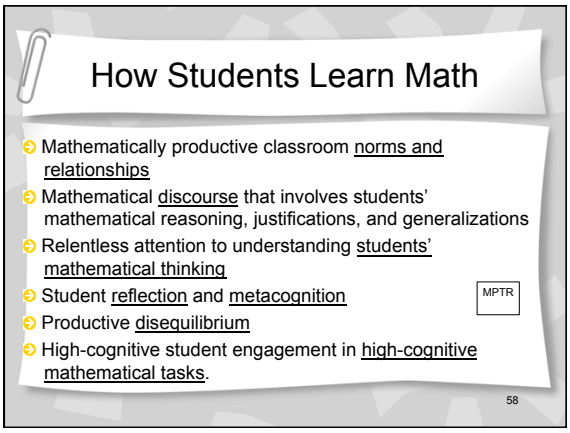
How Students Learn Math
Mathematically productive classroom norms and relationships
Mathematical discourse that involves students' mathematical reasoning, justifications, and generalizations
Relentless attention to understanding students' mathematical thinking
Student reflection and metacognition
MPTR
Productive disequilibrium
High-cognitive student engagement in high-cognitive mathematical tasks.
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