

Foundations for Implementation - Day 4

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CPM Learning Event Series, Day 4



"Teaching is a delayed gratification job, the fruits of my labor will be seen much after they leave my room. I am appreciated and they will thank me later."

Tatiyana Webb



Make a name tag.





Pick a puzzle piece. Find the statement that your piece is part of.





Foundations for Implementation Day 4



Name email@cpm.org





Housekeeping



- Bathrooms
- * 8:00 AM 3:00 PM
- Breaks scheduled and as needed
- + Lunch
- Parking Lot Poster
- Supply/Resource Table



Professional Learning Checklist



	Summer Session	Fall Semester	Spring Semester
Live Learning Events	Register and attend: In-Person Days 1-3 or Virtual Sessions 1-6	☐ Register and attend: In-Person Day 4 or Virtual Sessions 7-8	Register and attend: In-Person Day 5 or Virtual Sessions 9-10
Content Modules (On-Demand)	☐ Chapter 1 ☐ Chapter 2	☐ Chapter 3	☐ Chapter
Instructional Modules* (On-Demand)	☐ 1 - Closure and Team Assessments ☐ 2 - Review & Preview ☐ 3 - Intentional Planning	☐ 4 - Supporting Productive Struggle	☐ 5 - Assessment Practices

Icebreaker



Your task:

- Introduce yourself and identify your team role using the placemat.
- Try to find every solution from 1 to 20 using only four 4's.

Guidelines:

- + You must use exactly four 4's... no more, no less, no other numbers!
- + You can use any operation: + x ÷
- You can also use exponents, parentheses, square roots, factorials and all the math you know, but NOT the internet. Be creative!
- Your work must follow the order of operations. The use of a calculator is encouraged.

Effective Mathematics Teaching Practices



Support productive struggle in learning mathematics.



Outcomes



Participants...

strengthen knowledge of instructional strategies and research connections to support all learners.

reflect on instructional practices and challenges to connect solutions and actions that promote productive struggle in an equitable learning environment.

build an understanding of NCTM Effective Mathematics Teaching Practices, connecting them to the design of CPM curriculum and to instructional practice.

connect the Implementation Progress Tool to status and equity in the classroom.

Agenda



Focus: Productive Struggle



- + Opening
- + Research Connections Why?
- + Struggles, Solutions, Actions
- Team Collaboration
- + Productive Struggle



- + Supporting Productive Struggle
- + Status and Equity
- + Plan for Productive Struggle
- + Closure

Equity Principles



- The goal of teaching is to help all students transition from dependent to independent learners.
- Relationships are of vital importance.
- Student uniqueness is an asset, not a deficit.
- Reflection is a crucial part of growth.

CPM uses these principles to guide our vision and mission of More Math for More People.

CPM Implementation Progress Tool



The three pillars represent researched best practice in math education around which the CPM program is designed.

Collaborative Learning

Research says students learn ideas more deeply when they discuss ideas with classmates.

Problem-Based Learning

Research says students learn ideas more usefully for other arenas when they learn by attacking problems.

Mixed, Spaced Practice

Research says students learn ideas more permanently when they are required to engage and re-engage with those ideas for months or even years.

Three Pillars Reflection







Share evidence of the *Three Pillars* in action in your classroom.

CPM Implementation Progress Tool



SECTION ONE: The pillars that represent necessary first steps in any implementation.

Collaborative Learning

Students and teachers are aware of the purpose for and value of working in teams, and are familiar with team norms and roles.

Problem-Based Learning

Students and teachers share math authority as they value and engage in productive struggle. Teachers guide without taking over the thinking.

Mixed, Spaced Practice

Both individual lessons and chapters are followed, using suggested pacing. Review & Preview problems are assigned and valued as an essential part of learning.

CPM's Guiding Principles





Students deepen their mathematical understanding when they are engaged with concepts over time.



Students have significantly better retention of mathematics when concepts are grounded in context.



Students'
involvement in
effective study
teams increases
their ability to
learn
mathematics.



Effective study teams are guided, supported, and summarized by a reflective, knowledgeable teacher.



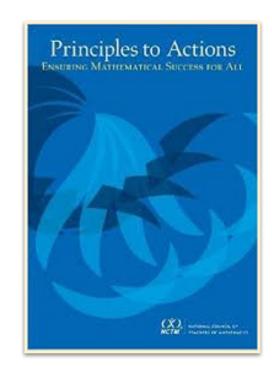
Assessing what students understand requires more than one method and more than one opportunity.



When students and stakeholders embrace a growth mindset, they understand that mastery takes time, effort, and support.



Principles to Actions (PtA)
Ensuring Mathematical Success for All



Guiding Principles for School Mathematics



Guiding Principles for School Mathematics

Teaching and Learning. An excellent mathematics program requires effective teaching that engages students in meaningful learning through individual and collaborative experiences that promote their ability to make sense of mathematical ideas and reason mathematically.

Access and Equity. An excellent mathematics program requires that all students have access to a high-quality mathematics curriculum, effective teaching and learning, high expectations, and the support and resources needed to maximize their learning potential.

Curriculum. An excellent mathematics program includes a curriculum that develops important mathematics along coherent learning progressions and develops connections among areas of mathematical study and between mathematics and the real world.

Tools and Technology. An excellent mathematics program integrates the use of mathematical tools and technology as essential resources to help students learn and make sense of mathematical ideas, reason mathematically, and communicate their mathematical thinking.

Assessment. An excellent mathematics program ensures that assessment is an integral part of instruction, provides evidence of proficiency with important mathematics content and practices, includes a variety of strategies and data sources, and informs feedback to students, instructional decisions, and program improvement.

Professionalism. In an excellent mathematics program, educators hold themselves and their colleagues accountable for the mathematical success of every student and for their personal and collective professional growth toward effective teaching and learning of mathematics.

Teaching and Learning -

An excellent mathematics program requires effective teaching that engages students in meaningful learning through individual and collaborative experiences that promote their ability to make sense of mathematical ideas and reason mathematically.

Self Reflection





Two Stars and a Wish

What is going well?

What is a challenge?

Your Two Stars and a Wish		
Star		
Star		
Wish		

Team T-Chart: Wishes & Challenges



Wishes & Challenges **Solutions & Actions** Please wait to fill **Record your** out this section team's until later in the challenges activity. here

Exploring Universal Access







Facilitator: Read Success for Students



Resource Manager: Read Student Struggle



Recorder/Reporter: Read Special Needs and Advanced Learners



Task Manager: Read EML

eBook:

Click on the **Teacher Tab** on the left side Next choose **Universal Access**



Team T-Chart: Solutions and Actions



Wishes & Challenges	Solutions & Actions
	As a team, brainstorm solutions and actions for your team's wishes and challenges.
	As a team, decide which one your team wants to have more support.

Study Team and Teaching Strategies



Traveling Salesperson

- Teams receive a topic or problem from teacher.
- Teams complete the problem by planning a presentation.
- + Team Member 1 shares the presentation with another team.
- The process continues with another topic or problem, and roles may rotate.



Tuning Protocol

- Team Member 1 presents an explanation to a problem in teams.
- Team Members ask Team Member 1 questions or clarifications.
- + Team Member 1 listens and writes notes.
- Team Member 1 shares a reflection of the discussion.
- The role is rotated to Team Member 2 and the process continues.



Solutions and Actions





Traveling Salesperson



Recorder/Reporter will travel and share your Team T-chart.



Tuning Protocol

Get more solutions from the team you are visiting. Return to your team and share out.

Other Supports



Professional Learning Portal

- Instructional Module 4 addresses Supporting Productive Struggle
- Instructional Module 5 addresses Assessment Practices
- Additional Teacher Resources has
 - **Teacher Toolkit**
 - **Public Relations Module**

Take a break



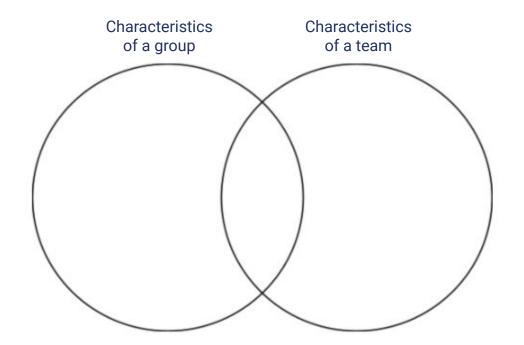




Characteristics



How would you describe the characteristics of groups and/or teams?



Team vs Groups



"A **team** is an interdependent group of individuals who share responsibility and are focused on a common goal. By working together, they tend to maximize each other's strengths and minimize weaknesses. **Unlike a group**, where each member is expected to contribute separately, the most important characteristic of a team is synergy: the whole is greater than the sum of its parts."

(Branislav Moga, ActiveCollab, 2017)

Supports



Reflect on strategies discussed from Days 1-3 and your discussions today.

What resources will help and support your teams?

What instructional practices will support teamwork?

Debrief



Whiparound



Resource Manager:

Take turns sharing out resources and instructional practices to support teams.



Supporting Students





Rough Draft Thinking

Which strategies do you want to add to your toolbox to better support your students working in teams?





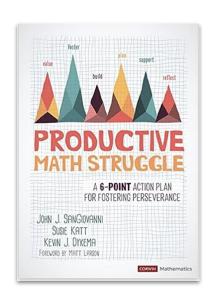
What is it?



How do you define Productive Struggle?

"Productive struggle can be thought of as purposefully reacting to an unclear challenge so that progress is made or learning advanced."

(Productive Math Struggle, 2020, p. 17)



When?



Think of a time in your life that you experienced productive struggle.

Consider:

- What helped you persevere through it?
- Who helped you and how did they provide the help?
- What did you learn about yourself?

Belief Shifts



Team Task:

- 1. Resource Manager: Get productive struggle belief shifts and descriptions.
- 2. As a team, match the shifts with the descriptions.

Which belief shift do you feel most comfortable with?

Which belief shift is most challenging for you?

Find the Heavy Coin





Activity goal:

Experiencing productive struggle.



Team goal:

Work collaboratively using team agreements.



Find the Heavy Coin - Debrief



What teacher moves supported productive struggle?

How did working collaboratively support your individual productive struggle?

How did working collaboratively support your team to struggle productively?

Take a break







Supporting Productive Struggle

Study Team and Teaching Strategy





Silent Debate

- Students work in pairs.
- Partner 1 is assigned the pro/for position, Partner 2 takes the con/against position.
- Partners share a pencil and one sheet of paper. A prompt or topic is given by the teacher.
- Partner 1 makes a pro, or supportive statement in writing.
- Partner 2 reads the statement, and writes a comment against.
- Process continues three or four times.

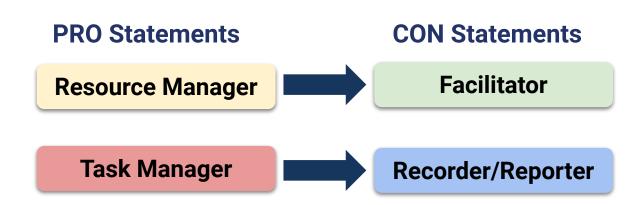
Silent Debate





Silent Debate

All students are capable of productive struggle.



Silent Debate Debrief



Please share the best **PRO** statement.

Facilitator

Recorder/Reporter

Please share the best **CON** statement.

Resource Manager

Task Manager

Supporting Productive Struggle - Why?



Read "CPM Statement about Learners who Sometimes Struggle"

Reflect on your current understanding of this topic and respond to each of the sentence stems:

I used to think...

Now I think...

Supporting Productive Struggle - Debrief





Whiparound

I used to think...

Now I think...

Share your thinking.

Principles to Actions - Why?



Guiding Principles for School Mathematics

Full statements of the Guiding Principles follow; *Principles to Actions* elaborates the unique importance of each, as summarized briefly below each statement. The first Guiding Principle, Teaching and Learning, has primacy among the Guiding Principles, with the others serving as the Essential Elements that support it.

Teaching and Learning. An excellent mathematics program requires effective teaching that engages students in meaningful learning through individual and collaborative experiences that promote their ability to make sense of mathematical ideas and reason mathematically.

The teaching of mathematics is complex. It requires teachers to have a deep understanding of the mathematical content that they are expected to teach and a clear view of how student learning of that mathematics develops and progresses across grades. It also calls for teachers to be skilled at using instructional practices that are effective in developing mathematics learning for all students. The eight Mathematics Teaching Practices (see fig. 1) describe the essential teaching skills derived from the research-based learning principles, as well as other knowledge of mathematics teaching that has emerged over the last two decades.

Mathematics Teaching Practices



Mathematics Teaching Practices

Establish mathematics goals to focus learning. Effective teaching of mathematics establishes clear goals for the mathematics that students are learning, situates goals within learning progressions, and uses the goals to guide instructional decisions.

Implement tasks that promote reasoning and problem solving. Effective teaching of mathematics engages students in solving and discussing tasks that promote mathematical reasoning and problem solving and allow multiple entry points and varied solution strategies.

Use and connect mathematical representations. Effective teaching of mathematics engages students in making connections among mathematical representations to deepen understanding of mathematics concepts and procedures and as tools for problem solving.

Facilitate meaningful 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.

Pose purposeful questions. Effective teaching of mathematics uses purposeful questions to assess and advance students' reasoning and sense making about important mathematical ideas and relationships.

Build procedural fluency from conceptual understanding. Effective teaching of mathematics builds fluency with procedures on a foundation of conceptual understanding so that students, over time, become skillful in using procedures flexibly as they solve contextual and mathematical problems.

Support productive struggle in learning mathematics. Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.

Elicit and use evidence of student thinking. Effective teaching of mathematics uses evidence of student thinking to assess progress toward mathematical understanding and to adjust instruction continually in ways that support and extend learning.

Teacher Tips



Share math authority with your students.

Reflect on your productive struggle beliefs.

Honor students mathematical identity.

Learning Log Reflection





Title: Supporting All Learners

What CPM tools, resources, practices will I incorporate as I plan to support productive struggle and students working successfully in teams?



Lunch Time







Welcome back - Icebreaker



As a team, (insert your icebreaker choice here from the agenda.)

Be prepared to share your ideas with the whole group.

Example:

Insert an example from the agenda

CPM Guiding Principles





Students deepen their mathematical understanding when they are engaged with concepts over time.



Students have significantly better retention of mathematics when concepts are grounded in context.



Students'
involvement in
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learn
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Effective study
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reflective,
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Assessing what students understand requires more than one method and more than one opportunity.



When students and stakeholders embrace a growth mindset, they understand that mastery takes time, effort and support.

Implementation Progress Tool



SECTION TWO: Features of desired student learning when the pillars are in place.

Collaborative Learning	Problem-Based Learning	Mixed, Spaced Practice
Students read and make sense of problems together.	Student thinking at varied depths of conceptual understanding are openly shared and valued.	Students work through lessons at an appropriate pace.
Students are able to listen to the ideas of others and communicate their own ideas both in teams and during whole class discussions.	Students demonstrate and value both conceptual and procedural knowledge.	Students understand that mastery takes time, effort, and support.
Students listen carefully to the thinking of others and respond with clarifying questions or extensions of their own.	Students look for, compare, and connect multiple models and solution strategies.	Students are aware of learning targets and periodically self-assess their progress towards those targets.
Students engage in productive mathematical discourse, justifying answers, creating viable arguments, and critiquing the reasoning of others.	Students recognize that incorrect work can be a stepping stone to learning and are willing to share and investigate their thinking.	Students solidify learning as they work on Review & Preview problem sets daily as intended.

Unproductive Struggle



Some common root causes of Unproductive Struggle are:

Lack of Mathematical Confidence

Fixed mindset

Lack of Motivation

Gaps in Understanding/Learning

One underlying social dynamic that may impact productive collaborative learning is **STATUS**.

Study Team and Teaching Strategy





Pairs Check

- Team Member 1 writes while Team Member 2 explains the first problem.
- + Team Member 1 asks clarifying questions to Team Member 2.
- + The pair checks with the other pair from their team, if they agree they put a ✓, if they disagree, they figure out what went wrong.
- Team Member 1 rotates the paper to Team Member 2, and roles are reversed.

Defining Status





Pairs Check

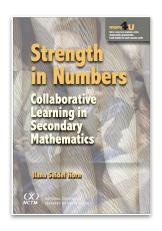
- 1. What is status?
- 2. What does it look like in the classroom?



Status in the Classroom



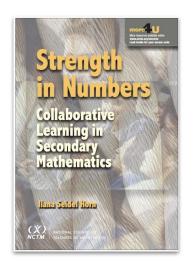
"Status plays out in classroom interactions. Students with <u>high status</u> have their ideas heard, have their questions answered, and are endowed with the social latitude to dominate a discussion. On the other side, students with <u>low status</u> often have their ideas ignored, have their questions disregarded, and often fall into patterns of nonparticipation or, worse, marginalization."



(Strength in Numbers, 2012, p.21)

Status in the Classroom





"Status is the perception of students' academic capability and social desirability."

(Strength in Numbers, 2012, p.21)

Seeing Status in the Classroom







- **Mag**
- Facilitator: Read Status vs Ability (pages 21-22).
- Resource Manager: Read Seeing Status in the Classroom through Listening (pages 22-23).
- Recorder/Reporter: Read Body Language, Organization of Materials and Resources, and Inflated Talk about Self or Others (pages 23-24).
- **Task Manager**: Read **The Opposite of Status Problems** (page 24).

What Connections Do You See?



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Students engage in productive mathematical discourse, justifying answers, creating viable arguments, and critiquing the reasoning of others.	Students recognize that incorrect work can be a stepping stone to learning and are willing to share and investigate their thinking.	Students solidify learning as they work on Review & Preview problem sets daily as intended.			

Implementation Action Plan





Title: Status and Collaborative Learning

- + To address status and collaborative learning, I will...
- To support learners who sometimes struggle, I will...

Regroup



Please sit together in pairs with same-course teachers.



Take a break







Study Team and Teaching Strategies







Which STTS have you tried in your classroom?

Why did you choose those?

How was your experience with them?

Anticipate Student Responses



Your Task:

- 1. Choose a lesson that you will be teaching soon.
- 2. **Complete** the core problems.
- 3. Anticipate other strategies students may use to solve these problems.



Strategies



Use the graphic organizer to complete the following:

- 1. Identify:
 - a. Strategies that students might use.
 - b. Questions/STTS that guide misconceptions or errors.
- Justify how the STTS/questions you selected:
 - a. Support productive struggle;
 - b. Raise status; and/or
 - c. Promote equity.
- 3. **Reflect on:**
 - a. Your support of collaborative work/teamwork.
 - b. Your strategies to promote sharing math authority.

Debrief



Ambassador	Board Report	Carousel	Dyad	Elevator Talk	Fishbowl	Fortune Cookie	Gallery Walk	Give One- Get One	Glow and Grow
GPS	Hot Potato	Hot Seat	Huddle	I have Who has	I Spy	Jigsaw	Listening Post	Math Chat	Notice & Wonder
Numbered Heads	Pairs Check	Participation Quiz	Partner	Peer Edit	Pick Three	Players- Coach	Reciprocal Teach	Red Light, Green Light	Silent Debate
Swapmeet	Teammates Consult	Think-Ink- Pair-Share	Traveling Salesperson	Tuning Protocol	Turn & Talk	Two Stars and a Wish	Visibly Random Teams	Walk & Talk	Whiparound



What have we learned?



Study Team and Teaching Strategy





Carousel: Index Card

- Students record one struggle/question/comment/concern on an index card.
- Index card rotates within a team of students or to the next team.
- Students or teams write suggestions on the index card.
- Rotate the index card several times.
- Index card is returned to original student or can be displayed in class for all to benefit from.

Carousel: Index Card



Your Task:

- 1. As a team **complete** the sentence starter on your index card.
- 2. When given the signal, **rotate** the index card to the next group.
- 3. Look at previous teams' responses on the new card.
- 4. Repeat above steps until your original card is returned to you.



Outcomes and Feedback

Participants...

strengthen knowledge of instructional strategies and research connections to support all learners.

reflect on instructional practices and challenges to connect solutions and actions that promote productive struggle in an equitable learning environment.

build an understanding of NCTM Effective Mathematics Teaching Practices, connecting them to the design of CPM curriculum and to instructional practice.

connect the Implementation Progress Tool to status and equity in the classroom.

Learning Event Feedback:

- 1. Open up the learning event module.
- 2. Scroll down to Event Attendance and Feedback.
- 3. Open Day 4 Feedback.
- Complete the Feedback form.

Teacher Tips - Implementation



Teacher Actions that Support Implementation

Use the Teacher Notes as intended.

Work all the problems in the lesson ahead of time, including the Review & Preview problems.

Create purposeful lesson plans.

Teacher Tips - Inclusion



Teacher Actions that Support *Inclusion*

Intentionally plan lessons without lowering the cognitive demand.

Use explicit agreements, team roles, and STTS to scaffold discussions and level status.

Allow time for students to shift from conceptual to procedural fluency.

Develop and assign competence to students using math learning behaviors.

Professional Learning Support



Professional Learning Support

Teacher Toolkit

Activities that support the following topics:

- Collaboration
- Team Agreements
- Pacing
- Time Management
- Routines
- Procedures

Supplemental Resources

- Math Notes and Checkpoints for all courses
- Digital resources and supports

On-demand Modules

- Content Modules
- Instructional Modules
- Inclusion Modules

Ignite Your Classroom



Start promptly.

Peer support expected within each team.

Active learning.

Respond to the team rather than individuals.

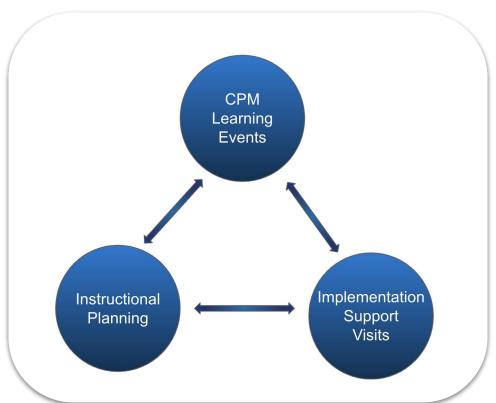
<u>Circulate</u>. <u>Circulate</u>.

<u>C</u>losure. <u>C</u>losure.



Triangle of Teacher Support





The Three Pillars of CPM



Collaborative Learning

Problem-Based Learning

Mixed, Spaced Practice

Attaining Long-Term Knowledge



Closure CPM Guiding Principles





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Know Before You Go



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- + Next Steps:

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