



[All Grades] Building a Culture of Math Learning Session 3 Facilitator's Guide

Summary

Effective teaching of mathematics requires cultivating a culture of math learning within the classroom - this culture encourages students to take academic risks, to persevere when content becomes challenging, to utilize a myriad of mathematical tools and models to approach new problems, to share their own thinking, and to offer feedback on the thinking of others. To cultivate this kind of culture, teachers must model through words and actions the importance of grappling with content to build a deep understanding; they must equip students with the content knowledge and problem solving tools to find multiple pathways to a given solution; and they must facilitate regular opportunities for students to engage in the practices of mathematics, including analyzing their own misconceptions and refining their approaches as part of the learning process.

Throughout this content cycle, teachers will explore these instructional moves and connect them directly to the mathematical content and standards for mathematical practices within the *Kentucky Academic Standards (KAS) for Mathematics*. While this content cycle will do a deep dive of the 3 Standards for Mathematical Practice indicated below, the *KAS for Mathematics* require teachers to implement all 8 Standards for Mathematical Practice. To support teachers in elevating different SMPs during their instruction, the *KAS for Mathematics* tag relevant MPs to every content standard. The inclusion of those tagged MPs does NOT mean those are the only ways students can engage in the practices while learning that content. The inclusion of tagged MPs also doesn't mean that those practices automatically happen throughout instruction on that content standard. How instruction is designed will determine how students engage with the content. This content cycle will support educators in purposefully planning and designing instruction to provide students with opportunities to engage in the practice standards while engaging with the content standards.

This content cycle focuses specifically on:

- SMP1. Make sense of problems and persevere in solving them
- SMP4. Model with mathematics
- SMP3. Construct viable arguments and critique the reasoning of others

See the [Mathematics Professional Learning Modules](#) for additional learning around the Standards for Mathematical Practice or for guidance/support with implementing the *KAS for Mathematics*.

Essential Questions

- How do the Standards of Mathematical Practice support teachers in creating and sustaining a culture of learning in math classrooms?
- How can teachers explicitly introduce and authentically incorporate the Standards of Mathematical Practice within their instruction?
- How can teachers create a “culture of error” where students feel comfortable taking academic risks, struggling through high-quality tasks and discussing their misconceptions to advance their own learning?



- Specifically, how can an emphasis on problem-solving (SMP 1), modeling to understand “concepts before procedures” (SMP 4) and justification of answers (SMP 3) create an environment where students are encouraged to own their own learning?

Enduring Understandings

- Teachers should communicate that perseverance, which requires a willingness to take risks and make mistakes, is a critical part of the learning process.
- In order for students to own their own learning, teachers intentionally design instruction which places equal value on the development of mathematical content and mathematical practices.
- True conceptual understanding of math comes from connecting multiple representations (concrete, representational/pictorial, and abstract).
- To build deep and enduring understanding of math, teachers must place emphasis on the “how” and “why” and push students to justify their answers,
- Meaningful teacher and peer feedback allow students to monitor their progress toward learning outcomes and provides students with opportunities to reflect on their own learning.

Key Components of Cycle

The Learning Cycle includes the following components to support shifts in instruction:

- **Shared Learning:** Learning sessions where teachers learn new knowledge and skills aligned to the topic of the content cycle. This might be designed in a variety of ways, including reading and discussing an article, studying a classroom video or doing some group practice of a particular planning component.
- **Planning & Practice:** Opportunities for teachers to apply the content they are learning within this content cycle to review/revise classroom instruction. This could include analyzing units/lessons using tools to evaluate alignment to the *KAS for Mathematics*, rehearsing lessons, watching and reflecting on videos of their classroom practice, etc.
- **Student Progress Monitoring:** This is an opportunity for teachers to examine student progress aligned to the topic of the cycle. This can include formative student work analysis, end of unit assessments, culminating tasks, etc.

Over the course of this 12-week learning cycle, teachers will:

- Examine instructional materials and tasks using the *KAS for Mathematics* and supporting resources;
- Consider the implications of these materials as they relate to changes in both teacher planning and practice;
- Engage in lesson study, practice in content delivery and peer-feedback, and reflect on progress by regularly revisiting goals and analyzing student data

Note that these components do not necessarily happen in a perfect rhythm. For example, depending on the content, there may be several shared learning sessions before a planning & practice, or there may be several cycles of shared learning and planning & practice before student progress monitoring.



Session	Type of Learning	Objective(s)	Supporting KAS Resources	Assessment of Learning
Session 3	Student Progress Monitoring	<ul style="list-style-type: none"> Analyze student work samples to determine levels of mastery and identify gaps in learning Prioritize instructional next steps to accelerate learning for <i>all</i> students 	<ul style="list-style-type: none"> KAS for Mathematics Engaging the SMPs: Look fors and Question Stems Mathematics Assignment Review Protocol 	<ul style="list-style-type: none"> Session tasks: Student Work Analysis/Next Steps

Preparation:

This Facilitator’s Guide is designed to accompany

- [\[All Grades\] BCML Session 3 PowerPoint](#)

Participant should be given access to the following documents to engage in the learning for this session:

- [\[All Grades\] BCML Session 3 Handout 1](#)
- [\[All Grades\] BCML Session 3 Handout 2](#)

Session Agenda Time (75-90 min)

- Slides 1 - 5: Welcome, norms, objectives & agenda, do now **(10 min)**
- Slides 6 - 7: Preparing to Analyze Student Work, Protocol Structures **(5 min)**
- Slides 8 - 9: Student Progress Protocol - Steps 1 and Step 2, Implications **(~35 min)**
- Slide 10: Student Progress Protocol - Step 3 **(20 min)**
- Slides 11-12: Reflection, closing whip around **(5 min)**



Facilitator Notes

Slide 1:

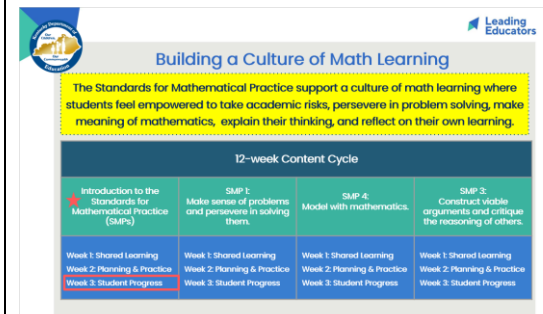
Session Summary: During this session, teachers will engage in student work analysis to identify evidence of student progress toward goals and to suggest instructional next steps. Following the analysis, teachers will share feedback in order to prepare for individual or co-teaching team planning. Finally, teachers will have the opportunity to plan strategically in response to the analyzed data to ensure that all students demonstrate progress toward the intended learning outcome(s).

Slide 2:

(2 min) Facilitator says:

- “Let’s revisit our 12-week arc of learning to take stock of where we are now. First, let’s ground ourselves in this content cycle’s guiding principle in the yellow box. Can someone please read that out loud?”
- “In green, you’ll see our four major topics of learning. For each topic of learning, we’ll engage in a three-week learning cycle that will include a shared learning session, a planning and practice session, and a student progress session. Our first topic of learning will include an overview of all 8 Standards for Mathematical Practice, so we can get a big picture idea of what excellence in math learning should look like for students. In the next 3 topics, we’ll narrow our focus to cover just one SMP so we can better internalize and apply our learning. As you’ll see, the three SMPs we will focus on are:
 - Standard for Mathematical Practice 1: Make sense of problems and persevere in solving them.
 - Standard for Mathematical Practice 4: Model with mathematics.
 - Standard for Mathematical Practice 3: Construct viable arguments and critique the reasoning of others.”
- **“While this content cycle will do a deep dive of 3 Standards for Mathematical Practice, the KAS for Mathematics require teachers to implement all 8 Standards for Mathematical Practices. To support teachers in elevating different SMPs during their instruction, the KAS for Mathematics highlights**

Accompanying Slide





connections between content standards and SMPs. The inclusion of those SMPs does NOT mean those are the only ways students can engage in the practices while learning that content. It also doesn't mean that throughout instruction on that content standard those practices automatically happen. How instruction is designed will determine how students engage with the content. See the [KY Standards Mathematics Professional Learning Modules](#) for guidance.”

- [Click to play animation] “During this Student Progress session, we’ll look at student data to see the impact of our shared learning on improved outcomes for students and determine where additional opportunities might exist.”

Slide 3:
(4 min) Review team norms and/or facilitate a quick team connector/icebreaker.

Our Norms

- Add your school or team norms here

Slide 4:
(1 min) Facilitator says:

- “This week, we’ll explore connections between our learning and our students’ growth. To do this, we’ll conduct student work analysis to analyze our instructional effectiveness through the lens of student outcomes on a learning task. As we uncover trends of growth and need, we’ll plan for instructional next steps that will support students in achieving learning targets.”
- “Before we begin, please take a minute to read over the objectives and agenda for today’s session.”

Objectives

1. Identify strengths and gaps in learning outcomes for all students.
2. Prioritize instructional next steps to accelerate learning for all students.

Agenda

- Opening
- Preparing and Analyzing Student Work
- Responding to Student Work
- Closing

Slide 5:



(3 min) Facilitator says:

- “Think of one student in your sub-group who had a ‘bright spot’ learning moment this week. As you reflect on this student’s experience, share a positive take-away about their learning with a partner.”

Do Now

- Think of one student in your sub-group who had a “bright spot” learning moment this week.
- Share a positive take-away about their learning with a partner.

Handout 1

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Slide 6:

(2 mins) Facilitator says:

- “In our previous sessions, we’ve engaged in shared learning and applied that learning to our planning and practice. Today, we’re looking for evidence of transfer to student work. Please take out the following materials: your set of student tasks (either whole class or specific subgroup) and tools to support your analysis of student work.”
- **[Click to play animation]** “In the Appendix folder, you’ll find the KAS for Mathematics Assignment Review Protocol, which has guiding questions that will support you in evaluating an already created task to gauge its alignment to the KAS for Mathematics. This is a good place to start if you’ve already created a student exemplar for your task and are ready to look at student work. If you haven’t created an exemplar for your task or considered how the task aligns to the targets of the standard, **[click to play animation]** handout 2 provides a task internalization tool where you can utilize the guiding questions from the Assignment Review Protocol to determine what evidence of student mastery should look like.” *

***Note:**

- *If applicable, facilitator may ask teachers to bring other curricular planning resources based on school/district context.

Preparing to Analyze Student Work

Gather the following:

- One set of student tasks (entire class or specific subgroup)
- Tools to support your analysis of student works (e.g. instructional rubrics, scoring protocols, etc)

Appendix

Handout 2

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Slide 7:

(1 min) Facilitator says:

- “The process we’ll be taking today has three parts. Can I have someone read out each step?” Teachers popcorn out the steps.



- “As we know, before we dig into to looking at student work, we as teachers must do Step 1 - the “intellectual prep work” of analyzing the task ourselves. Does this task align to the targets of the standard? If so, what would student mastery on this task look like? Once we have a clear vision of what an exemplar student response should look like, we can determine the key features of mastery - What conceptual understanding must be demonstrated? What procedural skills are in play? What does application of these understandings and skills look like?”

***Note:**

Some teachers may not have had time to do this in advance of the meeting, so time might need to be devoted to this prep work *prior* to teachers analyzing student work samples.

(1 min) Facilitator says:

- “With this end in mind, we can begin to analyze student work, which is Step 2 in the process. Using our own exemplar and/or other rubrics/checklists for mastery, we can begin to sort students into mastery group. We can look for trends within each mastery group. For example, ‘with students who only show partial mastery, what concepts or procedures regularly came up as obstacles?’”
- “With the knowledge of how our students performed and what areas of focus we need to address, we can begin to strategically plan to push more students to mastery. In Step 3, we will think creatively about how we’ll address misconceptions and present learning in a new way to ensure all learners can meet the targets of the standard.”

(1 min) Facilitator says:

- “Depending on where you are in the process, Handout 2 has different graphic organizers that can help you synthesize your thoughts.”
- **[Click for animation]:** “Handout 2 is a guide that pulls key questions from the KAS for Mathematics Assignment Review Protocol and chunks those ideas into a three-step process. You may choose to use the Assignment Review Protocol directly and/or other student progress tools to help you digest student learning and plan next steps.”

Slide 8:

(1 min) Facilitator reads out structure.

(30 min) Allow teachers time to work through Steps 1 and 2 on Handout 2 (or whatever resources they see fit). Circulate around the room to gauge teachers’ progress and to assist teachers in the protocol steps.

Protocol Structure

Step 1. Preparing to Analyze Student Work **Handout 2, Page 1**

- Determine the targets of the aligned standard and create an exemplar response.

Step 2. Analyzing Student Work **Handout 2, Page 1**

- Analyze student work and sort students into mastery groups.

Step 3. Responding to Student Work **Handout 2, Page 3**

- Create an action plan to increase student mastery.

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Leading Educators

Steps 1 and 2 (30 minutes)

If you have a grade level partner, work together to complete Steps 1 and 2. [Handout 2](#)

If your partner teaches a different grade, you may use a different structure to split up the time. See sample structure on Handout 1. [Handout 1](#)

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Slide 9:
(1 min) Facilitator says:

- “In reflecting individually, please consider the following question on Handout 1. Take 1 minute to jot down your thoughts.”
 - Overall, what strengths and gaps did you observe in your students’ work?
 - Considering our content cycle look-fors, how might planning and practice have contributed to the strengths and areas for growth?
 - How can you transfer what you learned from your sub-group of students to the larger class?”

(2 min) Teachers share out.

Leading Educators

Steps 1 and 2 - Implications

- Overall, what strengths and gaps did you observe in your students’ work?
- Considering our content cycle look-fors, how might planning and practice have contributed to the strengths and areas for growth?
- How can you transfer what you learned from your sub-group of students to the larger class?

[Handout 1](#)

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Slide 10:
(1 min) Facilitator says:

- “Now that we have identified one group to plan for, and which misconception we want to address in our planning, let’s begin to make a plan. How will this reteach be new and different from the instruction before? Be as specific as possible and consider the components of the *KAS for Mathematics* (specifically the Clarifications or Attending to the SMPs) for ideas on how to address this standard. As you make a reteach plan, also include how you’ll re-assess students to determine their understanding of the standard.

(20 min) Teachers can use remaining time to use ideas and insights gained in the student work analysis to plan instructional next steps

Leading Educators

Step 3 (20 min)

Use ideas and insights gained in the protocol to plan instructional next steps. Consider:

- How will this reteach be new and different? What specific instructional strategies will you use?
- End with a plan for re-assessment

[Handout 2](#)

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Slide 11:

(5 min) Participants complete the Topic 1 closing reflection. Facilitator may choose to ask participants to share out major takeaways from this learning cycle.

Topic 1 Closing Reflection

Please complete the reflection on Handout 1.

We'll come back together to do a quick whip-around to share out our reflections.

Handout 1

Slide 12:

Closing Slide

What's Next?

Shared Learning
Session 4: Focusing on SMP 1

- Internalize SMP 1
- Analyze how SMP 1 can support mathematical understanding and productive struggle as students engage with content standards