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REAL Mathematics Practical Measurement Toolkit:

Tools to Support Relevant, Engaging, and Applied Learning in Mathematics

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Introduction

Teachers and students want mathematics class to be **Relevant** and **Engaging** while providing opportunities for **Applied Learning**. They want **REAL** Mathematics! This toolkit was created to be a resource that helps teachers get better at doing just that. The toolkit grounds REAL Mathematics[1] in a set of approaches that support learning environments that affirm all students' experiences and identities so that each and every student may achieve positive academic outcomes. This REAL Mathematics Toolkit is informed by a conglomerate of similar approaches that have been previously described as Culturally Relevant Pedagogy (Ladson-Billings, 1994), Culturally Responsive Teaching (Gay, 2010), and Culturally Sustaining Pedagogies (Alim & Paris, 2017). Taken together as Culturally Responsive and Sustaining Education (CRSE), these pedagogies highlight the importance of teachers establishing positive relationships with students and families to leverage students' motivations, interests, and backgrounds for learning; learning about and incorporating students' lives into the curriculum; developing students' in- and out-of-school cultural competencies; holding high expectations for students; and enacting high-quality mathematics instruction. A REAL Mathematics classroom recognizes that students' identities—including cultural, racial/ethnic, linguistic, and other identities—are assets for teaching and learning.

The core of such an approach involves meaningfully connecting students' cultural identities, lived experiences, and prior knowledge to the school curriculum so that students have rigorous learning opportunities to master the content and skills needed to thrive in and out of school (Aguirre & del Rosario Zavala, 2013). Such skills and dispositions should be built in ways that support students' distinct identities rather than minimize or erase them.

CRSE approaches require educators to shift mindsets and practices toward sustained, meaningful partnerships with families and communities, recognizing and valuing their everyday mathematical knowledge and experiences outside the formal school context (Hand, 2012; Martin, 2013; Nasir, 2016). These approaches foster learning and belonging in schools by welcoming alternative ways of knowing and doing mathematics. Research demonstrates that culturally responsive education enhances learning and academic success (Randall & Mason, 2024).

1 This acronym was created to emphasize the ways that Culturally Responsive and Sustaining Education incorporates students' everyday lives into the curriculum and is not intended to suggest that other approaches to mathematics teaching and learning are any less real.

Practical Measurement for CRSE

Many educators are interested in the ideas of CRSE, but few know how to enact, measure, or improve it (Ladson-Billings, 2023). "You know it when you see it" (or "when you don't see it") has become a common understanding; however, this leads to inconsistent application of the theoretical principles guiding CRSE practices. As educators seek ways to enact relevant, engaging, and applied learning in mathematics, establishing practical ways to measure such learning presents an opportunity to clearly define CRSE and to strengthen the connection between theory and practice.

Practical measurement for improvement is "the deliberate and routine gathering, analysis, and interpretation of information with the distinct purpose of enhancing the learning of system actors as they test changes and improve processes that are at the heart of their work" (Takahashi et al., 2022, p. 423). When used in the context of teaching, practical measures can support educators by

- **providing timely data that are easy to collect,**
- **embedding data collection seamlessly into the everyday work of teaching, and**
- **producing meaningful data that educators can use to improve teaching and optimize learning.**

Adhering to this broad definition of practical measurement, the tools in this toolkit are designed to support teacher growth and understanding of CRSE practices as they make mathematics learning a more relevant and engaging experience that students see as applicable to their lives.

Purpose of This Toolkit

This REAL Mathematics Toolkit is a set of practical measurement tools designed to support teachers' continuous improvement efforts regarding CRSE practices. The designers of this toolkit envisioned teachers using the suite of tools within a teacher community. For instance, the resources and tools might be the main agenda in regularly occurring (i.e., weekly) professional learning community (PLC) meetings. In fact, when the tools and resources were tested with middle school and high school teachers, they agreed that the toolkit could be best used in such collaborative settings. In the Design of the Toolkit section, users can see how the toolkit lends itself to being used in this way. It is possible for an individual teacher to use the toolkit in the absence of a teacher community; if access to a group of teachers is a barrier for potential users, teachers can use the toolkit to reflect on and refine practice independently.

The purpose of the toolkit is not to evaluate teachers' instructional practices; rather, the toolkit is meant to support teachers in making incremental changes that align with CRSE.

This toolkit can be used to support teachers in focusing conversations on characteristics of CRSE that research has demonstrated matter in making mathematics learning meaningful to all students.

For this reason, the toolkit is designed around the five *Essential Characteristics of CRSE* (Warner, 2025):

- **Affirms Racial and Cultural Identities**
- **Cultivates Agency and Belonging**
- **Integrates Socially Responsible, Real-World Contexts**
- **Centers Community Knowledge**
- **Promotes Critical Mathematical Thinking and Learning**

Although all five essential characteristics hold equal importance, **the toolkit designers recommend that teachers begin by focusing on two essential characteristics: Promotes Critical Mathematical Thinking and Learning paired with one of the other four characteristics.** In doing so, teachers practice staying attuned to both the academic and social components of CRSE. Teachers may select the second essential characteristic based on their own familiarity, areas of growth, or other contextual factors. Once progress has been made and sustained over time, teachers can slowly introduce other characteristics to measure and improve. For more detail about these, a brief overview of each characteristic and examples of each are provided in the Essential Characteristics of CRSE section.

The toolkit is descriptive and *not prescriptive* of practice. The designers of this toolkit hope these tools help teachers describe and investigate practice. While using the toolkit in collaboration with colleagues, teachers can discuss how to apply the ideas meaningfully in their own teaching contexts. In doing so, teams of teachers can come closer and closer in their collective understanding about what each of these characteristics means in their particular contexts.

Design of the Toolkit

The toolkit features the following three key tools that can be used in ways that inform each other's use over 2–3 weeks in an inquiry cycle (see Table 1):

- **Lesson Planning Placemat**
- **Student Survey**
- **Observation and Debriefing Protocols**

The **Lesson Planning Placemat** is designed to be used on a daily basis. Daily use provides a quick reflection of the essential characteristics that are being attended to and those that are missed. Such reflection provides a quick opportunity to bolster a lesson that is missing an essential characteristic. After a few days or weeks, a teacher may decide to focus their efforts on learning more about and being more intentional in attending to one of the essential characteristics.

After teachers have used the Lesson Planning Placemat, it is important for them to receive feedback from their students regarding their CRSE efforts. For this purpose, teachers may use the **Student Survey**. This survey was designed to be used once every few weeks so as not to overly burden students. Teachers may use the survey in whole or in part. For instance, a teacher may choose to survey their students about the essential characteristic(s) they have been working to include as they complete the Lesson Planning Placemat.

An important component of the Student Survey is the debriefing conversation in which teachers and students review the anonymized class data to more fully understand each other's experiences. Such conversations should inform teachers' efforts to incorporate CRSE characteristics into future lessons.

Teachers who have reflected on the Student Survey data and used the Lesson Planning Placemat for several more weeks may be ready for additional perspectives using the **Observation and Debriefing Protocols**. This tool has four protocols, each focused on a specific essential characteristic. The last essential characteristic (Promotes Critical Mathematical Thinking and Learning) is integrated throughout the four protocols in the tool. The decision about which protocol to use at this phase of the inquiry should be informed by data collected from the Lesson Planning Placemat and Student Survey. The protocol tool is meant to be used with a colleague who is familiar with the teacher's recent inquiries into CRSE—this may be a department colleague, a coach, or an administrator. This observation should never be part of a teacher's evaluation.

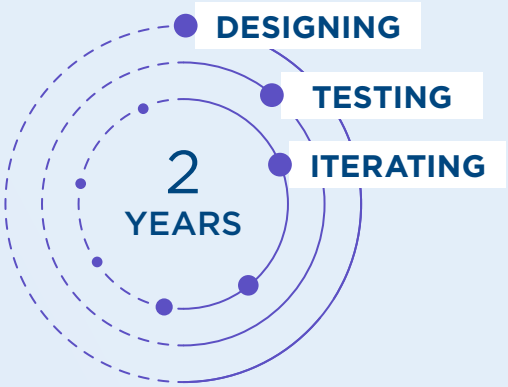
The creators of this toolkit hope that teachers have the support and community to use these tools with their colleagues. The tools can be helpful to use in a PLC setting, but teachers do not need to all be focused on the same essential characteristic at the same time.

Table 1. Timeline for Inquiry Cycle Using REAL Mathematics Measurement Tools

Time	Task
1 week before a lesson	• Use the Lesson Planning Placemat to modify an existing lesson or design a new one that aligns with the principles of CRSE. • Identify a colleague to observe the lesson; confirm their availability.
1 or 2 days before the lesson	• Select four to six Student Survey items from the bank of questions that best align with the lesson objectives. • Create a brief online version of the Student Survey using your preferred survey generator.
Day of the lesson	• Enact the lesson. • Have the observer use the Observation Checklist (from the Observation and Debriefing Protocols) to take notes.
1 or 2 days after the lesson	• Review the Student Survey responses independently. • Debrief the lesson with the observer, review notes from the Observation Checklist and Student Survey, and plan next steps.
1 week after the lesson	• Schedule and plan for the next inquiry cycle.

Toolkit Development Process

This toolkit is the product of a 2-year process of designing, testing, and iterating. In the early design phases, the WestEd team partnered with two California teacher educators with expertise in CRSE to conceptualize the toolkit. The team drafted an early prototype and incorporated feedback from two additional educators and roughly 40–50 attendees at teacher conferences. After several iterations, the measurement tools were tested in six classrooms across three high schools in the Mid-Atlantic region of the United States. Teachers who tested the tools had from 3 to 25 years of general classroom teaching experience.



All teachers had some prior knowledge of CRSE practices before using the toolkit. Teachers tested the tools using the inquiry cycle timeline outlined in Table 1. The teachers then participated in a debriefing conversation to inform final revisions to the toolkit.

Limitations

This toolkit is designed to support teachers with at least a moderate knowledge and familiarity with CRSE teaching practices; teachers with little to no experience with CRSE practices are welcomed to use the toolkit but may require additional support.

This toolkit's examples of culturally responsive practices and topics may be closely tied to the context of the Mid-Atlantic region of the United States where the toolkit was tested; teachers from other geographic regions may have other contextual considerations and may consider adapting the tools accordingly.

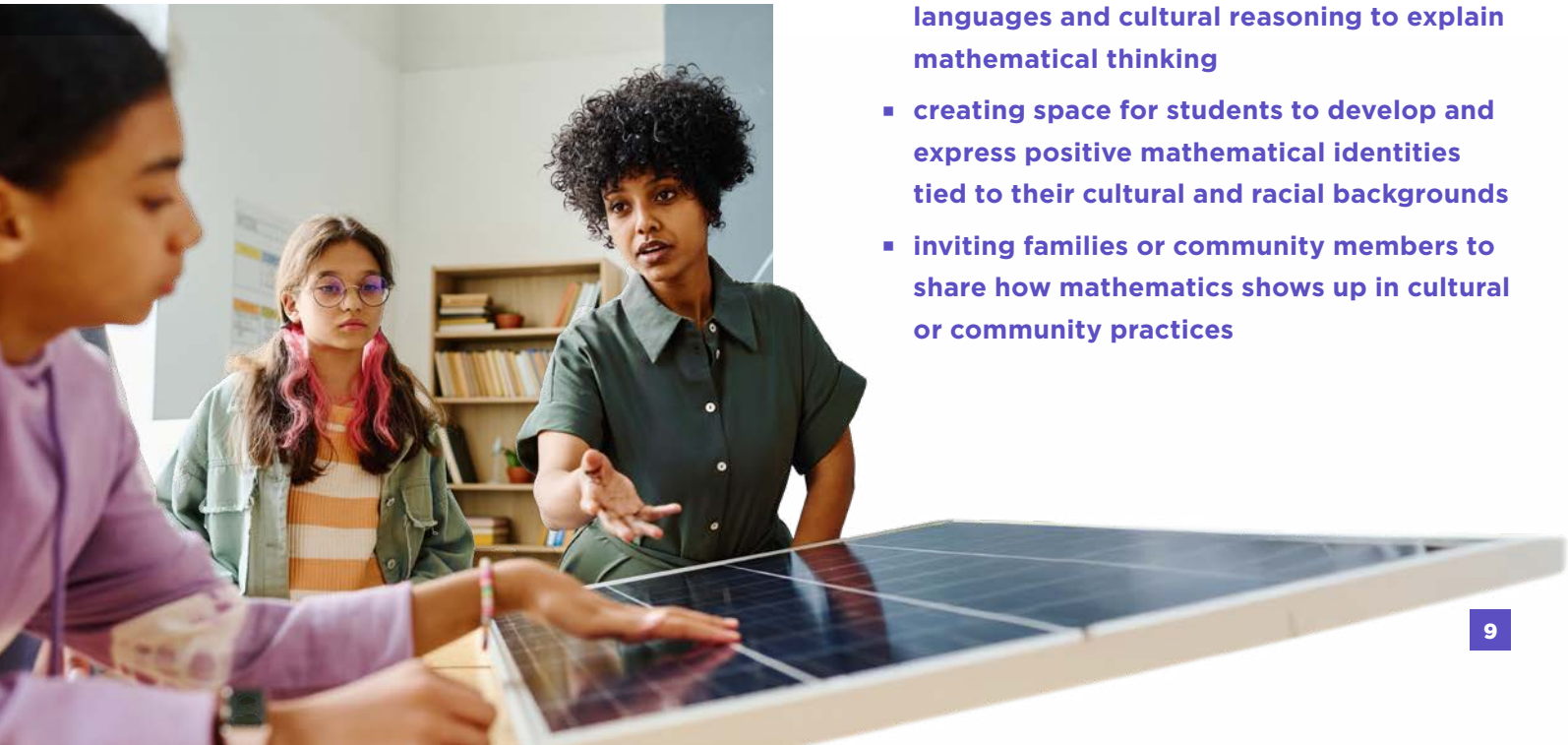
This toolkit has been tested in a few self-contained special education classrooms; however, the tools may fall short in meeting the needs of students with learning disabilities.

Essential Characteristics of CRSE

Essential Characteristic 1 (EC1). Affirms Racial and Cultural Identities

This essential characteristic is about creating mathematics classrooms where students' racial, cultural, and linguistic identities are seen, respected, and affirmed as central to learning. When students see themselves reflected in mathematics through tasks, language, visuals, and relationships, it helps develop a positive mathematics identity, builds confidence, and deepens engagement (Randall & Mason, 2024). Instruction should reflect students' lived experiences, challenge bias, and celebrate the full range of cultural knowledge students bring with them. In practice, this characteristic can be seen in the following:

- **designing mathematics tasks that reflect students' cultural experiences, practices, or community contexts**
- **using materials and examples that portray diverse identities, languages, and histories accurately and respectfully**
- **encouraging students to use home languages and cultural reasoning to explain mathematical thinking**
- **creating space for students to develop and express positive mathematical identities tied to their cultural and racial backgrounds**
- **inviting families or community members to share how mathematics shows up in cultural or community practices**



EC1 Practical Measurement Examples

Cultural Connection Exit Prompt

Prompt: *Did today's lesson connect to your life, family, or culture? How?*
Format: Written (exit slip or digital form)
Frequency: Weekly
Purpose: Understand whether students experience mathematics content as culturally relevant

Classroom Story: Ms. Ramirez introduced this prompt to check whether her lessons reflected students' lives. Early responses showed a disconnect—many students said, "Not really." She began incorporating student-sourced contexts into her lessons and referenced classroom conversations. Within a few weeks, students named more personal connections and participation increased.

Visual and Content Representation Log

Prompt: *Checklist of whether the lesson includes names, visuals, or contexts that reflect students' identities*
Format: Teacher self-assessment log
Frequency: Weekly
Purpose: Track how often classroom materials visibly reflect diverse identities and cultural knowledge

Classroom Story: Mr. Singh used a simple checklist each week to assess cultural representation in his materials. He found most content defaulted to dominant norms. This insight led him to revise names, visuals, and problem settings in upcoming lessons. He noticed students engaging more and recognizing themselves in the content.

Who Is Reflected? Student Audit

Prompt: *Whose knowledge or stories did we use in mathematics class this month?*
Format: Sticky note wall or anonymous journal entry
Frequency: Monthly
Purpose: Gather student perceptions of whose experiences and perspectives are centered in instruction

Classroom Story: Mr. Jones asked students to reflect monthly on whose stories showed up in class. Early answers pointed to generic textbook examples. He responded by inviting students to cocreate mathematics problems that reflected their communities. Over time, students named classmates, families, and cultural references—indicating deeper identification with the learning environment.

EC2. Cultivates Agency and Belonging

Belonging in mathematics means more than feeling welcomed. It means students see their identities, ways of thinking, and lived experiences reflected and respected in the mathematics space. Agency means students have the power to make choices, take intellectual risks, and use mathematics as a tool for understanding and shaping their world. This requires challenging systems that often sort, silence, or marginalize students based on dominant norms of correctness, speed, or language. In practice, this characteristic can be seen in the following:

- **designing mathematics tasks with multiple entry points and solution strategies that invite student voice and creativity**
- **encouraging students to explain and defend their reasoning using their own languages and representations**
- **structuring group work such that all students have meaningful roles and opportunities to contribute**
- **using self-assessment and reflection prompts that help students track their learning and see themselves as mathematicians**
- **examining norms, grading practices, or participation structures that may reinforce inequity—and shifting them to support inclusion and dignity**

EC2 Practical Measurement Examples

Mathematics Participation Poll

Prompt: *Check all that apply: I chose how to solve a problem / I shared an idea / I helped a classmate.*
Format: Digital or paper poll (checklist)
Frequency: 2–3 times per week
Purpose: Track student perceptions of agency and voice in mathematics class

Classroom Story: Mr. Smith created this quick poll to gauge who was actively engaging in discussions and problem-solving. After 2 weeks of using it, he noticed that only a handful of students checked all the boxes, while others rarely marked any. In response, he shifted toward more open-ended tasks, added choice-based structures in group work, and made space for different students to share ideas. A few weeks later, more students began checking all the boxes—and the range of voices in class noticeably widened.

Group Work Equity Tally

Prompt: *Record of who initiates, explains, and decides during group tasks*
Format: Teacher tally sheet
Frequency: During major group tasks (1–2 times weekly)
Purpose: Track equity in group participation and surface patterns of exclusion

Classroom Story: Ms. Patel felt like group work often reproduced social hierarchies, so she used a tally chart to see who was talking and contributing. The data confirmed that Multilingual Learners and some girls spoke less often. She introduced structured roles and modeled how to share space more equitably. Over time, the tally data showed broader participation, and students began to acknowledge one another's thinking more regularly.

Belonging Reflection Prompt

Prompt: *Did you feel like you belonged in mathematics class this week? Why or why not?*
Format: Anonymous written prompt (paper, digital)
Frequency: Weekly
Purpose: Identify barriers to belonging and track shifts in students' emotional connection to class

Classroom Story: Mr. Bae used this weekly prompt to learn how his students were experiencing the classroom culture. Several students shared that they felt hesitant to speak up because they feared being wrong. This feedback pushed him to slow down discussions, add structured wait time, and normalize mistakes. Soon after, more students reported feeling safe to share—and classroom dialogue grew more inclusive and thoughtful.

EC3. Integrates Socially Responsible, Real-World Contexts

This essential characteristic is about equipping students to use mathematics as a tool for analyzing and challenging injustice—both in the world and in their own lives. It involves designing instruction that helps students investigate systemic issues; evaluate arguments and data critically; and connect mathematics to real-world experiences involving race, identity, power, and equity. The goal is not to promote a particular viewpoint but to cultivate rigorous reasoning, critical inquiry, and empowered civic and personal agency. In practice, this characteristic can be seen in the following:

- **engaging students in data analysis related to social issues or inequalities that affect them or their communities**
- **using mathematics to model real-world sociopolitical, economic, or environmental challenges**
- **encouraging students to critique sources, assumptions, and uses of mathematical data**
- **creating space for student-led inquiry into ethics, access, and justice**
- **supporting students in applying their learning toward advocacy, problem-solving, or community-based action projects**

EC3 Practical Measurement Examples

Data for Justice Sentence Stems

Prompt: *These data made me think … [or] One question I have is …*
Format: Written student reflection
Frequency: Weekly
Purpose: Scaffold student sense-making and deepen critical analysis of mathematics-rich issues

Classroom Story: Ms. Holloway introduced these sentence stems to help students reflect on data and connect it to justice-related questions. Early responses were shallow, so she began modeling her own thinking using familiar issues and co-constructing examples with the class. Over time, students began generating deeper reflections—some asked about patterns in access to housing and others critiqued how data were presented. These reflections became a key tool for identifying who was ready for more complexity and who needed more scaffolds.

Power in Numbers Poll

Prompt: *Did today's mathematics help you understand something about fairness or justice? (1–5 scale and short explanation)*
Format: Digital or paper poll
Frequency: After any mathematics lesson
Purpose: Monitor whether students are making connections between mathematics learning and equity or injustice

Classroom Story: Ms. Davis began using this one-question poll after real-world lessons. The early results were lukewarm—students enjoyed the activities but did not yet connect them to larger justice themes. She added brief class discussions after each poll to unpack why the mathematics mattered. As students began voicing more thoughtful insights, the written explanations improved too—students referenced patterns in wage gaps, data bias, and climate impacts. The poll helped her adjust both the framing of tasks and the supports students needed to think critically.

Critical Questions Tracker

Prompt: *Teacher logs of student questions about fairness, systems, or power*
Format: Sticky note board or observation log
Frequency: Ongoing
Purpose: Notice the presence (or absence) of student inquiry related to justice and system-level thinking

Classroom Story: Mr. Young created a "critical questions wall" to capture justice-oriented questions during class. At first, the wall remained mostly blank. He realized he needed to model the kinds of questions he hoped students would ask. After he began introducing student examples and embedding questioning routines into data discussions, students started contributing: "Why are the data collected this way?" "Who gets left out?" The wall began to fill up, and Mr. Young used it both to adjust instruction and to highlight student voice in future lessons.

EC4. Centers Community Knowledge

This essential characteristic is about broadening the mathematical landscape to include historically marginalized voices, a variety of ways of knowing and being, and diverse forms of participation. When students see their cultural identities, lived experiences, and intellectual traditions reflected in mathematics, they come to understand that mathematics is not neutral or culture-free but rather a deeply human endeavor shaped by worldviews, histories, and community knowledge. Mathematics instruction honors this perspective by challenging dominant norms, validating multiple ways of thinking and doing, and making space for student identity and discourse. In practice, this characteristic can be seen in the following:

- **elevating mathematical ideas rooted in nondominant cultural traditions, practices, and number systems**
- **honoring and integrating diverse strategies, languages, and problem-solving methods—not just those modeled by the teacher**
- **inviting students to share how mathematics appears in their homes, communities, and daily lives**
- **reflecting with students on whose knowledge is valued in mathematics and why**
- **designing tasks that affirm identity, expand what counts as "rigorous," and invite multiple modes of participation (e.g., verbal, visual, physical, collaborative, intuitive)**

EC4 Practical Measurement Examples

Multiple Strategies Tracker

Prompt: *How many different strategies surfaced? Who contributed them?*
Format: Teacher tracking log
Frequency: Weekly, during or after mathematics discussions
Purpose: Monitor the variety of mathematical approaches used and whose voices are elevated

Classroom Story: Ms. Kim noticed that classroom discussions tended to focus on one "right" method—usually the one she had modeled. To shift this dynamic, she created a tracker to document each unique strategy shared and the initials of the student who introduced it. After a week, it was clear that only a few voices dominated. In response, she added think-pair-share structures, rotated who shared, and invited strategy sorts whereby students analyzed multiple peer approaches. The shift led to a visible increase in idea diversity, and the tracker helped affirm the value of student-sourced knowledge.

Mathematics Story Share

Prompt: *What's a way your family or culture uses mathematics in everyday life?*
Format: Verbal or written story sharing
Frequency: Weekly or biweekly, as a ritual
Purpose: Bring students' cultural and familial mathematical knowledge into the classroom

Classroom Story: Mr. Ortega started "Mathematics Story Share" to connect learning with students' lives. Early on, participation was sparse—until he shared a personal story about how his grandmother used patterns to track planting cycles. That moment sparked something. More students brought stories—from budgeting during grocery trips to playing ancestral games involving counting. Mr. Ortega began referencing these stories in problem design and warm-ups. Over time, students saw their lived experiences as sources of mathematical insight, and their engagement and ownership deepened.

Whose Ways Did We Use? Reflection

Prompt: *Whose ways of thinking did we use in mathematics this week?*
Format: Student reflection (written or verbal)
Frequency: Weekly
Purpose: Surface whose reasoning and approaches are being centered in class

Classroom Story: Ms. Delacruz used this weekly reflection to explore whether students recognized diverse perspectives in their learning. At first, responses pointed only to her own explanations. She realized she needed to name whose ideas were shaping the work, so she started crediting strategies aloud ("This was Jaden's approach") and explicitly naming community-based reasoning. Within weeks, student reflections became more specific, and some referenced family problem-solving styles or peer strategies. The classroom culture shifted from teacher-led thinking to shared authorship.

EC5. Promotes Critical Mathematical Thinking and Learning

This essential characteristic is about holding all students to high academic expectations while ensuring they are meaningfully supported, affirmed, and challenged as capable mathematical thinkers. It requires disrupting deficit-based beliefs and designing instruction that is both rigorous and responsive and that provides every student with access to grade-level content and opportunities to grow. High expectations are not about uniformity or pressure—they are about believing in students' abilities, providing the tools to access complex ideas, and honoring diverse ways of showing understanding. In practice, this characteristic can be seen in the following:

- **designing rich, standards-aligned mathematics tasks that are connected to students' lived experiences and cultural contexts**
- **scaffolding learning in ways that build conceptual understanding, confidence, and productive struggle**
- **inviting students to set goals, reflect on progress, and take ownership of their learning**
- **creating routines that celebrate persistence, reasoning, and growth and not just correctness or speed**
- **using multiple forms of assessment to capture student thinking, growth, and mathematical agency**

EC5 Practical Measurement Examples

Effort Reflection Journal

Prompt: *What did you learn today, and what effort helped you get there?*
Format: Student-written reflection (digital or paper)
Frequency: 2–3 times per week
Purpose: Reinforce the value of effort and help students track growth in their learning over time

Classroom Story: Ms. Castillo noticed that her students often equated mathematics success with being "naturally good" rather than putting in work. She introduced a simple reflection journal in which students wrote about their effort and learning. Early entries were surface level, such as "I finished the worksheet." But over time, with modeling and prompts, students began naming specific strategies, describing challenges they overcame, and celebrating their persistence. The journal helped Ms. Castillo notice which students needed confidence boosts and which strategies were resonating, and it began to shift student talk toward growth and progress.

Rigor and Support Self-Check

Prompt: *Was today's mathematics task appropriately challenging for all students? Did I provide scaffolds without lowering the bar?*
Format: Teacher self-assessment log or checklist
Frequency: Weekly
Purpose: Help monitor the balance between maintaining high expectations and providing effective support

Classroom Story: Mr. Chen wanted to make sure his lessons were not unintentionally lowering expectations for students who struggled. He started using a weekly checklist to reflect on whether tasks were at grade level and whether scaffolds allowed access without simplifying the mathematics. After noticing a pattern of over-scaffolding for some students, he began redesigning tasks with tiered entry points and reintroduced productive struggle into lessons. Over time, more students began engaging in higher level reasoning, and Mr. Chen felt more confident that he was supporting rigor for everyone.

Student-Led Progress Tracker

Prompt: *What goal are you working on in mathematics, and what's your next step?*
Format: Goal-setting form or visual tracker (student-owned)
Frequency: Biweekly
Purpose: Support student ownership of academic goals and promote metacognition

Classroom Story: Ms. Green wanted her students to take more ownership of their mathematics learning. She introduced a progress tracker that students could use to choose a skill or habit to work on (e.g., explaining thinking, completing multistep problems) and updated it every 2 weeks. At first, students needed help identifying realistic goals. But with support, they began naming specific actions and reflecting on progress. Ms. Green used the trackers in conferences to discuss learning plans and celebrate small wins. Students felt more in control of their learning, and Ms. Green had clearer insight into what motivated each learner.

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REAL Mathematics

Lesson Planning Placemat

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At a Glance

What is a placemat? This placemat is a visual tool designed to help teachers quickly and efficiently organize, assess, and reflect on key aspects of their lesson plans. It serves as a practical guide that can be used daily to ensure that lesson planning remains focused, comprehensive, and aligned with specific educational goals.

Why This Measure Matters

This particular placemat is intended to support teachers in integrating Culturally Responsive and Sustaining Education (CRSE) essential characteristics (see below) into their mathematics instruction by providing a structured approach for practical measurement of the characteristics. This tool is intended to help teachers regularly assess the extent to which their lessons reflect the identities, experiences, and linguistic diversity of students of color and other marginalized groups.

Important Use Considerations

- Teachers can use the placemat to modify existing lessons or develop new lessons.
- This placemat is designed for teachers with some previous understanding of the concepts of CRSE; additional support may be necessary for teachers new to CRSE.
- The reflection questions at the end of the placemat (see "Reflection on CRSE Essential Characteristics") are important for learning; it is recommended for teachers to set aside time to reflect after using the placemat.

CRSE Essential Characteristics

EC1. Affirms Racial and Cultural Identities

The lesson reflects and celebrates the diverse cultures, languages, and identities of students, families, and communities. It ensures all materials are accurate, are free from bias, and validate students' identities to foster belonging.

EC2. Cultivates Agency and Belonging

The lesson provides open-ended tasks that allow students to express their funds of knowledge, voice, and creativity. It helps build a learning community that fosters connections across cultures and supports social and emotional growth.

EC3. Integrates Socially Responsible, Real-World Contexts

The lesson helps students explore mathematical concepts through the lenses of power, privilege, and justice. It connects math to real-world issues, encouraging students to critically engage and take action to address social inequities.

EC4. Centers Community Knowledge

The lesson challenges dominant narratives by including the voices and experiences of marginalized groups. It promotes multiple ways of problem-solving, encouraging students to connect math to their own lives and communities.

EC5. Promotes Critical Mathematical Thinking and Learning

The lesson maintains high expectations while providing differentiation for students' cultural and linguistic identities. It scaffolds learning to support diverse students, recognize students' efforts, and promote students' ownership of their academic growth.

Essential Components of the Lesson Planning Placemat

The placemat can be used as a checklist and is divided into eight key sections, each chosen for its critical role in creating culturally responsive and sustaining math lessons:

1. **Lesson Framing: Centering Identity, Cultural Relevance, and Linguistic Diversity**
2. **Learning Goals and Outcomes**
3. **Instructional Strategies**
4. **Assessment and Reflection**
5. **Instructional Materials**
6. **Scaffolding and Supports**
7. **Peer Review, Collaboration, and Language Inclusion**
8. **Reflection and Revision**

Using This Placemat

Teachers can use this placemat as a daily checklist to ensure their instruction consistently integrates CRSE essential characteristics. By following the prompts in each of the eight checklist sections, teachers can create lesson plans and make adjustments to instruction so that it meets academic standards while also honoring and elevating the cultural and linguistic diversity of their students.

Next Steps

1. **Start with the first section**

   Ensure the lesson affirms students' cultural and linguistic identities.

2. **Examine each section**

   Address prompts systematically and adjust the lesson as needed.

3. **Gather feedback**

   Encourage students, colleagues, families, and the community to be responsive.

4. **Reflect and revise**

   Evaluate the lesson and identify areas for improvement.

5. **Integrate feedback**

   Use insights from reflections and feedback to improve instruction.

6. **Use regularly**

   Incorporate the placemat into your routine consistently.

1. Lesson Framing: Centering Identity, Cultural Relevance, and Linguistic Diversity

1.1 Affirmation of Identities

- ☐ The lesson actively affirms and reflects students' racial, cultural, and linguistic identities.

1.2 Culturally Relevant Purpose

- ☐ The math is introduced through a purpose that connects to students' lives, cultures, or communities.

1.3 Linguistically Inclusive Framing

- ☐ The lesson framing acknowledges and integrates students' home or heritage languages.

2. Learning Goals and Outcomes

2.1 High Expectations

- ☐ Learning goals are designed and differentiated to sustain high expectations.

2.2 Culturally and Linguistically Relevant Math Goals

- ☐ Learning goals connect to students' cultural and linguistic backgrounds.

2.3 Diverse Measures of Success

- ☐ The lesson offers multiple ways for students to demonstrate understanding.

3. Instructional Strategies

3.1 Development of Agency, Belonging, and Language Inclusiveness

- ☐ Activities invite students to share ideas, use home languages, and shape how they engage.

3.2 Critical Consciousness Development

- ☐ Activities encourage students to critically examine issues of race, identity, and power.

3.3 Mathematical Relevance

- ☐ Math concepts connect to students' experiences, cultures, prior knowledge, and social realities.

3.4 Student Voice, Ownership, and Language Choice

- ☐ Students explore topics and show learning in ways that matter to them.

4. Assessment and Reflection

4.1 Culturally and Linguistically Responsive Assessment

- ☐ Assessments reflect cultural and linguistic contexts, with multiple ways to show mastery.

4.2 Mathematical Understanding

- ☐ Students apply math reasoning in culturally and linguistically relevant ways.

4.3 Reflection on Identity, Learning, and Language

- ☐ Students reflect on how their cultural and linguistic identities shape learning.

5. Instructional Materials

5.1 Bias-Free, Inclusive, and Linguistically Accessible Resources

- ☐ Materials for the lesson are free from stereotypes and deficit assumptions.
- ☐ Materials offer multiple ways to participate, engage, and show mastery.

5.2 Cultural and Linguistic Representation

- ☐ Materials represent culturally and linguistically diverse math contributions and lenses.

5.3 Elevation of Marginalized Voices and Languages

- ☐ Materials challenge dominant narratives and elevate marginalized voices.

6. Scaffolding and Supports

6.1 Cultural, Linguistic, and Mathematical Responsiveness

- ☐ Supports include visuals, language frames, or prior knowledge bridges tied to students' cultures and languages.

6.2 Social and Emotional Supports

- ☐ Strategies like affirmations, check-ins, or peer support build safety, confidence, and belonging.

7. Peer Review, Collaboration, and Language Inclusion

7.1 Feedback on Language Accessibility

- ☐ I have sought feedback on the language accessibility of the lesson.

7.2 Collaboration With Families and Communities

- ☐ Families and communities enhance the lesson's cultural and linguistic relevance.

8. Reflection and Revision

8.1 Reflection on Cultural and Linguistic Responsiveness

- ☐ The lesson effectively centered students' cultural and linguistic identities.

8.2 Revisions for Continuous Improvement

- ☐ I know how to and will improve the lesson's cultural and linguistic relevance.

8.3 Reflection on Integration of CRSE Essential Characteristics

- ☐ I can identify which CRSE essential characteristics I've successfully integrated and which ones need further development. *[See the reflection box.]*

Reflection on CRSE Essential Characteristics

Which essential characteristic was most successfully integrated into the lesson, and which one needs more attention or support to enhance the cultural relevance of the lesson? Where in the lesson did these moments occur?

- ☐ **EC1. Affirms Racial and Cultural Identities**
- ☐ **EC2. Cultivates Agency and Belonging**
- ☐ **EC3. Integrates Socially Responsible, Real-World Contexts**
- ☐ **EC4. Centers Community Knowledge**
- ☐ **EC5. Promotes Critical Mathematical Thinking and Learning**

Your Reflection

REAL Mathematics

Student Survey

At a Glance

This survey is designed to gather student feedback after enacting a culturally responsive math lesson.

Why This Measure Matters

- Many teachers make efforts to connect with student identities and cultural knowledge but need feedback on how students perceived these efforts.
- Each item corresponds with an essential characteristic, so teachers can identify and improve on specific areas of growth.
- If a particular lesson centers the experience of one culture, teachers can learn about how both students within *and* students outside of that culture experienced the lesson.

Important Use Considerations

- **Before administering the survey, remind students that their responses will not impact their grades and that you want honest feedback.**
- **Be sure to look at how student responses vary by race, ethnicity, and/or primary language to identify priority students.**
- **The survey items are a bank of questions; decide which items are most appropriate to use in a given lesson.**
- **Include in every survey the questions that measure the essential characteristic "Promotes Critical Mathematical Thinking and Learning"; other essential characteristics can be explored one at a time in alignment with the Observation and Debriefing Protocols (see page X).**
- **Be sure to share survey responses with students and discuss next steps to show them you value their feedback.**

Survey Content

A Digital Google Form of the Student Survey includes all items listed on the next page. Teachers can make a personal copy of the survey to administer to students and delete any items that do not apply.

The following core survey items were designed to be used on a 5-point scale: (1) Strongly Disagree, (2) Disagree, (3) Neither Disagree nor Agree, (4) Agree, and (5) Strongly Agree. It is recommended that teachers choose no more than five items for each survey. Teachers may select the items most appropriate for their lesson.

Core Survey Item	What it Measures
Today's math lesson was • ***very easy***—I didn't have to think much; I didn't learn anything new. • ***easy***—I had to think a little bit; I learned a little bit. • ***just right***—I had to think through it and struggled at times; I learned something new. • ***hard***—I had some trouble thinking through it; I learned a little bit. • ***very hard***—it was too confusing or frustrating to think through it; I didn't learn anything, or I gave up trying.	Promotes Critical Mathematical Thinking and Learning
My math skills are improving because of today's lesson.	Promotes Critical Mathematical Thinking and Learning
I see how the math we learned today can be used to make the world a better place.	Integrates socially responsible, real-world contexts
I understand a problem that affects people in my community in a new way.	Integrates Socially Responsible, Real-World Contexts
In today's math lesson, we used examples that remind me of people and places I am familiar with.	Affirms Racial and Cultural Identities
I felt proud of my culture and/or community during today's lesson.	Affirms Racial and Cultural Identities
In today's math lesson, I learned something about a culture different from my own.	Centers Community Knowledge
Today's math lesson helped me to see how people from the culture we learned about use math.	Centers Community Knowledge
I felt comfortable sharing my ideas during today's math lesson.	Cultivates Agency and Belonging
The lesson helped me to feel more connected to my ***classmates***. The lesson helped me to feel more connected to my ***teacher***.	Cultivates Agency and Belonging

Racial/ethnic demographic question	What it measures
Which racial/ethnic background(s) do you identify yourself as? *(Select all that apply.)* • American Indian or Alaska Native • Asian • Black or African American • Hispanic or Latino • Middle Eastern or North African • Native Hawaiian or Pacific Islander • White • Other: _____	The racial/ethnic demographic question is included to support teachers in identifying similarities and differences in how students from various groups perceived the lesson. **The racial/ethnic demographic question should be the last item on the survey.**

Survey Debriefing Protocol

Once the survey is administered to students, it is important for the teacher to review the survey responses within a day. The teacher should also share back the results with the class in a timely manner. Here are some recommended discussion questions that the teacher can use to facilitate a conversation while reviewing the data. The teacher may also use these questions for self-reflection prior to sharing them with students.

Part 1. Interpreting the Data

1. **Understanding Trends:**
   - What patterns or trends do you notice in the survey responses?
   - Are there any questions that most students answered similarly, and what might that tell us about the lesson?
2. **Analyzing Variability:**
   - Were there any survey questions that had a wide range of answers?
   - Why do you think students had different experiences or opinions?
3. **Identifying Surprises:**
   - Is there anything in the data that surprises you?
   - Why did this response stand out to you, and what might it tell us about this lesson?
4. **Synthesizing Information:**
   - Based on the data, how do you think students enjoyed the lesson overall?
   - How can you apply this feedback to improve future lessons?

Part 2. Reflecting on the Lesson Experience

1. **How did the examples we used during the lesson connect to your own experiences or culture?**
2. **What types of examples or topics would you like to see in future lessons to make them more relevant or meaningful to you?**
3. **How do you feel about the connections you made with your classmates and your teacher during this lesson? What activities or approaches could help strengthen these connections in future lessons?**
4. **Based on your responses about the lesson's difficulty, what can we do to make our math lessons more engaging and appropriately challenging for everyone?**
5. **How do you feel about the connections you made with your classmates and your teacher during this lesson? What activities or approaches could help strengthen these connections in future lessons?**

Observation and Debriefing Protocols

At a Glance

These observation and debriefing protocols are designed to gather an additional perspective on the enactment of a culturally responsive math lesson. There are four protocols, each focused on a different essential characteristic of Culturally Responsive and Sustaining Education (CRSE), but **only one should be used at a time**. The protocol you choose should be informed by reflecting on data collected from the Lesson Planning Placemat, the Student Survey, and the things you are wondering about.

Why This Measure Matters

- It is important to get feedback on the lessons you teach from a CRSE perspective.
- Focused conversations can support you and your colleagues in developing common language to investigate teaching practice.
- Colleagues can offer additional perspectives and feedback to support your improvement efforts.

Important Use Considerations

- **Use only one protocol per observation.**
- **Do not use the protocol's indicators in an evaluative manner. The indicators should not be used to calculate a score of any kind.**
- **Each indicator lies on a spectrum regarding the extent to which it is visible in the lesson (e.g., minimally present, partially present, fully present). Some users have found it useful to distinguish between such levels with a checkmark (✔), an X (✘), or a star (★), but doing so is not always necessary.**
- **The first time you use any of the protocols, it may be best to simply check off what you observed and note the evidence (e.g., what you saw or heard) rather than to try to evaluate the level to which something is present.**
- **These protocols are intended to help you and your team co-construct understanding of the essential characteristics. It is okay to have differing perspectives and interpretations so long as they result in collegial conversations that support a refined understanding.**
- **The use of evidence is paramount in these conversations. The following sentence starters may be useful:**
  - ***"When … [evidence] …, I saw … [indicator]. This made me wonder about …***

EC1. Affirms Racial and Cultural Identities

Step	Action
Step 1: Understand the purpose of the observation	**Core questions:** How are students' racial and cultural identities and outside-of-school experiences invited into the lesson? How can I ensure focal students feel connected to the lesson?
Step 2: Observe the lesson	Use the following page to identify actions that may indicate that focal students' racial and cultural identities are being affirmed throughout the lesson.
Step 3: Reflect on the lesson together	Consider the following questions: • How did the lesson help students connect mathematics with relevant and authentic issues or situations in their lives? How can lessons create more of these opportunities in the future? • What kinds of contexts were used throughout the lesson? How did students relate to them? How can I learn more about my students and adjust my planning so that their experiences are reflected in the mathematics? • How did the lesson broaden what counts as mathematical knowledge and affirm that all students have thinking that supports the class's learning?
Step 4: Continue learning	Review sample lessons in Appendix A for more insights into how you might improve your understanding and implementation of this essential characteristic: Essential Characteristics of Culturally Responsive and Sustaining Education in Mathematics Curriculum Materials: Sample Lessons

EC1. Affirms Racial and Cultural Identities (continued)

Core questions: How are students' racial and cultural identities and outside-of-school experiences invited into the lesson? How can I ensure focal students feel connected to the lesson?

Look for the following in focal students	Observation notes *[provide evidence for each item you observe as present]*
☐ Make references to their community and/or experiences during the lesson	
☐ Speak in languages that help them make meaning of mathematical ideas	
☐ Share *their* mathematical thinking and what makes sense to them	

Look for the following in the teacher	Observation notes *[provide evidence for each item you observe as present]*
☐ Provides math examples that are embedded in students' community and/or cultural contexts	
☐ Encourages students to speak in languages they are comfortable with to make sense of mathematical ideas	
☐ Recognizes, values, and respects a variety of students' contributions to the lesson	
☐ Uses a personal experience (e.g., when launching the lesson) to draw students into a mathematics lesson and to develop relationships with students	
☐ Asks questions (or uses another practice) to learn more about students' lived experiences	
☐ Provides representations of nondominant individuals or groups who have made significant mathematical and/or societal contributions	
☐ Uses students' informal speech or linguistically diverse phrases to connect with students	

EC2. Cultivates Agency and Belonging

Step	Action
Step 1: Understand the purpose of the observation	**Core questions:** How are students positioned within the lesson as active sense-makers? Whose mathematical ideas are privileged and/or diminished?
Step 2: Observe the lesson	Use the following page to identify actions that may indicate that focal students are expressing their mathematical agency and sense of belonging and to identify teacher actions that cultivate agency and belonging.
Step 3: Reflect on the lesson together	Reflect on the lesson by considering the following questions: • How did the lesson help students closely explore and analyze their reasoning strategies to make sense of conventional concepts and procedures? • How does my lesson maintain high rigor with high support for all students, including Multilingual Learners? • Who shared mathematics ideas? How were those ideas responded to, and who responded to them?
Step 4: Continue learning	Review sample lessons in Appendix B for more insights into how you might improve your understanding and implementation of this essential characteristic: Essential Characteristics of Culturally Responsive and Sustaining Education in Mathematics Curriculum Materials: Sample Lessons

EC2. Cultivates Agency and Belonging (continued)

Core questions: How are students positioned within the lesson as active sense-makers? Whose mathematical ideas are privileged and whose are diminished?

Look for the following in focal students	Observation notes *[provide evidence for each item you observe as present]*
☐ Express when they are confused or unsure and/or ask for help when needed	
☐ Are invited to use materials and/or representations that make sense to them	
☐ Speak in languages that are familiar to them (e.g., code-switching)	
☐ Participate in mathematical discourse in extended ways by explaining *their* reasoning	
☐ Talk with each other (not only to the teacher) about their mathematical ideas and funds of knowledge (e.g., experiences) that help them to make sense of complex ideas	

Look for the following in the teacher	Observation notes *[provide evidence for each item you observe as present]*
☐ Encourages the use of multiple representations	
☐ Emphasizes how varied approaches help to better understand an idea more completely	
☐ Publicly acknowledges focal students' specific mathematical strengths	
☐ Encourages students to use their linguistic funds of knowledge (e.g., encourages translanguaging) to support their thinking	
☐ Invites multiple students to explain their reasoning	
☐ Encourages students to respond to (e.g., add on to, question, clarify) their peers' thinking and ideas	
☐ Provides linguistic supports so that Multilingual Learners can access the lesson	

EC3. Integrates Socially Responsible, Real-World Contexts

Step	Action
Step 1: Understand the purpose of the observation	**Core questions:** How does the lesson build students' capacities to understand and address historical and contemporary injustices (economic, environmental, legal, political, patriarchal, etc.)? To what extent is mathematics positioned as a useful tool for understanding and taking action in response to real-world situations?
Step 2: Observe the lesson	Use the following page to identify actions that may indicate that focal students are using mathematics in critically conscious ways and to identify teacher actions that may build critical consciousness.
Step 3: Reflect on the lesson together	Reflect on the lesson by considering the following questions: • How did the lesson help students understand power, privilege, and/or positionality with regard to social issues and inform their future choices and actions? To what extent did the mathematical goals of the lesson support students in making sense of power and privilege? • How did the lesson disrupt status differences, stereotypes, and inequitable power relationships present in all mathematics classrooms? • How can we create more opportunities for students to use mathematics to explore social issues that matter to them?
Step 4: Continue learning	Review sample lessons in Appendix C for more insights into how you might improve your understanding and implementation of this essential characteristic: Essential Characteristics of Culturally Responsive and Sustaining Education in Mathematics Curriculum Materials: Sample Lessons

EC3. Integrates Socially Responsible, Real-World Contexts (continued)

Core questions: How does the lesson build students' capacities to understand and address historical and contemporary injustices (economic, environmental, legal, political, patriarchal, etc.)? To what extent is mathematics positioned as a useful tool for understanding and taking action in response to real-world situations?

Look for the following in focal students	Observation notes *[provide evidence for each item you observe as present]*
☐ Pose questions or problems about their communities that arise from the mathematics they are doing	
☐ State how their perspectives related to the context of the lesson have changed	
☐ Invite other students to share additional perspectives and/or ideas	
☐ Contextualize the quantities they are working with to make interpretations	

Look for the following in the teacher	Observation notes *[provide evidence for each item you observe as present]*
☐ Uses contexts that explore issues of injustice	
☐ Explicitly addresses stereotypes related to mathematics ability	
☐ Uses current events to connect students to the mathematics lesson	
☐ Invites students to state how the lesson will inform future choices or actions	
☐ Invites students to share new perspectives on a social issue	

EC4. Centers Community Knowledge

Step	Action
Step 1: Understand the purpose of the observation	**Core questions:** How does the lesson challenge dominant narratives about mathematics and schooling? To what extent does the lesson elevate historically marginalized voices?
Step 2: Observe the lesson	Use the following page to identify actions that may indicate that focal students are attending to diverse perspectives and to identify teacher actions that may center diverse perspectives.
Step 3: Reflect on the lesson together	Reflect on the lesson by considering the following questions: • To what extent did the lesson challenge dominant narratives about what it means to be good at school math? • To what extent did the lesson challenge dominant narratives about who is traditionally positioned as mathematically capable? • Whose voices and ideas were more prominent during the lesson and why? Whose voices and ideas had little presence during the lesson and why? • How can we create more opportunities for a diversity of mathematical ideas to be shared with the class?
Step 4: Continue learning	Review sample lessons in Appendix D for more insights into how you might improve your understanding and implementation of this essential characteristic: Essential Characteristics of Culturally Responsive and Sustaining Education in Mathematics Curriculum Materials: Sample Lessons

EC4. Centers Community Knowledge (continued)

Core questions: How does the lesson challenge dominant narratives about mathematics and schooling? To what extent does the lesson elevate historically marginalized voices?

Look for the following in focal students	Observation notes *[provide evidence for each item you observe as present]*
☐ Share their mathematical reasoning and connect how it is similar to or different from other ideas	
☐ Listen and respond to their peers' ideas and reasoning (e.g., by asking questions, by making connections)	
☐ Display their thinking in varied ways (e.g., orally, visually)	
☐ Are invited to share their mathematical thinking (multiple students are)	
☐ Talk about their learning with ownership of their learning style, which demonstrates effort over ability	

Look for the following in the teacher	Observation notes *[provide evidence for each item you observe as present]*
☐ Names and discusses mathematicians from nondominant groups	
☐ Shares and discusses nondominant mathematical ways of knowing that relate to the topic of study	
☐ Leverages students' divergent mathematical thinking and connects it to the lesson goals	
☐ Explicitly addresses societal narratives that position nondominant groups as mathematically deficient and/or other groups as mathematically superior	
☐ Recognizes and validates multiple students' mathematical assets (including the value of "dead ends")	