

Sense of Belonging in Math

Facilitator's Guide

Time: 120 minutes

Facilitators: Instructional coaches or teacher leaders who work with elementary school teachers

Audience: Upper elementary school math teachers

Background Reading

- Master, A., & Walton, G. M. (2013). Minimal groups increase young children's motivation and learning on group-relevant tasks. *Child Development, 84*(2), 737–751.
- Osterman, K. F. (2000). Students' need for belonging in the school community. *Review of Educational Research, 70*(3), 323–367.
- Yeager, D. S., & Walton, G. M. (2011). Social-psychological interventions in education: They're not magic. *Review of Educational Research, 81*(2), 267–301.

Session Outcomes

By the end of the session, participants will be able to:

- Define sense of belonging.
- Explain the importance of belonging for academic success in math.
- Apply actionable strategies to promote belonging in math classrooms.

Materials and Supplies

- PowerPoint slides
- Three sheets of poster paper posted on different sides of the room, each with one of the following questions:
 - *Think about a time when you experienced a sense of belonging in a group. How did you know you belonged?*
 - *Think about a time when you struggled to feel that you belonged in a group. What happened?*
 - *Think about a time you witnessed someone else struggle to feel that they belong in a group. What happened?*
- Markers
- Time-keeping device
- Teacher guides (enough for each participant to have a copy of both):
 - Normalizing Belonging Uncertainty
 - Group Membership

Session at a Glance

Timing	Segment	Key Activities
10 minutes	Welcome and Introductions	Facilitator introduces self and leads participants in an icebreaker activity that prepares them for a conversation about belonging and learning. The learning objectives for the session are reviewed.
10 minutes	Overview of Sense of Belonging	Sense of belonging is defined, described, and contrasted with identity.
20 minutes	Activity: Belonging Brainstorm	Participants engage in a “gallery walk” activity to reflect on their own experience with belonging and how they think it impacts learning in general and math instruction in particular.
15 minutes	Belonging and Learning	Recent research on sense of belonging in schools is summarized, including the interplay between belonging and equity.
10 minutes	Belonging and Math	The implications of sense of belonging research on math teaching and learning are presented.
5 minutes	Break	
15 minutes	Classroom Strategies to Promote Belonging	General and specific strategies for building students’ sense of belonging are presented.
25 minutes	Activity: Teacher Guide Review	Participants review, discuss, and adapt two teacher guides outlining strategies for building students’ sense of belonging.
10 minutes	Closing Reflection	Participants reflect on what they learned in the session and how they will apply it in their work.

Timing	Topic/Steps/Activities	Facilitator Notes	Resources/ Materials
10 minutes	<p data-bbox="304 191 409 289"></p> <p data-bbox="430 219 814 251">Welcome and Introductions</p> <ol data-bbox="310 300 1218 641" style="list-style-type: none"> 1. Introduce self. 2. Display icebreaker slide and lead the activity: <ul data-bbox="409 365 1218 609" style="list-style-type: none"> • Ask participants to form groups of three people who don't know each other well. • Have groups spend 5 minutes finding the three most interesting things all three of the group members have in common. • Have groups introduce themselves to the other groups and share the three things in common they discovered. 3. Debrief the icebreaker using the following key points. <p data-bbox="304 673 409 755"></p> <p data-bbox="409 698 562 730">Key Points</p> <ul data-bbox="310 771 1218 1339" style="list-style-type: none"> • By participating in this activity, you hopefully increased your sense of understanding of and connection with each other. The simple act of finding things in common can create a more inclusive atmosphere and help foster a sense of community and a sense of belonging. • Teachers help build a sense of community and belonging in their classrooms by asking simple questions about their students' lives and finding things they have in common, such as enjoying baseball or having a dog. Similarly, they encourage their students to find common ground and experiences between each other. • In this session, we will explore how a sense of belonging—or a lack thereof—impacts a student's participation and success in school, particularly in math. • We will examine the latest findings from sense-of-belonging research and review and practice research-based strategies for promoting a sense of belonging among students participating in math instruction. <ol data-bbox="310 1380 1018 1412" style="list-style-type: none"> 4. Display and review the session learning objectives. 	<p data-bbox="1260 219 1669 316">Direct participants to the background reading to deepen their understanding.</p> <p data-bbox="1260 349 1680 479">For smaller groups, the icebreaker can be done in pairs, with the large-group sharing optional.</p>	<p data-bbox="1711 324 1932 357">Slide: Icebreaker</p> <p data-bbox="1711 1274 1911 1339">Slide: Learning Objectives</p>

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10 minutes	<p data-bbox="304 219 409 316"> Overview of Sense of Belonging</p> <p data-bbox="430 300 1197 397">1. Walk through the slides defining and describing the concept of belonging and contrasting it with identity. Use the key points that follow.</p> <p data-bbox="304 430 724 462"><i>Defining Belonging (5 minutes)</i></p> <p data-bbox="304 503 409 584"> Key Points</p> <ul data-bbox="304 592 1218 1494" style="list-style-type: none"> ➤ There are many ways to describe belonging, but all share the common theme of connection between people. Today we will use this definition: Feeling like an accepted, respected, valued, and legitimate group member. It's important to stress the “feeling like” part of that definition and to keep in mind that when we discuss belonging, we are referring to people’s subjective perceptions about their acceptance in groups. A student who appears to be very connected (i.e., is a member of a club or organization and seems to have friends) may still feel a painful lack of belonging. ➤ Belonging matters because we are inherently social creatures and have a strong, fundamental need to form and maintain positive connections with other people. It is important to distinguish between need and want: Failure to satisfy a want may lead to disappointment, but failure to satisfy a need leads to severe distress and negative long-term consequences. ➤ Psychologists theorize that we have evolved the need for belonging because connection to groups was so critical to survival; in other words, we are hard-wired for connecting with other people. Although humans may differ in the quantity of connections they desire, we all need to be connected. This is really striking when you review the literature on belonging. These results are replicated again and again, across age groups, across cultures, and across time. ➤ Research has shown that we are very attuned—consciously or not—to our belonging status at all times. We pick up on and react to cues that our belonging might be at risk. Maybe you’ve received the “silent treatment” from a friend before and know how 		<p data-bbox="1717 324 2005 487">Slides: Belonging: What Is It?; Belonging Is a Fundamental Need; Exclusion Is Painful</p>

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	<p>hurtful that can be. That is a pretty extreme signal about belonging, but we also pick up on more subtle cues, such as when another person won't look us in the eye.</p> <ul style="list-style-type: none"> ➤ Experiencing exclusion or lack of belonging is intensely painful and can have serious psychological and health consequences. <p><i>Belonging and Identity (5 minutes)</i></p> <ul style="list-style-type: none"> ➤ Belonging is tied to specific contexts. A person can have a distinct sense of belonging within a school, within a particular class or subject area, and within a group of friends. A person can also experience a sense of belonging with their larger social categories, such as gender, race/ethnicity, and sexual identity. ➤ Talking about belonging also brings up the concept of identity. Identification entails perceiving membership within a group as important and self-defining (this can refer to both social categories and specific domains). ➤ The difference between belonging and identification: Belonging is a feeling of connection to a group, while identification is the importance placed on being a member of that group. ➤ While distinct in many ways from identity, belonging is an important part of math <i>identity motivation</i>, which involves “the ways students think about themselves in relation to mathematics and the extent to which they have developed a commitment to, are engaged in, and see value in mathematics.” ➤ We will now spend some time thinking about our own experiences with belonging and identity and reflecting on what it might mean for teaching and learning in elementary classrooms. 	<p>For more information on identity motivation, see www.girlsmathidentity.org</p>	<p>Slides: Belonging and Identity (2 slides)</p>
20 minutes	 <p>Activity: Belonging Brainstorm</p> <ol style="list-style-type: none"> 1. Display the brainstorming activity slide and direct participants' attention to the three posters hanging around the room with the following questions: <ul style="list-style-type: none"> • <i>Think about a time when you experienced a sense of belonging in a group. How did you know you belonged?</i> • <i>Think about a time when you struggled to feel that you</i> 	<p>If your group is small, this activity can be done as a discussion with one group member or the facilitator taking notes on poster paper.</p>	<p>Slide: Belonging Brainstorm</p> <p>Materials:</p> <ul style="list-style-type: none"> • Pre-labeled posters • Markers • Time-keeping device

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	<p><i>belonged in a group. What happened?</i></p> <ul style="list-style-type: none"> • <i>Think about a time you witnessed someone else struggle to feel that they belonged in a group. What happened?</i> <ol style="list-style-type: none"> 2. Divide the group up into three small groups and ask them to move to one of the three posters. 3. Have participants use the markers and posters to write down all the answers they can think of as individuals and as a group for each question. 4. After 2 or 3 minutes, have the groups rotate to the next poster. 5. Have the groups review what the previous group wrote on the poster and add any additional thoughts. 6. After another 2 or 3 minutes, have the groups rotate again and review and comment on the poster they just arrived at. 7. After another 2 or 3 minutes, have the groups rotate a final time so that they are back at the poster they started with. 8. Have the groups review what has been added to their posters by the other groups and highlight or circle representative comments or things that stand out for them. 9. Have the groups select a spokesperson and give them a minute to summarize for the larger group what stood out for them. 10. Debrief the activity with the large group by using the following key questions. <p> Key Questions</p> <ul style="list-style-type: none"> • How do you think belonging, identity, and exclusion affect how children learn? • Have you seen the effects of belonging or exclusion impacting students in your own classroom or the classrooms of teachers you work with? • Why should we consider the impact of belonging in schools? 	<p>You (or a volunteer) may wish to write down the group's responses to these questions.</p>	

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15 minutes	<p data-bbox="296 191 394 289"> Belonging and Learning</p> <p data-bbox="310 305 1192 370">1. Walk through the slides that describe the impact of belonging on learning. Use the key points that follow.</p> <p data-bbox="310 402 798 435"><i>Belonging and Learning (10 minutes)</i></p> <p data-bbox="296 472 394 548"> Key Points</p> <ul data-bbox="310 565 1218 1498" style="list-style-type: none"> ➤ A sense of belonging is important for everyone, but especially for children and youth. Their sense of belonging is complex. It is impacted through social relationships, which are grounded in norms and biases that are a result of our culture and environment. They are constantly monitoring their belonging status. ➤ Early adolescents' sense of belonging may be particularly vulnerable as they become increasingly independent from their parents and negotiate new peer groups and relationships. Also, in times of transition we tend to be particularly vulnerable (for example, when we start a new school, new grade, or new class). New social ties must be formed and uncertainty about belonging is introduced. This leads us to question "Do I belong here?" Belonging may also be particularly important for young people with marginalized identities, which we'll talk more about in a few minutes. ➤ Just as general belonging is linked to more positive outcomes, we also know that belonging in schools is linked to better outcomes for students. Why might this be the case? ➤ Research has identified the importance of mindsets for student behavior and achievement. For example, Farrington (2013) identified four academic mindsets that drive academic behaviors, which in turn impact student achievement. First among Farrington's academic mindsets is, <i>I belong in this community</i>. ➤ Because belonging is related to and promotes so many important things, we view belonging as a kind of psychological hub. It is very difficult if not impossible to be fully engaged, motivated, 		<p data-bbox="1717 326 2018 727">Slides: Students Seek Belonging; Belonging in School: So What?; Students' Mindsets Influence Behaviors and Achievement (2 slides); Belonging as a "Psychological Hub"; Lack of Belonging Saps Concentration and Focus; Do I Fit in Socially?</p>

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	<p>interested and persist within a context where you don't feel as though you belong.</p> <ul style="list-style-type: none"> ➤ When we are concerned about whether we belong, precious mental energy gets sapped, and we have fewer resources left over to concentrate on other things. Uncertainty about belonging makes people more vigilant to cues about their belonging. ➤ What's more, this uncertainty colors people's interpretation of social events, and the meaning these cues are given is more negative. For instance, normal things, such as a teacher canceling a meeting or a classmate that doesn't say "hi," get interpreted in the worst possible light: "The classmate didn't say hi because everyone here hates me and I don't belong." This creates even more uncertainty, which feeds back into the cycle. If we consider the flip side, when someone feels more positive about their belonging then they are less attentive to cues regarding belonging and more likely to give any incoming cues the benefit of the doubt. This further bolsters belonging and promotes resiliency and stronger belonging. ➤ Coming from a place of vigilance versus benefit of the doubt can create very different perceptions of the same environment and can lead to different reactions. Think back to the example of the friend who didn't say "hi" in the hallway. For a student who is lacking belonging, this may be perceived as an indication that no one at school likes them and they don't fit in. This perception will probably lead to more withdrawal. In contrast, for a student who feels a sense of belonging, the friend not saying "hi" is explained away: "She just didn't see me." This perception may lead to friendlier behavior next time. ➤ This difference in perspective can be a challenge for teachers and administrators who may be aware of the importance of belonging but are coming from a different perspective than students. For example, canceling a meeting with a student carries no hidden meaning for a teacher who assumes the student will understand that they were simply busy at that time, but to the student who worries about belonging it may feel as though the teacher doesn't like the student and doesn't want them in the class. <p><i>Belonging and Equity (5 minutes)</i></p>		<p>Slide: Belonging and Equity</p>

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	<ul style="list-style-type: none"> ➤ The young people who face the most adversity are also those that are most affected by school experiences. A sense of belonging may be even more important—and more difficult—for these students. The question of “Do I belong here?” becomes a more global question of “Do people <i>like me</i> belong here?” “Is my group welcome here?” “Am I safe here?” ➤ Children from underrepresented groups, such as English language learners, economically disadvantaged students, refugees, and stigmatized minorities are more likely to question their belonging because they often have less evidence that people <i>like them</i> belong in <i>this</i> school. They’ve had experiences that have given them very real reasons not to feel like they belong. ➤ For example, imagine what it’s like for an African American student in a predominantly white school. As this student looks around at the teachers and fellow students, they don’t see many people who look like them. For this reason, they are more likely than their white peers to ask, “Do I belong here?” Due to a long history of experiences with discrimination and stereotypes about intellectual inferiority, as well as potential daily micro-aggressions from staff and students, they are likely to worry that others in the school don’t and won’t accept them. ➤ When we talk about disparities within education, we rarely talk about gaps in belonging. We more commonly use language that focuses on structural inequality, discrimination, achievement gaps, and opportunity gaps. Unfortunately, we know that not all students are given equal opportunity and that there are pervasive achievement gaps in the U.S. education system. Math is one place in which achievement gaps are most evident. ➤ We need to do all that we can to address the structural disparities in education. However, it is a mistake to think that we can only address educational inequality by tackling these factors directly. Indeed, given how hard it is to change structural inequality directly, focusing solely on these factors would virtually ensure that progress is slow and that little is done in time to help the students who are in school today. ➤ While school administrators can make a long-term impact through policy and professional development efforts, they can also have 		

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	<p>an impact by addressing the concept of belonging in the present. One consequence of structural inequality is that students from historically underrepresented groups are often denied a sense of belonging in academic contexts—this is something that can be addressed immediately.</p> <p>2. Ask the following key question to set up the next segment and to help participants make a connection between belonging and math.</p> <p> Key Question</p> <ul style="list-style-type: none"> ➤ Why do you think belonging might be an especially pertinent issue for success in math instruction, particularly when working with struggling, disadvantaged, or marginalized students? 		
10 minutes	<p> Belonging and Math</p> <p>1. Walk through the slides that describe the impact of belonging on math teaching and learning. Use the following key points.</p> <p> Key Points</p> <ul style="list-style-type: none"> ➤ When we talk about belonging in academic contexts, it's important to consider that it is multidimensional. Students not only have to negotiate their sense of belonging with their peers (“Do I fit in here socially?”), but also with the domain itself (“Do I fit in here intellectually?”). ➤ Considering the multidimensional nature of belonging, it is especially important when we’re talking about math. A student may feel like an outsider in math, but have a strong sense of connection with their peers in math class. On the other hand, a student can feel like he or she is a “math person” but can still have trouble connecting with his or her classmates in a math class. These two aspects of belonging can interact, and both are 		Slides: Belonging Is Multidimensional; Do I Fit in Intellectually?

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	<p>important.</p> <ul style="list-style-type: none"> ➤ Just as concerns about social belonging can affect social behavior in ways that reinforce negative patterns, concerns about intellectual belonging can negatively affect academic behavior in ways that further threaten belonging. Students who feel less certain about their math belonging may interpret normal setbacks and challenges much more negatively. For instance, a bad grade on a quiz may be attributed to their lack of ability and belonging in math, which in turn leads to more negative responses such as withdrawing effort and avoiding math in the future. On the other hand, students who feel more positive about their math belonging are likely to interpret the challenges they face in more adaptive ways, which has positive implications for their behavior. <ol style="list-style-type: none"> 2. Display the “Who Belongs in Math?” slide and note that these are the first five pictures that come up in a Google search using the term “math student.” 3. Ask the following key question. <p> Key Question</p> <ul style="list-style-type: none"> • What do you notice about the students in these pictures? <p> Key Points</p> <ul style="list-style-type: none"> ➤ Math is different from some other domains because as a society we have very strong stereotypes about who belongs in this field. ➤ The stereotypes our society holds about math make it likely that some students—girls and students of color in particular—are more likely to question their belonging in this domain. ➤ The quote from Shelley Correll illustrates the importance of students’ expectations about whether they belong and how stereotypes can perpetuate inequities in achievement. Boys expect to belong in math, and this may in part explain why we see boys pursuing math at higher rates than girls. ➤ Research suggests that children begin to adopt the pervasive stereotypes of their culture at a surprisingly early age and that 		<p>Slide: Who Belongs in Math?</p> <p>Slides: Math Stereotypes; Girls and Math; What’s Inside a Stereotype?</p>

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	<p>children’s stereotypes influence their academic attitudes and performance. “Cultural fit” and “ability” stereotypes can both contribute to educational inequities, because when girls compare themselves to these stereotypes, they feel a mismatch that signals to them that they do not “belong” in STEM (science, technology, engineering, and math) fields. The gender difference in young students’ interest and motivation in STEM is a major contributor to later disparities in STEM majors and careers.</p> <p>➤ One strategy for promoting belonging is thus to avoid feeding into stereotypes about what types of people excel in math (or any other domain).</p> <p>4. Ask the following key question.</p> <p> Key Question</p> <ul style="list-style-type: none"> • What are some strategies you’ve used or seen others use in the classroom to help girls, students of color, and disadvantaged students feel more included? 		
5 minutes	BREAK	Be sure to set a timer.	
15 minutes	<p> Classroom Strategies to Promote Belonging</p> <p>1. Walk through the slides that describe how classroom teachers can promote a sense of belonging. Use the key points that follow. Note that the techniques move from general suggestions to math-specific ones.</p> <p><i>General Strategies (5 minutes)</i></p> <p>Key Points</p>		Slide: General Classroom Strategies to Promote Belonging

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	 <ul style="list-style-type: none"> ➤ Teachers can do a lot to create a welcoming and inclusive environment in the classroom. ➤ Making eye contact and using correctly pronounced student names are small but powerful cues that signal belonging. ➤ The physical space students encounter can also affect their sense of belonging. Physical objects serve as cues about who belongs in that particular environment and signal the culture of the people associated with that environment. ➤ For example, in one study researchers assessed the impact of academic environments that did or did not possess objects consistent with stereotypes about computer scientists and assessed students' sense of belonging and interest. The study, which was successfully replicated, showed that girls were more likely to feel that they belonged in a non-stereotypical computer science classroom—that they would fit in and be similar to the other students—than a stereotypical classroom. In this case, the non-stereotypical computer science classroom contained objects that did not project stereotypes associated with STEM, such as computer parts and “science nerd” things like Star Trek posters. Rather, objects included neutral things commonly found in a classroom or office space, such as potted plants and nature posters. The researchers measured students' computer science interest and found that girls were three times more likely to be interested in taking a computer science course when the classroom did not project current computer science stereotypes. Boys were equally interested in taking computer science regardless of how the classroom looked. ➤ Second, relationships between teachers and students can be an important source of support, particularly for children who may have less secure/reliable relationships at home. ➤ Another study, for example, engaged fifth-grade students in a series of teacher-facilitated, structured activities designed to promote positive peer relationships and inclusive classrooms. The Relationship Building Intervention (RBI) assessed the impact of intentional relationship building on social behaviors, school connectedness, and academic achievement. In all three areas, the RBI was positively associated with fifth-grade students' school experiences and success, even controlling for pretest scores, 	<p>For more information on cues to signal belonging, see https://www.mindsetkit.org/belonging#cues-belonging</p> <p>For details of this study, see Master & Meltzoff (2016) in the reference list.</p>	

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	<p>cohort, and demographic variables. Students who participated in the RBI were described by their teachers as less aggressive, personally reported liking school more, felt a greater sense of classroom identification and inclusion, and performed academically better than students in control classrooms.</p> <ul style="list-style-type: none"> ➤ To the extent possible, building relationships with families can also promote belonging for both parents and students. Some parents will enter a school or classroom and will see people that look like them, speak like them, and value the same things they do, but this won't be the case for everyone. Teachers can ask themselves, from a parent's perspective: "Is this a place that reflects my culture, values, and language?" Teachers can then work to incorporate aspects of their students' cultures, languages, and values into the classroom to help promote the sense of belonging that comes from seeing yourself reflected in a setting. <p><i>Normalizing Uncertainty (5 minutes)</i></p> <p>2. Walk through the slides that describe the first strategy to promote belonging in math: Normalizing Uncertainty. Use the key points that follow.</p> <p> Key Points</p> <ul style="list-style-type: none"> ➤ When students struggle in a subject, they may misperceive their struggle as an indication that they are not good at the subject and will never succeed in it. Even if students SAY they believe that everyone has the potential to be successful in math or science these beliefs may not translate into beliefs about their own abilities. ➤ As we discussed earlier, belonging is multidimensional. One way to promote intellectual belonging is to normalize the experience of struggling and feeling challenged when learning math. ➤ Stories can powerfully impact people's attitudes, beliefs, and behaviors. Emergent research suggests that learning about how accomplished scientists and scholars struggled during their own professional journeys can help promote a sense of belonging in 		<p>Slides: Strategies to Promote Belonging in Math; Normalizing Uncertainty: It's OK to Struggle; How "Struggle Stories" Work; Normalizing Uncertainty Intervention (3 slides)</p>

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	<p>math and science.</p> <ul style="list-style-type: none"> ➤ One reason this intervention might be effective is because it interrupts the cycle we discussed earlier by giving students an adaptive way to understand their own challenges and struggles instead of interpreting events as proof that they don't belong. When students understand that it's normal to encounter challenges, it can help them reframe their own struggles. For example, "The bad quiz grade I got is because I studied with the TV on and not because I'm not smart enough. Math is challenging for me, just like it is for everyone, so I need to put forth my best effort and try a different study technique next time." ➤ Learning how Einstein struggled in math early in his life or even how an older student in one's own school overcame challenges in math, reassures students that their own struggles in math and science are not insurmountable and that persistence will pay off. ➤ Researchers have developed an intervention to promote belonging. This intervention emphasizes that concerns about belonging are <i>normal for everyone</i> and are likely to fade with time. Basically, this intervention imparts the message "I've been there, too, and it gets better." This intervention is called <i>Normalizing Uncertainty</i>. ➤ Normalizing belonging concerns can help young people frame setbacks, challenges, and worries about belonging as common and transitory instead of proof that they do not belong. ➤ The goal of the Normalizing Uncertainty intervention is to communicate a two-part message: Worrying about belonging and struggling in school are normal experiences for <i>everyone</i>, and they fade with time. ➤ In the first part of the intervention, students hear first-person stories from older students (e.g., middle school students) that convey this message. It is important that these messages are authentic to students' lived experiences. The first-person messages should also come from students of different background characteristics to show that everyone—regardless of gender or race—worries about their belonging or has struggled in school (specifically with math) from time to time. The messages can come in the form of letters, videos, or in-person visits. ➤ In the second part of the intervention, students engage in a 	<p>A letter example is provided in one of the handouts that</p>	<p>Slides: Strategies to Promote Belonging in Math: Group Membership; Group Membership (2 slides);</p>

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	<p>writing exercise with an imaginary pen pal in which they reflect on how this has been true in their experience (a time they've struggled with something). This helps students see themselves as benefactors instead of beneficiaries of help.</p> <ul style="list-style-type: none"> ➤ This intervention appears to be beneficial because it gives young people a more adaptive way to interpret normal social setbacks and adversities. This interrupts the negative feedback cycle discussed earlier, in which uncertainty about belonging can contribute to even lower belonging. <p>3. Pause to take any questions from participants about Normalizing Uncertainty.</p> <p>4. Note that in the next segment participants will get hands-on practice with the intervention.</p> <p><i>Group Membership (5 minutes)</i></p> <p>5. Walk through the slides describing the second strategy to promote belonging in math: Group Membership. Use the following key points.</p> <p> Key Points</p> <ul style="list-style-type: none"> ➤ Evidence suggests that educators might be able to boost young children's motivation by creating classroom group identities tied to learning activities such as math. ➤ Several studies have found that young children persist and perform better on individual math and spatial tasks when they are primed using social cues to feel like part of a group. ➤ In a classroom setting, young children seem to perceive task-based collaborative groups to be important, similar to intimacy groups such as friends or social category groups. When children develop socially shared motivations, it may forge a sense of common purpose and reinforce the feeling of group identity—a sense that “This is who we are and this is what we do.” ➤ Groups can be created in a variety of ways, such as color groups, groups with a specific purpose, or groups named after an animal. 	<p>participants will work with in the next segment.</p>	<p>Make Math Collaborative: The “Jigsaw” Classroom; How-To Jigsaw Classroom; A Note of Caution</p>

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	<ul style="list-style-type: none"> ➤ Evidence suggests that outcomes improve only if children identify with their group. An experimental study found that young children who completed a math or spatial task as part of a group: a) persisted longer in the task, b) correctly completed more pieces of the task, c) thought they were better at the task, and d) were more interested in the task. ➤ Incorporating non-academic social factors, such as group membership, into curricula could be an effective way to boost children’s math motivation. ➤ In addition to promoting group membership in the classroom, another way to make learning math more collaborative is by using the Jigsaw Classroom technique. In this technique, students learn different content and then rotate within the space to share their knowledge with their classmates. This gives each student expert status and every group member then becomes integral to the success of the group. ➤ For example, in a lesson about measures of central tendency, you could divide students into three groups: one group to learn about the mean and how to calculate it, another to learn about the median, and a third to learn about the mode. After students become experts, they reconfigure into groups with one expert for each topic and then must teach the other group members about their expert topic. ➤ The Jigsaw Classroom was initially designed to reduce racial conflict, but it has also been shown to increase positive education outcomes, including: a) social relatedness and belonging, b) test performance, c) liking for school, and d) reduced absenteeism. ➤ Be careful when forming math groups for group membership and jigsaws. Children are sensitive to social cues, so make sure to stress that you value each group’s contributions equally, to avoid creating “out-groups.” Associating groups with activities may increase motivation, but associating groups with an underlying or fixed ability at those activities may decrease motivation. In other words, avoid grouping strategies such as “This is the subtraction group because they are great at subtraction.” <p>6. Pause to take any questions from participants about Group Membership.</p> <p>7. Note that in the next segment participants will get hands-on</p>	<p>For details of this study, see Masters et al. (2017) in the reference list.</p> <p>See jigsaw.org for more details about this technique.</p>	

Timing	Topic/Steps/Activities	Facilitator Notes	Resources/ Materials
	practice with the intervention.		
25 minutes	<p> Activity: Teacher Guide Review</p> <ol style="list-style-type: none"> Note that participants will now have a chance to spend more time with the two belonging strategies: Normalizing Uncertainty and Group Membership. They will review a teacher guide for each and discuss with their table partners how they would adapt and use the guides for training teachers on how to promote belonging in their math instruction. If desirable and time permits, have participants reform into new table groups (e.g., by counting off and moving to new tables). Display the slide with activity directions. Distribute the two handouts (if you have not already). Invite the table groups to pick one of the two teacher guides to review first. After each table has selected one, invite them to review it and answer the following questions (which are also on the slide): <ol style="list-style-type: none"> <i>What do you like about the intervention?</i> <i>What might you have to adapt to make it useful in your context?</i> <i>What questions do you have about the intervention?</i> After groups have worked for about 8 minutes, pause them and ask each table group to share highlights of their discussion and ask any questions they might have. Give the table groups another 8 minutes to review the second handout and answer the same questions. Ask each table group to share highlights of their discussion and ask any questions they might have. Close the segment by asking participants to respond to the following key question: <p> Key Question</p> <ul style="list-style-type: none"> What additional strategies have you used or seen others use to promote belonging in the classroom? How can these strategies be used in the context of a math class? 	<p>In a small group, there is no need to form breakout groups.</p> <p>You (or a volunteer) may wish to write down the group's responses.</p>	<p>Slide: Small-Group Activity: Teacher Guides Review</p> <p>Materials: Normalizing Uncertainty Teacher Guide; Group Membership Teacher Guide</p>

