

Math Self-Efficacy Facilitator's Guide

Time: 60 minutes

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

Audience: Upper elementary school math teachers

Background Reading

- Margolis, H., & McCabe, P. P. (2006). Improving self-efficacy and motivation: What to do, what to say. *Intervention in School and Clinic, 41*(4), 218–227. <http://eric.ed.gov/?id=EJ757868>.
- Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology, 25*(1), 82–91.

Session Outcomes

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

- Define self-efficacy and understand how it is formed.
- Understand the importance of self-efficacy for student engagement and success in math.
- Apply actionable strategies to build students' math self-efficacy.

Materials and Supplies

- PowerPoint slides

Session at a Glance

Timing	Segment	Key Activities
10 minutes	Welcome and Introductions	Participants engage in a brief icebreaker activity that helps them get to know one another and assess their experiences with and attitudes about math.
20 minutes	Overview of Self-Efficacy	Self-efficacy is defined and described. The discussion will focus on the sources of self-efficacy, how it contrasts with the related concepts of <i>self-esteem</i> and <i>growth mindset</i> , and how it is related to gender stereotypes about which students are successful and unsuccessful in math.
25 minutes	Classroom Strategies to Build Self-Efficacy	Participants explore strategies teachers can use or adapt to build students' self-efficacy in math.
5 minutes	Closing Reflection	Participants reflect on what they learned in the session and think about how they will apply it in their work.

Timing	Topic/Steps/Activities	Facilitator Notes	Resources/ Materials
10 minutes	<div data-bbox="296 185 394 289">  </div> <p data-bbox="422 220 804 250">Welcome and Introductions</p> <ol data-bbox="310 305 1167 399" style="list-style-type: none"> 1. Introduce yourself. 2. Display the icebreaker slide and ask participants to think about the prompt: <p data-bbox="380 440 1192 565"><i>Think of a time when your performance at something surprised you—a time you succeeded or failed unexpectedly. How did your success or failure impact your feelings about yourself and your abilities?</i></p> 3. Ask participants to share their story with someone at their table. 4. Ask for one or two volunteers to share their story with the large group, if they are comfortable. 5. Review the icebreaker and set up the session using the following key points. <div data-bbox="306 808 384 885">  </div> <p data-bbox="405 833 558 862">Key Points</p> <ul data-bbox="310 899 1205 1062" style="list-style-type: none"> ➤ Our past successes and failures make a big impact on how we perceive our abilities—for better or for worse. ➤ This session will summarize current research on self-efficacy and provide sample classroom organizing and teaching strategies that can build student self-efficacy and motivation. <ol data-bbox="310 1101 1014 1130" style="list-style-type: none"> 6. Display and review the session learning objectives. 	Direct participants to the background reading to deepen their understanding.	<p data-bbox="1717 363 1938 393">Slide: Icebreaker</p> <p data-bbox="1717 1141 1913 1203">Slide: Learning Objectives</p>

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20 minutes	<p data-bbox="304 186 409 284"> Overview of Self-Efficacy</p> <p data-bbox="304 300 1155 365">1. Walk through the slides that define and describe self-efficacy, using the following key points.</p> <p data-bbox="304 397 745 430"><i>Defining Self-Efficacy (2 minutes)</i></p> <p data-bbox="304 470 409 552"> Key Points</p> <ul data-bbox="304 560 1197 787" style="list-style-type: none"> ➤ Self-efficacy is a person’s belief that they can succeed at a given task. ➤ Much of the research on self-efficacy has been pioneered by Dr. Albert Bandura, who established social learning theory. ➤ In today’s session, we will talk specifically about student self-efficacy in the context of math—a student’s belief that they can succeed in math. <p data-bbox="304 828 882 860"><i>Why Does Self-Efficacy Matter? (8 minutes)</i></p> <ul data-bbox="304 901 1207 1494" style="list-style-type: none"> ➤ Camille Farrington at the University of Chicago is an influential researcher on the noncognitive factors that allow students to do well in school and life. Farrington uses the term “academic mindsets” to capture all the attitudes and beliefs students hold about themselves as learners. In her review of many studies on noncognitive factors, Farrington concludes that more positive academic mindsets promote academic perseverance and certain academic behaviors (such as studying hard and attending class)—which, in turn, lead to better learning or academic outcomes. ➤ Today, we will focus on one dimension of students’ academic mindsets: Students’ beliefs about their ability to succeed at a given task—or self-efficacy. ➤ The quote from Henry Ford [on slide] nicely sums up why educators care about self-efficacy: “<i>Whether you think you can, or you think you can’t, you’re right.</i>” What we believe about ourselves and how we expect to perform are powerful influences on how we actually perform. 	<p data-bbox="1249 560 1669 690">When possible, connect these key points to insights and experiences participants shared during the icebreaker.</p>	<p data-bbox="1711 365 1963 430">Slide: What is Self-Efficacy?</p> <p data-bbox="1711 820 2005 1218">Slides: Students’ Mindsets Influence Behaviors and Achievement (two slides); Why Does Self-Efficacy Matter?; Self-Efficacy is Domain Specific; Self-Efficacy vs. Self-Esteem and Growth Mindset; Self-Efficacy in Schools</p>

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	<ul style="list-style-type: none"> ➤ Self-efficacy is tied to specific domains or abilities. That means students have different self-efficacy beliefs depending on the subject: math versus art versus language, etc. ➤ Students may feel highly efficacious in some domains but not in others. Students may even feel efficacious in some aspects within a domain but not others (e.g., for some types of math problems but not others). ➤ Self-efficacy may bring to mind other concepts that involve how students think about themselves and their abilities. ➤ Self-efficacy is related to—but distinct from—<i>self-esteem</i> and <i>growth mindset</i>. <ul style="list-style-type: none"> • High self-esteem and a growth mindset may support self-efficacy, but they are different concepts. • Self-esteem is a more global feeling about the self and one’s self-worth. • Growth mindset is not about assessment of current skill level but the potential to improve with effort. ➤ Why should teachers care about their students’ sense of self-efficacy? <ul style="list-style-type: none"> • Students with higher self-efficacy are more interested, persist longer, are more engaged, respond productively when they encounter a challenge or setback, and show stronger academic performance. • One study found that self-efficacy for math was a better predictor of math achievement than general ability. • Students seek situations in which they believe they can succeed but avoid those in which they lack confidence. <p><i>Sources of Self-Efficacy (3 minutes)</i></p> <ul style="list-style-type: none"> ➤ Research from Bandura and others has shown that self-efficacy beliefs are formed by several overlapping factors that influence an individual’s self-efficacy beliefs in a given area. Some of these factors are more influential on overall efficacy beliefs than others. ➤ Bandura identified four sources of self-efficacy: <ul style="list-style-type: none"> • <i>Mastery experiences</i> are the most influential sources of self-efficacy. Students’ past experiences are the most enduring influence on their self-efficacy. 		<p>Slides: Sources of Self-Efficacy (two slides)</p>

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	<ul style="list-style-type: none"> • <i>Vicarious experiences</i> will be more influential when the person observed is a peer and is judged to be similar to the self. • <i>Social persuasion</i> depends on the credibility of the source. Vicarious experiences and social persuasion are less stable sources of self-efficacy. Each is more influential when followed up with a student's success experience. • <i>Physical and emotional states</i> of nervousness or anxiety (e.g., sweatiness, rapid heartbeat, and dry mouth) can undermine confidence. <p><i>Wrap-Up (7 minutes)</i></p> <ol style="list-style-type: none"> 2. Display the slide with the quote from Bandura and ask participants to consider it for a moment. 3. Ask participants to respond to the quote using the two prompts provided on the slide and discuss with a partner at their table. <ul style="list-style-type: none"> • <i>Do you agree that beliefs are a powerful determinant of academic behavior?</i> • <i>Are there certain groups of students who seem to enter the classroom with more positive beliefs about their competence and ability than others? Why do you think that's the case?</i> 4. Invite a few volunteers to share what they discussed. 5. Display the slide with the quote from Shelley Correll, a Stanford sociologist, about boys' and girls' pursuit of math activities. 6. Ask participants to consider the quote and then ask them to share their reactions or thoughts. 7. Display the slide about self-efficacy and math stereotypes. 8. Make the following key points about how math stereotypes impact students' sense of self-efficacy. <p> Key Points</p> <ul style="list-style-type: none"> ➤ Correll's quote emphasizes the importance of students' expectations about whether they will succeed and how stereotypes can perpetuate inequities in achievement. Boys expect to succeed in math, and this may explain in part why we see boys pursuing math at higher rates than girls. 		<p>Slides: Self-Efficacy: What Do <i>You</i> Think?; Gendered Perceptions of Math; Self-Efficacy and Math Stereotypes</p>

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	<ul style="list-style-type: none"> ➤ It's important to consider students' self-efficacy and how those self-beliefs can differ depending on gender and race/ethnicity or socioeconomic background, particularly in math. This is because math is different from some other domains; as a society, we have strong stereotypes about who is likely to have the right abilities to succeed. ➤ The stereotypes our society holds about math make it likely that some students—girls and students of color in particular—are more likely to approach math with less self-efficacy. <p>9. Note that participants will now have a chance to explore research-based classroom strategies that can boost students' self-efficacy in math.</p>		
25 minutes	 <p>Classroom Strategies to Build Self-Efficacy</p> <p><i>Preview (2 minutes)</i></p> <ol style="list-style-type: none"> 1. Display the classroom strategies and key strategies slides and give a preview of the strategies that will be presented. 2. Note that the strategies align with the sources of self-efficacy presented earlier. Add that this session focuses on specific strategies math educators can employ with elementary school students related to mastery experiences, vicarious experiences, and social persuasion. Other REL Northwest workshops also emphasize other relevant strategies. For example, some strategies to support vicarious experiences are discussed in the Belonging module, strategies related to social persuasion with the use of encouragement are emphasized in the Growth Mindset module, and strategies to support student physical and emotional states are shared in the Math Anxiety module. 3. Walk participants through the strategies, using the corresponding slides and the key points, key questions, and activities that follow. 		<p>Slides: Classroom Strategies to Build Self-Efficacy; Key Strategies</p>

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	<p data-bbox="310 185 1087 212"><i>Increase Likelihood of Success to Build Mastery (6 minutes)</i></p> <div data-bbox="310 250 569 326">  Key Points </div> <ul data-bbox="310 342 1213 1485" style="list-style-type: none"> <li data-bbox="310 342 1213 440">➤ Bandura found that mastery experiences are the biggest influence on self-efficacy. In other words, students who have succeeded in the past are going to expect to succeed in the future. <li data-bbox="310 448 1213 545">➤ Two key approaches to building mastery experiences for students are <i>using scaffolding to promote success</i> and <i>helping students set goals and track progress</i>. <li data-bbox="310 553 1213 748">➤ One way to set students up for success is to use scaffolding. This gives them a supporting framework during the learning process to help them independently transition from what they can already do to more difficult tasks. Scaffolding involves giving students a “road map”; the lesson is broken into chunks, and supports are available for each chunk. <li data-bbox="310 756 1213 821">➤ As students develop their skills, teachers can gradually remove scaffolding and build autonomy. <li data-bbox="310 829 1213 959">➤ Scaffolding can be horizontal (building a bridge), which involves teachers evaluating whether their guided practice exercises have sufficiently prepared students to succeed at similar problems on their own. <li data-bbox="310 967 1213 1065">➤ Scaffolding can also be vertical (building a ladder), which involves teachers comparing starting skills to end learning goals and placing enough “rungs” on the ladder to help students progress. <li data-bbox="310 1073 1213 1308">➤ Some students will need more supports, and some will need fewer; teachers should help them identify where they are on the road map. To help accommodate a range of abilities, teachers should choose tasks that have a low floor (even beginners can have some successes) and a high ceiling (even advanced students will be challenged). Youcubed.org is a good resource for these types of tasks. <li data-bbox="310 1317 1213 1446">➤ Another way to support mastery experiences is to set students up to achieve frequent, small successes. As with the scaffolding process, this involves chunking a larger goal or learning objective into smaller attainable goals. <li data-bbox="310 1455 1213 1485">➤ In addition to setting goals, students should be encouraged to 		<p data-bbox="1724 207 2018 472">Slides: Increase Likelihood of Success to Build Mastery; Use Scaffolding to Promote Success (four slides); Help Students Set Goals and Track Progress</p>

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	<p>track their progress toward those goals so they can see their improvements, even when incremental.</p> <ul style="list-style-type: none"> ➤ Be sure to point out and celebrate successes as they occur. <p> Key Questions</p> <ul style="list-style-type: none"> • What is an example of how you chunked out and scaffolded steps for a math concept to better support student learning (or helped a teacher do so)? • What is an example of how you have helped students set goals for their math learning and track progress toward those goals (or helped a teacher do so)? <p><i>Cultivate Successful Vicarious Experiences (6 minutes)</i></p> <p> Key Points</p> <ul style="list-style-type: none"> ➤ Students observing others whom they can relate to is a powerful strategy to promote self-efficacy. ➤ Classroom demonstrations with peer models provide opportunities for students to experience vicarious success. One way to do this is with fishbowl activities in which a small group in the center of the class engages in an activity and models how it's done for the larger group. ➤ Another way to do this is by creating collaborative learning opportunities in which students develop skills while observing their peers who have mastered a similar challenge or are modeling an effective strategy. ➤ This is particularly effective when students can relate to the peer, so use models of varying aptitudes. ➤ When possible, use guided questioning to help peer models attribute success or roadblocks to factors they can control (e.g., the time they spent studying, practice, and trying a new strategy). ➤ Examples: <i>Tell us what you know about this. How could you break this into smaller steps? How did you get from this step to that step?</i> 		<p>Slides: Cultivate Successful Vicarious Experiences; Help Students See Successes of Others Like Them</p>

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	<p> Key Question</p> <ul style="list-style-type: none"> • What is an example of how you have helped create vicarious success experiences for students learning math (or helped a teacher do so)? <p><i>Provide Positive Verbal Persuasion (6 minutes)</i></p> <p> Key Points</p> <ul style="list-style-type: none"> ➤ Teacher feedback can have a big effect on how students perceive their abilities, but the style and content of the feedback are very important. ➤ Feedback should be focused on students' process and relate specific approaches to the end result. ➤ Example: <i>"That was great work, Salome! You remembered to start by finding the greatest common factor for that equation, and then you were able to factor it out."</i> ➤ Teachers should also be realistic and honest. Undeserved or insincere praise is not helpful. Don't pretend setbacks haven't happened. Instead, acknowledge the struggle and identify specific strengths that could help a student cope with the struggle. ➤ Example: <i>"I can tell you're frustrated, Lila. You're having a hard time solving this equation. I remember how last week you did a great job of following the right order of operations. I wonder if you can use that knowledge now."</i> ➤ Teachers should also point out negative self-talk and challenge it. ➤ Example: <i>"Daren, I heard you say this is too hard. It's true that this is challenging, and you might not be able to do it yet. But I know you can if you keep at it. Let me show you a different approach that might help."</i> <p>4. Display the positive social persuasion scenario slide. Ask participants to identify how the feedback provided by the teacher in this scenario represents the steps we just reviewed for providing process-related feedback.</p>		<p>Slides: Provide Positive Verbal Persuasion; Use Process-Related Feedback</p> <p>Slide: Positive Social Persuasion Scenario</p>

