Examples of Social and Emotional Learning in Elementary Mathematics Instruction

Acknowledgments

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Introduction

Within the Collaborating States Initiative many states are developing competencies to articulate goals for what students should know and be able to do in terms of their social and emotional development (Dusenbury et al., 2015). An immediate question from stakeholders and constituents is: How can teachers effectively promote or teach social and emotional competence to achieve these goals? Put another way: What do teachers and other adults need to do in the classroom and school to help students achieve the goals laid out in social and emotional learning (SEL) competencies?

In the past 15 years CASEL has produced three separate guides to evidence-based programs designed to promote student social and emotional development (CASEL, 2003; CASEL 2013; CASEL, 2015). We believe our reviews of the actual content of evidence-based programs helps inform the answers to the important question of how adults can effectively promote student SEL in the classroom and school. The purpose of this document is to draw on these previous reviews of evidence-based programs to identify and describe some of the most common strategies used to promote student SEL.

A Mathematics curriculum is enhanced when it is intentional about developing social and emotional learning (SEL) core competencies.

- **Self-Awareness and Self-Management**. All education is based on the implicit assumption that students will have the self-awareness and self-management skills necessary to recognize their feelings, calm themselves, and focus their attention sufficiently so they can effectively participate in learning, including Mathematics. Further, all learning, including Mathematics, assumes that students will have basic goal-setting skills to complete academic assignments.
- **Social Awareness**. Effective participation in all educational activities, including Mathematics, depends on students' ability to understand and observe important social norms of the class, recognize there are diverse approaches to problem-solving, and understand that the approaches of others can help us identify new and improved strategies ourselves. Further, empathy and perspective-taking are critical skills when applying mathematical reasoning to real-world problems.
- **Relationship Skills**. Success in Mathematics and other academic subjects depends on effective communication skills, including how to listen well and how to ask questions, as well as broader social skills such as how to effectively seek help when one doesn't understand academic content. Cooperative learning and group problem-solving are anchored in relationship skills.
- **Responsible Decision-Making**. Mathematics assumes that students will have the basic ability to evaluate options and make effective decisions to complete assignments.

Mathematics can be enhanced when instruction and teaching practices are *explicitly* designed to promote all five core competencies of SEL. Indeed, we know from rigorous research that curriculum and instruction that are intentional about giving students the chance to develop core social and emotional competencies of self-awareness, self-management, social awareness, relationship skills, and responsible decision-making significantly increase academic achievement, improve attitudes and behaviors, decrease negative behaviors and discipline problems, and reduce emotional distress.[1] Effective Mathematics instruction builds upon these competencies to drive student learning and engagement.

For example, through Mathematics, educators can support students to:

- See connections between current tasks and their personal interests **(self-awareness).**
- Develop skills for focusing attention, managing stress and anxiety, and accomplishing goals in order to effectively participate in learning **(self-management)**.
- Develop awareness of positive classroom norms and an understanding of how students contribute to a positive classroom experience, respect for peers and teachers, and empathy and perspective-taking in order to apply mathematical reasoning to real-world problems and reviewing the reasoning of others **(social awareness)**.
- Develop speaking and listening skills (e.g., how to ask questions, how to listen well, and how to effectively seek help when one doesn't understand academic content) and the ability to collaborate to solve problems **(relationship skills)**.
- Use reasoning strategies to reflect on choices and goals as a way of developing strong decision-making skills **(responsible decision-making).**

In short, core social and emotional learning competencies can help students to develop stronger Mathematics skills and to become college and career ready.

Activities and Practices

Self-Awareness	
Lessons/Activities	Students begin the school year or instructional unit by drawing what being a mathematician "looks and feels like" to them. Students are encouraged to add more affirmative language as they learn more math skills. Similar to a feeling chart with "Today, I feel like…," students would be encouraged to write or say, "As a mathematician, I feel… [satisfied that I solved this problem, curious or confused about that solution, etc.]."
	During the first week of school, establish shared classroom rules and expectations and consequences so that students can see the impact of their own actions and behaviors on outcomes.
	Lead a class activity that asks students to identify feelings they might have in situations involving mathematics using vocabulary (e.g., lead discussions using questions such as, "How would you feel if you solved an easy problem?," "Would you feel different or the same if you solved a harder problem?," "How would you feel if a friend was having a hard time in class?").
	Set up small-group discussions that allow students to discuss how and why emotions can influence our behaviors (e.g., "What can happen when we get frustrated?," "What can happen when class or homework is challenging?").
	Use stories about mathematicians or stories that include puzzling scenarios to have students identify with a time they may have had the same feelings as a character and ask them to discuss in small groups (or draw a picture or write simple sentences in their journals) to describe how they handled those situations.
	Read stories about clever protagonists who used math to solve problems, or about actual mathematicians, and discuss how they felt and why they took certain actions or behaved the way they did. Have students consider how they feel in similar scenarios (e.g., while solving math problems).
	Ask students to identify their own personal interests, strengths, and weaknesses, including in math. Encourage them to use mathematical representations to elaborate (for example, "Graph what you feel like over the course of the day" or "Fill this hundreds grid to show how strong you feel at this particular skill.").
	Routinely provide authentic feedback and also ask dialoguing questions that help students reflect on their own strengths and interests. e.g., "I can tell you're really enjoying this puzzle/problem. Can you tell me what about this puzzle/problem that makes you feel so excited/happy?," "I can tell you're really proud of how you did on this project. Can you tell me what about this you're most proud of?"

Teaching Practices	Routinely give students the opportunity to reflect on when they have had success in math or what kinds of problems/puzzles they prefer. Also ask students why they like the types of materials they identified, e.g., "Why do you think you liked this problem, especially?," "Why do you think you like solving those kinds of problems/puzzles?," "Will you share with me the strategy that helped you solve this problem?".
	Routinely tell students authentic reasons why you feel happy/optimistic for them and their future, including your optimism about their ability to succeed in a career in math, science, or technology. Encourage conversations about how they feel learning math will contribute to their success in the future.
	Create class roles and responsibilities that emphasize individual strengths, areas to improve, and personal goals. For example, students might be assigned the roles of organizing math manipulatives, arranging problem-solving stations, or displaying student work. Students might be asked to volunteer for specific roles and responsibilities, and the roles could be frequently rotated.
	Establish shared classroom rules, expectations, and consequences so that students can see the impact of their own actions and behaviors on outcomes.
	Create group projects—such as "future problem-solvers" or "math circles"—and help students develop appropriate strategies for providing feedback to each other if someone is not pulling his/her weight on the team.

Self-Management	
Lessons/Activities	Teach self-management techniques such as belly breathing, yoga positions, counting to ten, self-talk, relaxation exercises, or mental rehearsal to help students develop concrete techniques for managing their own stress or anxiety.
	Have students brainstorm ways to motivate themselves. Use fraction bars and other linear diagrams to represent their targets (e.g., mood thermometers or progress lines). During a lesson, talk about how you motivate yourself—to keep yourself-going—when you might want to give up. Students can also be taught to self-assess progress toward their learning goals, a powerful strategy that promotes academic growth and should be an instructional routine in classrooms from grade 3-12 (teachers are clear about the learning target at earlier grades).
	Lead discussions about positive ways we can express our feelings (e.g., talk to an adult or friend, put our feelings into words, draw a picture about how we feel), especially in response to classmates/situations. Examples: I like the way Chris helped me," "I was glad to help Juan with the presentation."

	Teach students a lesson on procedures for class transitions. Create classroom goals and monitor progress over the course of several weeks. For example, have students create a graph that shows progress at keeping the room neater.
	Lead a discussion that encourages students to reflect on barriers they may encounter when completing an assignment (e.g., finding a computer) and that also help them think about ways they can overcome them, including how to approach others for help (e.g., how to politely ask the teacher for help).
	Students can also be taught to self-assess progress toward their learning goals, a powerful strategy that promotes academic growth and should be an instructional routine in classrooms from grade 4-12.
	Teach students a lesson on how to use certain equipment (such as computers or iPads) and other resources appropriately. Use a lesson to establish rules for how equipment (e.g., printers or iPads) should be put away.
Teaching Practices	As a teacher, consistently model effective self-management in an age-appropriate way for students ("I'm feeling a little frustrated, so I'm going to stop and take a breath, before I decide what to do next.").
	Routinely practice self-management techniques as regular part of the school day (e.g., start class with a deep breathing exercise). Asking students to focus for a few moments or minutes on their breathing helps them learn to focus their attention.
	Routinely use simple challenges to help students focus their attention (e.g., ring a chime to bring students back to order after individual or group work, but ask them to quietly listen to the chime until they can no longer hear it and then raise their hand, holding it up until all hands in the class are raised).
	Give students authentic feedback for self-management (e.g., regulating their emotions by taking a breath, or taking a break to think about a decision). For example, "I saw the way you used those math tools appropriately, just now," "I saw you cross your arms so you would keep your hands to yourself—you should be proud of yourself.").
	Give students support and/or authentic feedback for expressing emotions appropriately (e.g., "I know you're angry at her right now for bumping into you. What are some calm ways you could tell her what you're upset about?").
	Teachers can model expressing emotions by saying, "I feel… sad, disappointed or worried… when I see you get so angry or...."
	Establish a separate space in the classroom for individual self-management (e.g., a peace corner).
	Routinely teach students how to use resources appropriately (e.g., how to use calculators, rulers, and

	other manipulatives).
	Routinely ask students who they think might be able to help them in various situations, including if they need help with a math problem or using equipment.
	Routinely notice and discuss with students when they persevere. Give authentic feedback when students persevere (e.g., "I noticed that you rearranged the math manipulatives, bars, until you found the solution," "I noticed you respectfully asked a peer for help and tried that suggestion," "I noticed that you looked at the chart to decide which strategy you could try next.").
	Routinely encourage students to save a desired activity or experience (e.g., playing with a friend) until they have completed tasks or duties (e.g., until they have finished their homework).

Social Awareness	
Lessons/Activities	Together with the class create shared classroom rules and expectations and consequences so students can see the impact of their own actions and behaviors on outcomes.
	Lead a discussion about taking different approaches to problem solutions, identifying feelings and thoughts of others who adopt these strategies.
	Tell stories about famous mathematicians who showed respect for each other within the discipline (e.g., Blaise Pascal and Pierre de Fermat). Use examples of communication between thinkers to show how to have disagreements without insult.
	Ask students to draw a picture (or ask them to respond with short answers on a worksheet) to show how they try to be helpful in their families or with their peers, especially in learning or math contexts (e.g., teaching a younger sibling how to count, teaching a friend how to solve a math problem).
	Organize a class service project to examine and address a community issue. Use math to examine the issue and develop a budget and timeline for a service project.
	Morning meetings can be used to involve students in sharing and recognizing that others have different experiences, which develops empathy and appreciation for differences and similarities. Encourage the use of quantities and numerical relationships within these reflections. Routinely ask questions in different situations that make the point that we all are similar and we all are different
	Use cooperative learning and project-based learning strategically during math (reflecting thoughtfully and intentionally on the composition of groups) to build diverse working groups. Be careful not to put overly dominant/aggressive children in small groups with overly shy/timid children. Be sure that students have the SEL skills to work productively in a group.
	Routinely reflect with students on shared classroom rules, expectations, and consequences so

Teaching Practices	students can see the impact of their own actions and behaviors on outcomes. A class meeting can be an effective way to facilitate this reflection activity.
	Routinely ask students to talk about the kinds of problems and puzzles they like to solve and why, so that students can begin to see the ways in which other students have similar or different preferences and learn from each other about why other concepts and problem-solving approaches are interesting. Utilize games that require math skills and promote working together to solve them.
	Routinely provide students with opportunities to reflect (in journals or in small groups) how they feel in different situations, especially after solving challenging or multistep problems.
	Model and routinely promote a rule or norm of treating others the way you would want to be treated.
	When there is a difference of opinion among students (perhaps over solution strategies), allow them to reflect on how they are feeling and then share with a partner or in a small group—to be heard but also to listen to how others feel differently, and why, in the same situation.
	Build respect for diversity in the classroom by having students share their different perspectives on situations or solution strategies.
	Consistently model respect and enthusiasm for learning about diversity. Seek out and show enthusiasm for stories about mathematicians and other professionals who use math from many different cultures. Show enthusiasm for learning about different cultures.
	Routinely Identify and celebrate characters in books and stories who contributed to their communities using math and math-based skills. List their contributions and ways they contributed to the common good.
	Give feedback to students in authentic ways when they are respectful toward others. Encourage students to identify how they feel when they were respectful or supportive of another person, or when others are respectful or supportive of them.
	Ask routine questions throughout the day to draw attention to how students' behavior is affecting those around them. Model concern for the well-being of others.

Relationship Skills	
	Teach lessons to develop communication skills (e.g., how to speak loudly and clearly so that others can hear) as they present solutions.
	Teach lessons on effective listening (e.g., how can we show that we are listening?) and give students a chance to practice listening, taking turns in pair shares. Have students follow each other with

Lessons/Activities	responses to what the last student said, e.g. "I heard you say, 'The next number in the sequence is….'"
	Teach lessons on nonverbal classroom signals to encourage listening. For example, the class might use common hand signals to show agreement, to request clarification, or to recognize a different strategy.
	Teach lessons on how to ask a peer or teacher for help. Brainstorm with students the most effective ways to request help. Brainstorm and practice ways to say "thank you." Also teach students how to apologize sincerely when frustrated, especially when students express frustration inappropriately.
	Use stories about mathematicians and mathematics-based situations as an opportunity to talk about problems characters face and how to resolve intellectual disagreements peacefully
Teaching Practices	Use team-based, collaborative teaching practices such as cooperative learning and project-based learning to provide students with frequent opportunities to develop and routinely practice communication, social, and assertiveness skills. Be very intentional when creating groups to balance students so there are natural leaders who can inspire the others they are working with. Be careful not to put overly intimidating/aggressive children on the same teams with overly shy/timid children, and continually monitor to ensure that teams are working together in positive ways.
	Give students opportunities to practice social skills in small groups and project-based learning activities.
	Give students authentic feedback anytime they work well with others. Thank students whenever they listen well and tell them specifically what they did well. Give students authentic feedback for resolving conflicts peacefully.
	Establish morning meetings to give students the opportunity to take turns interacting with each other and practicing speaking and listening skills
	Model and reinforce effective communication, relationship skills, and conflict-resolution skills.
	Establish a conflict-resolution process to be used any time there is a conflict within the class.
	Give students support and guidance as needed when they are working through a conflict. Ask nonjudgmental questions about what happened and what the students might do differently to avoid the conflict.
	Use collaborative work groups (e.g., cooperative learning projects or project-based learning) to reinforce the importance of working together to solve problems and achieve goals

Responsible Decision-Making	
Lessons/Activities	Use a lesson to teach students a simple formula for making good decisions (e.g., stop, calm down, identify the choice to be made, consider the options, make a choice and do it, how did it go?). Post the decision-making formula in the classroom.
	Routinely encourage students to use the decision-making formula anytime they face a choice (e.g., whether to finish homework or go out with a friend). Support students through the steps of making a decision anytime they face a choice or decision. Simple choices like "Which tool should I use to measure this angle?" or "Do I need a calculator for this problem?" are good places to start.
	Routinely walk students through the decision-making formula anytime there is a discipline issue—to think about the decision they faced, how their choice resulted in a problem, and how they might choose differently if they had it to do over again.
	Use graphic representations to illustrate decisions (flow chart, relationship of decisions over time) or translate decision chains into symbolic expressions (goals + patience = success…□ + ▷ =◯; older students may use variables, e.g., X + Y = Z).
	Use context-based problems to practice decision-making. Lessons that include budgets, scaling recipes for uncertain numbers of guests, and other such open-ended problems are useful.
	Use simple data analysis (in graphs and tables) to examine larger-scale and ethical situations such as the amount of paper waste in the neighborhood or how much money is spent on electronics every year.
	Use rich math problems that demand group effort. Before proceeding, have students discuss norms for mathematical collaboration. Have them answer questions about what they like to do and say while working in groups or how they think others can act to make the group work well.
Teaching Practices	Routinely model good decision-making.
	Support students through the steps of making a decision anytime they face a choice or decision. Simple choices like "Which tool should I use to measure this angle?" or "Do I need a calculator for this problem?" are good places to start. Have students make a list of possible tools to reach the learning target before they start working on a specific math problem.
	Give students authentic, specific, and timely feedback for making good decisions so they can reproduce the action in another context.
	Examine problem or moral situations in stories and consider other alternatives and impacts. Lead students through the exercise of quantifying the situations, e.g., "How many people helped during the problem?" or "How long/how many days did the situation last?"

	Develop and enforce class rules and shared norms, discussing them routinely.
	Help students understand logical consequences, discussing them frequently and whenever appropriate.
	Encourage students to reflect on how they approached mathematics "today," including in journals or pair shares. Ask them to include how their choices could be repeated if successful or improved in order to be more successful.

Activity and Task Sources[2]

Understanding Common Core	**Think Math — CCSS Mathematical Practices** This site is set up much like Wikipedia. This page briefly describes the Standards for Mathematical Practice that are part of the Common Core State Standards for Mathematics. At the bottom of the page are links to pages that describe each of the Standards for Mathematical Practice in greater detail and provide an example of what each might look like at the elementary level.
	Differences between, and connections between Content and Practice Standards This page explains ways in which the Mathematical Practices and the Content Standards are intended to work collaboratively in the Common Core State Standards for Mathematics.
	Hunt Institute Common Core State Standards Videos These videos were developed to help teachers, policymakers, and parents understand the Common Core State Standards and the ways in which they will impact teaching and learning. There is a group of general videos introducing the Common Core State Standards and a more detailed group of videos focused specifically on the Mathematics Standards. The video *The Importance of Mathematical Practices* introduces the Standards for Mathematical Practice and their importance in the Common Core State Standards for Mathematics.
Tasks and Teacher Practices	**YouCubed (at Stanford University)** "Our main goal is to inspire, educate and empower teachers of mathematics, transforming the latest research on math learning into accessible and practical forms." This site is a source for brain science, tools for developing math-minded culture in the classroom, including abundant ideas and resources for connecting mathematics and growth mindsets.
	Dan Meyer: Math Class Needs a Makeover In this TEDx talk, Dan Meyer says, "I teach high school math. I sell a product to a market that doesn't want it but is forced by law to buy it." He demonstrates his adaptations of curriculum materials to create learning opportunities and immerse students in becoming "patient problem solvers." He ends the talk with five ways teachers can assist in this process, including, "Be less helpful."
	Illustrative Mathematics This site contains sample tasks and problems, referred to as "illustrations," for the Common Core State Standards in Mathematics. It also includes a section on the Standards for Mathematical Practice.
	Inside Mathematics This site includes resources and videos illustrating the Standards of Mathematical Practice, including descriptions of what each practice might look like in the classroom and videos illustrating that practice at different grade levels.

Implementing Mathematical Practice Standards (EDC)

Explore this site to learn more about the Common Core Standards for Mathematical Practice (SMP) and how they can be connected to the content standards. Use the Illustrations, centered on student dialogues, to see the Standards for Mathematical Practice in action.

[1] Durlak, J. A., Weissberg, R. P., Dymnicki, A. B., Taylor, R. D. & Schellinger, K. B. (2011). The impact of enhancing students' social and emotional learning: A meta-analysis of school-based universal interventions. *Child Development*, 82(1): 405–432.

[2] Many of these resources are listed on Learn NC - a program of the University of North Carolina at Chapel Hill School of Education from 1997 – 2013. It provided lesson plans, professional development, and innovative web resources to support teachers, build community, and improve K-12 education in North Carolina.