The University of Texas at Austin
Charles A. Dana Center & CASEL

Integrating Social and Emotional Learning and the Common Core State Standards for Mathematics

Describing an ideal classroom

"Imagine a classroom, a school, or a school district where all students have access to high-quality, engaging mathematics instruction. There are ambitious expectations for all, with accommodation for those who need it. Knowledgeable teachers have adequate resources to support their work and are continually growing as professionals.

The curriculum is mathematically rich, offering students opportunities to learn important mathematical concepts and procedures with understanding. Technology is an essential component of the environment. Students confidently engage in complex mathematical tasks chosen carefully by teachers. They draw on knowledge from a wide variety of mathematical topics, sometimes approaching the same problem from different mathematical perspectives or representing the mathematics in different ways until they find methods that enable them to make progress.

Teachers help students make, refine, and explore conjectures on the basis of evidence and use a variety of reasoning and proof techniques to confirm or disprove those conjectures.

Students are flexible and resourceful problem solvers. Alone or in groups and with access to technology, they work productively and reflectively, with the skilled guidance of their teachers.

Orally and in writing, students communicate their ideas and results effectively. They value mathematics and engage actively in learning it."

— Epigraph to Chapter 1, "A Vision for School Mathematics," in National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*.[1]

. . . Where we're coming from

Standards-driven education

In 2000, the members of the National Council of Teachers of Mathematics shared this vision for school mathematics—what it means to teach, and what it means to learn, mathematics. This vision served as a call to action for educators to implement the guiding principles and standards for mathematics education as a strategy for increasing student achievement and narrowing achievement gaps among groups of students. Since 2000, the NCTM *Principles and Standards* document has been a touchstone for nearly two million mathematics teachers and leaders, and student achievement is at historic highs, with record high National Assessment of Educational Progress (NAEP) scores and increases in SAT and ACT achievement.

[1] National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author, page 3 (paragraph breaks added).

Other data, however, point to areas of continuing challenge, with consistent gaps among student groups, significant percentages of students not ready for college, and fewer students interested in or able to engage in STEM careers. (For more discussion of student achievement gains and challenges, see National Council of Teachers of Mathematics, 2014, pages 1–2).

After more than three decades of curriculum standards implementation on a state-by-state basis, the *Common Core State Standards for Mathematics* (National Governors Association Center for Best Practices and the Council of Chief State School Officers 2010), adopted by 46 states, brought the conversation about mathematics education to the national scene. From the work of the Common Core State Standards initiative to the National Council of Teachers of Mathematics and their 2014 publication, *Principles to Action*, mathematics leaders and teachers can now work from a set of expectations outlining the sorts of learning opportunities our students deserve and that 21st-century careers demand (National Research Council, 2012).

High-stakes assessment systems

We know that for decades in most states, standards-based education—with student performance measured by large-scale assessment (what many call *high-stakes assessments* because of these assessments' effect on children and education professionals)—has informed instructional choices, content decisions, and resource choices. Standards-driven policies and systemic responses have resulted in improved student achievement and, in many instances, a reduction in the achievement gaps among various student subpopulations.

Now, that influence continues through implementation of the Common Core State Standards and their accompanying assessments, and educators—teachers and leaders alike—see that implementation of the CCSS will improve teaching practice and student outcomes (Education Week Research Center, 2014).

Popular conceptions of mathematics education

Many people still groan when asked about their experiences as mathematics students, and many more recall an uncomfortable image of the typical mathematics classroom. Watch any evening of primetime television, and if you catch a glimpse into classrooms, a caricature of school emerges: teacher-centered classrooms and teacher-centered lessons—classrooms and lessons alike designed so students can watch and listen and replicate.

Across the country, current popular metaphors about schooling—that assortment of commonly held understandings of, beliefs about, and expectations for public education—closely resemble the notions about education embraced by our parents, grandparents, and great-grandparents. In this conceptualization of schooling, students learn through listening to the teacher explain concepts, watching the teacher demonstrate standardized steps for getting things done, and then replicating those steps.

In this conceptualization, student-to-student conversation is typically seen as unruly or dishonest, while student mistakes—spoken, written, or enacted—are immediately "corrected" by the teacher. In this image of school, effective teachers are "born that way" (Scott & Dinham, 2008), each student is intrinsically apt to learn (or not) (Schunk & Richardson, 2011), and principals who strive to raise student achievement are aided or impeded by the random chance of which students enroll in their school.

Where we're headed . . .

To change this approach to school, and particularly to mathematics teaching and learning, we must consider not only the expectations of a given locality's *content* standards (*what* content students must learn) but of its *practice* standards (*how* students engage with the content). Educators implementing the *Common Core State Standards for Mathematics* find that it's *how* students engage in mathematics content that must change most significantly so that students can learn the content more deeply and in ways that transfer into other content areas—and into other aspects of their lives.

To ensure that all our students have a full slate of promising options when they graduate from high school, we must reinvigorate the humanizing social element in teaching and learning. The CCSS for Mathematics demand that we provide learning environments in which students feel safe to take risks and work collaboratively as mathematical problem solvers—and to engage in the hard work of learning both academic content and the social worlds in which the learning takes place (Schaps, 2005).

The Collaborative for Academic, Social, and Emotional Learning (CASEL) describes **social and emotional learning** in terms of five domains of competence:

- self-awareness,
- self-management,
- social awareness,
- relationship skills, and
- responsible decision-making.

Voices in the field are calling for school leaders and educators to provide supportive and collaborative learning environments that promote the interpersonal and intrapersonal skills that students need for success in school, work, and life. The phrase *social and emotional learning* (or "SEL") is now widely used to refer to the competencies needed to develop these skills.

An ideal classroom

What could it look like when teachers build a classroom environment that promotes and supports engaged, collaborative mathematical teaching and learning?

One vision for an ideal classroom blends the practices described in the Common Core State Standards for Mathematical Practice with the social and emotional learning competencies as articulated by CASEL, so that each set of skills reinforces and supports the other. Following this narrative is a table that maps the Standards for Mathematical Practice to the SEL competencies as laid out by CASEL.

Teachers can leverage the connections between the mathematical practices and the SEL competencies to inform their instruction and to build a collaborative problem-solving culture in their classrooms.

In an ideal classroom…

… The teacher has the content and instructional expertise to create a context for robust student learning.

… The teacher regularly studies the Common Core State Standards (Ball & Forzani, 2011; David & Talbert, 2013) through individual study and through collaborative engagement with other teachers (professional learning communities; common planning time).

… The teacher collaborates with colleagues—within the context of their ongoing study of the standards—to prepare and plan for instruction, to choose instructional materials, to determine criteria for assessing student work products and learning, to identify possible challenges in the content, and to devise targeted support for students facing those challenges.

> … The teacher pursues this study of the standards in an ongoing cycle in which teachers collaboratively plan, teach, gather data, and refine their practice.

(See the sidebar for a quick glance at teacher perceptions of organizational structures that support their professional learning.)

In addition to content knowledge and instructional expertise, in an ideal classroom, the teacher provides students with robust mathematical tasks, thinks strategically about instructional moves, and assesses students' mathematical learning along with their social and emotional learning.

The teacher works to build an environment of trust and belonging (Good, Rattan, & Dweck, 2012; Tschannen-Moran & Hoy, 2000) and a community of "democratic learning among diverse people" (Sengupta-Irving, 2014, p. 50) so that students feel supported as they engage in the challenging work of learning rigorous mathematics.

In a classroom like this, the teacher is ready with questions to prompt student consideration of both the mathematics and the social and emotional aspects of learning.

In an ideal classroom like this, things get noisy—and in the noise you can hear students wrangling with mathematical concepts, acknowledging the different perspectives in groups, and pausing to reflect before speaking or acting. This "noise" is the sound of students learning math and learning how mathematics helps people solve problems in our increasingly complex world.

Perceptions of helpful supports for implementation of the CCSS

Collaborative planning time
89% agreed/strongly agreed

Professional learning community
73% agreed/strongly agreed

Instructional coaching
70% agreed/strongly agreed

Professional development is most helpful when it . . .

- Presents best classroom practices/strategies
- Provides information/research on CCSS instructional shifts

CCSSM implementation will . . .

Improve my instructional practice
69% agreed/strongly agreed

Improve student learning
65% agreed/strongly agreed

—Education Week Research Center, 2014

Connecting the Common Core State Standards for Mathematical Practice and social and emotional learning

The following two tables illustrate the connections between the Common Core State Standards for Mathematical Practice (CCSS-SMP) and social and emotional learning (SEL) competencies. Each table provides examples of these connections in a different way.

The first table maps four social and emotional learning competencies (*self-awareness*, *self-management*, *social awareness*, and *relationship skills*) with the eight Common Core State Standards for Mathematical Practice.

The second table provides a few examples of these connections in action by linking to video clips of students in a high school math class.

Table 1. Connections between the CCSS-SMP and SEL competencies

	Common Core State Standards for Mathematical Practice	Social and Emotional Learning Competencies
SMP 1 — Make sense of problems and persevere in solving them.	Mathematically proficient students ***start by explaining to themselves the meaning of a problem and looking for entry points to its solution***. They analyze givens, constraints, relationships, and goals. They make conjectures about the form and meaning of the solution and plan a solution pathway rather than ***simply jumping into a solution attempt***. They consider analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. They ***monitor and evaluate their progress and change course if necessary***. Older students might, depending on the context of the problem, transform algebraic expressions or change the viewing window on their graphing calculator to get the information they need. Mathematically proficient students can explain correspondences between equations, verbal descriptions, tables, and graphs or draw diagrams of important features and relationships, graph data, and search for regularity or trends. Younger students might rely on using concrete objects or pictures to help conceptualize and solve a problem. Mathematically proficient students check their answers to problems using a different method, and they continually ask themselves, "Does this make sense?" They can ***understand the approaches of others*** to solving complex problems and identify correspondences between different approaches.	***Be aware of their strengths and what they know*** **Self-awareness** ***Resist impulses and regulate their thoughts and behaviors*** **Self-management** ***Manage their time and energy toward a goal while appraising their work*** **Self-management** ***Take on others' perspectives*** **Social awareness**
SMP 2 — Reason abstractly and quantitatively.	Mathematically proficient students make sense of quantities and their relationships in problem situations. They bring two complementary abilities to bear on problems involving quantitative relationships: the ability to decontextualize—to abstract a given situation and represent it symbolically and manipulate the representing symbols as if they have a life of their own, without necessarily attending to their referents—and the ability to contextualize, to ***pause as needed during the manipulation process in order to probe into the referents for the symbols involved***. Quantitative reasoning entails habits of creating a coherent representation of the problem at hand; considering the units involved; attending to the meaning of quantities, not just how to compute them; and knowing and flexibly using different properties of operations and objects.	***Self-regulate and think metacognitively*** **Self-management**

	Common Core State Standards for Mathematical Practice	Social and Emotional Learning Competencies
SMP 3 — Construct viable arguments and critique the reasoning of others.	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They ***justify their conclusions, communicate them to others, and respond to the arguments of others*. They *reason inductively about data, making plausible arguments that take into account the context from which the data arose***. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can ***listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments***.	***To anticipate how students' own arguments may be interpreted and received, take on the perspectives of others*** **Social awareness** ***Think metacognitively and organize their own thoughts with given information*** **Self-management** ***Understand others' perspectives to effectively interpret their arguments*** **Social awareness** ***Listen actively to further explore the arguments of others*** **Relationship skills**

	Common Core State Standards for Mathematical Practice	Social and Emotional Learning Competencies
SMP 4 — Model with mathematics.	Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are ***comfortable making assumptions and approximations*** to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They ***routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose***.	***Be aware of their own strengths and limitations*** **Self-awareness** ***Self-reflect and self-motivate by recognizing the need to improve and work toward goals*** **Self-management**
SMP 5 — Use appropriate tools strategically.	Mathematically proficient students ***consider the available tools*** when solving a mathematical problem. These tools might include pencil and paper, concrete models, a ruler, a protractor, a calculator, a spreadsheet, a computer algebra system, a statistical package, or dynamic geometry software. Proficient students are sufficiently familiar with tools appropriate for their grade or course to make sound decisions about when each of these tools might be helpful, recognizing both the insight to be gained and their limitations. For example, mathematically proficient high school students analyze graphs of functions and solutions generated using a graphing calculator. They detect possible errors by strategically using estimation and other mathematical knowledge. When making mathematical models, they know that technology can enable them to visualize the results of varying assumptions, explore consequences, and compare predictions with data. Mathematically proficient students at various grade levels are able to identify relevant external mathematical resources, such as digital content located on a website, and use them to pose or solve problems. They are able to ***use technological tools to explore and deepen their understanding of concepts.***	***Think metacognitively to identify when to use what tool; motivate themselves to deepen their current understanding*** **Self-management** ***Motivate themselves to deepen their current understanding*** **Self-management**

	Common Core State Standards for Mathematical Practice	Social and Emotional Learning Competencies
SMP 6 — Attend to precision.	Mathematically proficient students try to ***communicate precisely to others***. They try to ***use clear definitions in discussion with others*** and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign ***consistently*** and ***appropriately***. They are ***careful*** about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students ***give carefully formulated explanations to each other***. By the time they reach high school they have learned to examine claims and make explicit use of definitions.	***Take on the perspective of others and be aware of others' thoughts and feelings in order to strengthen the effectiveness of communication*** **Social awareness** **Relationship skills** ***Self-regulate thoughts and behaviors*** **Self-management**
SMP 7 — Look for and make use of structure.	Mathematically proficient students ***look closely to discern a pattern or structure***. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can ***step back for an overview and shift perspective***. They can ***see complicated things***, such as some algebraic expressions, ***as single objects or as being composed of several objects***. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.	***Understand their strengths and possess confidence or optimism about their ability to look for and make use of structure*** **Self-awareness** ***Motivate themselves, persist, and regulate against impulses to give up when a pattern or structure is not immediately apparent*** **Self-management** ***Manage their own progress*** **Self-management**

	Common Core State Standards for Mathematical Practice	Social and Emotional Learning Competencies
SMP 8 — Look for and express regularity in repeated reasoning.	Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y - 2)/(x - 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x - 1)(x + 1)$, $(x - 1)(x^2 + x + 1)$, and $(x - 1)(x^3 + x2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students ***maintain oversight of the process, while attending to the details***. They ***continually evaluate the reasonableness of their intermediate results***.	***Regulate their thoughts to know when organizational strategies are needed (e.g., writing key facts or organizing information on paper)*** **Self-management** **Have a well-grounded and accurate appraisal of their own abilities and work** **Self-awareness**

Table 2. Examples–with video clips–of the connections between the CCSS-SMP and SEL

SEL/CCSS-SMP connection	Video link & time stamp	Description
Relationship skills help students make sense of problems (**SMP 1**).	Group Work Part A 0:59–2:18	Instead of simply jumping into their own solution attempts, students in this group discuss the problem together before deciding how to approach it. In doing so, they demonstrate good relationship skills by listening and responding well to one another. They expound upon and clarify each other's questions and comments, ask follow-up questions of one another, and clarify their own questions when they recognize that their question has not been fully addressed.
Self-management provides opportunities for students to look for and make use of structure (**SMP 7**).	Group Work Part A 2:19–3:01	The boy in this clip has a misunderstanding that is called out by the other members of his group. However, instead of becoming defensive or angry, the student acknowledges his error, readily accepts his peers' correction, and continues to contribute to the group discussion. Because of these self-management efforts, the group is able to continue the discussion in a constructive way that leads them to discern a subtle structural aspect in the manipulatives they are using to create quadrilaterals.
Self-awareness provides opportunities for students to construct viable arguments (**SMP 3**).	Group Work Part A 2:55–3:45	The girl shown in this clip is unsure of the shape of one of her sketches. She recognizes and expresses her uncertainty to her fellow group members ("*I'm not sure if this is a kite*"), which provides the group with the opportunity to construct arguments and critique one another's reasoning.
Social awareness helps students attend to precision (**SMP 6**).	Group Work Part B 0:00–5:38	The students in this group are working to define rules for creating various quadrilaterals. They consistently take one another's perspective, which helps them attend to precision while constructing definitions. They demonstrate this perspective-taking by responding to, clarifying, and enhancing each other's explanations. As they do so, the students try to communicate precisely and use clear definitions. The students are even explicit in their attempt to be precise. For example, at 4:40, one student says, "*Oh, I need to make this more clear because it doesn't make sense*."

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About these resources

This document is one of five interrelated resources that articulate correlations and mutually reinforcing commonalities between the social and emotional learning competencies (as described by CASEL) and the Standards for Mathematical Practice (as described in the *Common Core State Standards for Mathematics*).

These resources consist of a whitepaper focused on **making the case** for integrating social and emotional learning with the Standards for Mathematical Practice; a vision **describing an ideal classroom** exemplifying such an integration; and three **instructional guides** for using selected MARS tasks, with special attention to the CCSS Standards for Mathematical Practice and the social and emotional learning competencies. (These MARS tasks can be found on the Inside Mathematics website at http://www.insidemathematics.org/performance-assessment-tasks.)

This work was funded by a grant from the Noyce Foundation, founded in 1990 to honor the memory and legacy of Dr. Robert N. Noyce, cofounder of Intel and inventor of the integrated circuit—which fueled the personal computer revolution and gave Silicon Valley its name.

While the Noyce Foundation concluded its operations in 2015, its mission—to help young people become curious, thoughtful, and engaged learners—continues through the work of this project and others like it, including the Inside Mathematics website (http://www.insidemathematics.org), which has joined the Dana Center's portfolio of services.

The resources are:

- Integrating Social and Emotional Learning and the Common Core State Standards for Mathematics: **Making the case**
- Integrating Social and Emotional Learning and the Common Core State Standards for Mathematics: **Describing an ideal classroom**
- Using Social and Emotional Learning to Develop Mathematically Proficient Students: An **instructional guide** for use with **MARS Task: "Conference Tables"**
- Using Social and Emotional Learning to Develop Mathematically Proficient Students: An **instructional guide** for use with **MARS Task: "Printing Tickets"**
- Using Social and Emotional Learning to Develop Mathematically Proficient Students: An **instructional guide** for use with **MARS Task: "Swimming Pool"**

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About the Dana Center

The Dana Center develops and scales math and science education innovations to support educators, administrators, and policy makers in creating seamless transitions throughout the K–14 system for all students, especially those who have historically been underserved.

We focus in particular on strategies for improving student engagement, motivation, persistence, and achievement.

The Center was founded in 1991 at The University of Texas at Austin. Our staff members have expertise in leadership, literacy, research, program evaluation, mathematics and science education, policy and systemic reform, and services to high-need populations.

For more information, see our website at **www.utdanacenter.org**.

About CASEL

Collaborative for Academic, Social, and Emotional Learning (CASEL) is the nation's leading organization advancing social and emotional learning (SEL). Our mission is to make social and emotional learning an integral part of education from preschool through high school. Through research, practice, and policy, CASEL collaborates to ensure all students become knowledgeable, responsible, caring, and contributing members of society. Learn more about our work at **www.casel.org**.