Subject-Area Lesson Planning Tool: Mathematics

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INTRODUCTION

The Washington Mathematics Learning Standards ask students to advance their 21st century mathematical skills, including being able to collaborate with others to solve complex mathematical problems, communicate and justify one's thinking, make connections among math concepts, and think about and be able to solve problems in which there may be more than one correct answer. To do this, students need to use a variety of social emotional competencies, including, for example, developing a growth mindset, perseverance, risk taking, collaborative skills, and flexibility.

"Social emotional learning (SEL) is a process through which individuals build awareness and skills in managing emotions, setting goals, establishing relationships, and making responsible decisions that support success in schools and in life." -- OSPI

Washington Office of Superintendent of
PUBLIC INSTRUCTION

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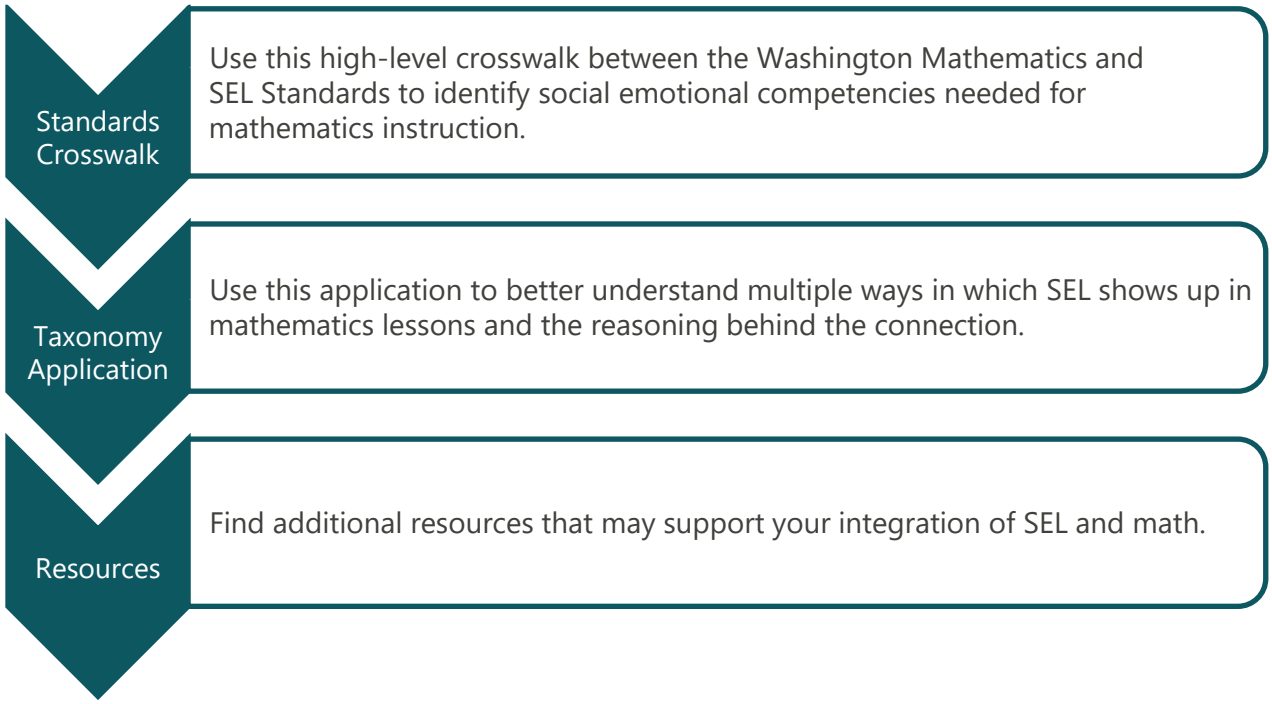
How to Use This Tool

The TPEP Student Growth Goal Rubrics tell us that effective mathematics instruction "relies heavily on the teacher's knowledge of students' cultural, academic, and social/emotional assets." This lesson planning tool supports mathematics educators in Washington as they intentionally plan ways to nurture social emotional competencies within their academic lessons. The tool is scaffolded for your use and includes a standards crosswalk, application of how the standards align, and additional resources (see Figure 1 for a road map of how to use this tool). You can use the questions for reflection in each section to customize these strategies for your classroom.

Figure 1. Road Map for Using the Lesson Planning Tool



Questions for Reflection

Before advancing to the next section, reflect on some of your own assumptions and beliefs:

- How do you see social emotional competencies align with specific mathematics standards? Which social emotional competencies do mathematics scholars (e.g., statisticians, economists) tend to use? How do you encourage students' development of those competencies?
- How do teachers explicitly connect social emotional competencies to effective teaching practices (the four Affirming Learning Environment practices in Module 2 and the Lesson Design Practices in Module 3) to promote students' mastery of mathematics content and practice standards? How do you reinforce students' use of those competencies?
- What social emotional competencies do you use to create the conditions for the kind of learning necessary for all students to develop mathematics skills and engage with mathematics content?

CROSSWALK OF THE WASHINGTON MATHEMATICS STANDARDS AND THE SEL STANDARDS

Washington's Mathematics Learning Standards (the Common Core standards) are divided into two sections: (1) eight practices that cut across mathematics at all levels and (2) mathematics content proficiencies per grade level. The eight practice standards specify the mathematical processes (e.g., problem solving, communication) that students should be able to engage in over time. In this section, we provide a crosswalk between the eight mathematical practices and examples of aligned Washington SEL Standards. Many of the example social emotional competencies can be used across multiple practices as they are meant to be illustrative of both the learning process and ways students can apply the mathematical content.

Standards for Mathematical Practice[1]	Example Alignment With Washington SEL Standards
Make sense of problems and persevere in solving them Students explain to themselves the problem, determine entry points towards a solution, and plan a solution pathway. As they work to solve problems, students monitor and gauge their progress, changing course if necessary. They further attempt to understand the approaches of others to solve complex tasks, while continuously asking themselves if what they or others do make sense.	To support their ability to make sense of problems and persevere in solving them, students may draw upon the following social emotional competencies: • Set, monitor, persevere, and evaluate progress (Self-Efficacy 3A) towards mathematical problem-solving goals. • Manage their emotions, thoughts, impulses, and stress in constructive ways while considering problems and potential solutions (Self-Management 2A). • Communicate effectively with others about potential solutions and resolve interpersonal conflicts constructively (Social Management 5A and 5B) in pursuit of mathematical understandings.
Reason abstractly and quantitatively Students make sense of quantities and their relationships in problem situations. When students engage in this practice, they bring together both an ability to decontextualize and contextualize when engaging in problem solving, while also using flexible thinking and developing a coherent representation of the problem and the solution.	To support their ability to reason abstractly and quantitatively, students may draw upon the following social emotional competencies: • Demonstrate responsible decision-making and problem-solving skills (Self-Management 2B and Self-Efficacy 3B) using mathematical reasoning in a variety of situations. • Awareness of their own identities, strengths, and areas of growth in mathematical content (Self-Awareness 1B). • Use reflection to take on a growth mindset (Self-Awareness 1A) and continue to learn in the midst of challenges (Self-Efficacy 3A) when practicing abstract reasoning.

[1] Abridged definitions come from the Common Core State Standards for Mathematics.

Standards for Mathematical Practice[1]	Example Alignment With Washington SEL Standards
Construct viable arguments and critique the reasoning of others Students use stated assumptions, definitions, and previously established results to explore their conjectures. They can justify their conclusion, communicate them to others, and respond to arguments of others. They are also able to evaluate plausibility of two arguments. Students further ask useful questions to clarify or improve their own or others' arguments.	To support their ability to construct viable arguments and critique the reasoning of others, students may draw upon the following social emotional competencies: • Awareness of their own emotions and emotions' influence on their behavior and reasoning (Self-Awareness 1A). • Awareness of others' perspectives, identities, and abilities, and their impact on potential understandings (Social Awareness 4A) of mathematical problems and potential solutions. • Communicate effectively with others about problems and potential solutions (Social Management 5A). • Engage respectfully with others who have differing perspectives (Social Management 5C).
Model with mathematics Students use mathematics to solve problems arising in everyday life, society, and the workplace. To do this, students make approximations and assumptions to solve problems, recognizing they may need to make corrections. They further use mathematical models to solve the problems, and reflecting on whether the results make sense given the context.	To support their ability to model with mathematics, students may draw upon the following social emotional competencies: • Demonstrate [mathematical] problem-solving skills to engage responsibly in a variety of situations (Self-Efficacy 3B). • Understand internal and external influences when making decisions (Self-Awareness 1C), approximations, and assumptions. • Contributes productively to their school, workplace, and community (Social Engagement 6C) using mathematical models and mathematical thinking. • Work independently or with a group to achieve and evaluate [mathematical] goals and problem-solving efforts (Self-Efficacy 3A and Social Engagement 6B).
Use appropriate tools strategically Students recognize and use tools (e.g., pencil/paper, 3-D models, rules, protractors, or calculators, etc.) to solve specific mathematical problems. They use their knowledge of tools and the problem to make sound decisions about how the tools will be useful and their limitations. Students can also use technological and digital tools to help solve mathematical problems.	To support their ability to use appropriate tools strategically, students may draw upon the following social emotional competencies: • Make responsible decisions [about how to use mathematical tools and instruments] when solving problems (Self-Management 2B). • Manage their emotions, thoughts, and impulses (Self-Management 2A) and use responsibility (Self-Efficacy 3B) when using mathematical tools. • Understand availability of resources and determine when using additional resources is necessary (Self-Awareness 1C).

Standards for Mathematical Practice[1]	Example Alignment With Washington SEL Standards
Attending to precision Students attempt to communicate to others precisely, using clear definitions when explaining their rationale for solving specific mathematical problems. They are careful as they explain solutions to each other and are clear and accurate to specify mathematical concepts (e.g., units of measure and axes on graphs).	To support their ability to attend to precision, students may draw upon the following social emotional competencies: • Communicate effectively with others (Social Management 5A) about mathematical concepts. • Awareness of and respect for differences in others' perspectives, communication styles, histories, identities and abilities (Social Awareness 4A and 4B) and their impact on mathematical word choice and interpretation. • Awareness of their own personal and collective identity, including culture and linguistic assets and areas for growth (Self-Awareness 4B).
Look for and make use of structure Students examine patterns and structures in mathematical problems. For example, they may begin organizing shapes based on how many sides they have (for younger students) or how numbers and operations can function in different patterns (e.g., see as a single object or functions as a whole or composed of several objects).	To support their ability to look for and make use of structure, students may draw upon the following social emotional competencies: • Displays the ability to set, monitor, adapt, persevere, achieve, and evaluate goals (Self-Efficacy 3A) related to mathematical thinking and fluency.
Look for and express regularity in repeated reasoning Students learn to recognize how a problem and its solution (or calculation) is repeated, where students look for shortcuts or methods based on the pattern or repetition that they notice.	To support their ability to look for and express regularity in repeated reasoning, students may draw upon the following social emotional competencies: • Awareness of their own personal areas of strength and areas for growth when mastering mathematical concepts and reasoning (Self-Awareness 1B). • Ability to manage their emotions, thoughts, impulses, and stress when engaging in new, challenging tasks (Self-Management 2A).

Questions for Reflection

- How did the information in the crosswalk align with your existing knowledge of the relationships between mathematics and SEL? Were there new ideas that broadened your

thinking about the relationships between these areas? What questions emerged for you as you reviewed this crosswalk?[2]

- What Affirming Learning Environment practices (e.g., Warmth and Support, Responsibility and Choice, Student-Centered Problem Solving) and Learning Design practices (e.g., Balanced Instruction, Cooperative Learning, Self-Assessment and Self-Reflection) might facilitate students' development and application within these examples?
- How can you ensure that you incorporate students' personal and cultural strengths and assets as you continue to nurture social emotional competencies in instruction related to mathematics?

TAXONOMY APPLICATION

Now that you have had a chance to explore, at a high level, some alignment between the mathematics disciplines and the SEL standards, review some concrete ways to ensure that you are meeting your students' SEL needs within the mathematics curriculum. Specifically, you will review concrete examples of how various SEL Standards and Benchmarks connect to the mathematics practice and content standards. As you review these examples, consider the following questions as you begin to plan your own mathematics lessons that more intentionally integrate and nurture social emotional competencies. The following questions are based on the SEL–Academic Integration Taxonomy that you have been learning about in the module series Academic Learning Is Social and Emotional: Equity-Centered Social emotional Learning in Washington.

1. **Explicit skill alignment:** Which SEL standards include *the same* skills, knowledge, and mindsets as those within the mathematics standards?
2. **Explicit strategy alignment:** What social emotional competencies within the SEL standards do students use to accomplish specific mathematics tasks?
3. **Ways of interacting:** How do students use their social emotional competencies within the SEL standards to participate in activities that help them learn mathematics skills and content?
4. **Ways of being:** What social emotional mindsets and habits do mathematics scholars (e.g., statisticians, economists, and accountants) develop to be successful?

As you consider these examples, remember that the goal for you as an educator is to create the conditions that encourage students to develop, apply, and exhibit their social emotional competencies while mastering mathematics content. The questions and examples in the table that follows can help you begin to intentionally integrate these efforts.

[2] These three question prompts are adapted from the Project Zero Thinking Routine *Connect, Extend, Challenge,* https://pz.harvard.edu/resources/connect-extend-challenge.

Mathematics Skills: Examples[3]

Standard	Taxonomy Approach & SEL Standard and Benchmark	Reasoning
Practice: Make Sense of Problems and Persevere in Solving Them **Content:** Students solve multistep word problems and assess the reasonableness of answers using mental computation (CCSS-M.4.OA.A.3).	Ways of Interacting and Self-Management 2A (Demonstrates the skills to manage one's emotions, thoughts, impulses, and stress in constructive ways).	Students must work carefully to solve multistep problems and check their work, which can be a stressful process when they are learning and practicing new skills. Students can use helpful self-talk and affirmations to encourage themselves through the problem-solving process. It is important to practice potential affirmations and helpful self-talk prior to students engaging in independent problem solving.

Standard	Taxonomy Approach & SEL Standard and Benchmark	Reasoning
Practice: Construct Viable Arguments and Critique the Reasoning of Others **Content:** Students generate numerical patterns using two given rules and identify relationships between corresponding terms (CCSS-M.5.OA.B.3).	Explicit Skill Alignment and Social Management 5B (Demonstrates the ability to identify and take steps to resolve interpersonal conflicts in constructive ways.).	Patterns can be complicated, especially when there may be more than one way to describe a pattern or when more than one pattern emerges. When students are constructing, sharing, analyzing, and critiquing each other's conjectures on the patterns, students will need to ensure they do so in a way that is constructive and helpful. In other words, students will need to promote peaceful interactions with their peers, actively listen to one another, and practice conflict resolution. Thus, the skills to demonstrate the mathematics practice are the same social emotional skills.

[3] Abridged content standard examples come from the Common Core State Standards for Mathematics.

Standard	Taxonomy Approach & SEL Standard and Benchmark	Reasoning
Practices: Model with Mathematics **Content:** Explain why a fraction is equivalent to another by using visual fraction models (CCSS-M.4.NF.A.1).	Ways of Being and Social Engagement 6C (Contributes productively to one's school, workplace, and community).	Mathematics scholars often use mathematics to benefit their workplace and/or community in the real world. Students can use mathematical models to apply a mathematical concept (e.g., fraction equivalence) in a variety of situations that contributes positively to their school, classroom, and/or community. They might help scale up a recipe for their favorite dessert for the cafeteria staff to share with the whole school or help a community organization distribute school supplies equally between schools, and so forth.

Standard	Taxonomy Approach & SEL Standard and Benchmark	Reasoning
Practice: Attend to Precision **Content:** Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators (CCSS-M.4.NF.B.3b).	Explicit Strategy Alignment and Social Management 5A (Demonstrates a range of communication and social skills to interact effectively with others).	Attending to precision refers to the way that students can communicate solutions and mathematical content. To engage in this practice, students need to communicate clearly and effectively with others using mathematical language. This communication may happen in a variety of settings, including verbally sharing solutions, building a presentation about a problem-solving strategy, or showing their work clearly while solving a word problem.

Questions for Reflection

- What did you learn from these taxonomy examples? What does it mean to intentionally embed social, emotional, and academic competencies in mathematics?
- What are some questions you may ask yourself to become more intentional in your approach to SEL–academic integration during mathematics?
- What are some steps you can take to incorporate multiple, lived experiences and interpretations through a more intentional SEL–academic integration approach in mathematics?

Additional Resources

- Integrating Social and Emotional Learning and the Common Core Standards for Mathematics (The University of Texas at Austin Charles A Dana Center)
- Social and Emotional Learning in Math (Massachusetts Department of Elementary and Secondary Education)
- Examples of Social and Emotional Learning in Elementary Mathematics Instruction (CASEL)
- Social and Emotional Learning Skills and the Mathematical Processes (Kings Printer for Ontario)
- 3 Ways to Promote Social and Emotional Learning through Math (Education Development Center)
- Mathematics Teacher Special Issue: Social and Emotional Learning (National Council of Teachers of Mathematics)[4]
- Mathematics with Rigor, Relevance, and Responsiveness (National Council of Teachers of Mathematics)

[4] Must be a member of National Council of Teachers of Mathematics to access this resource.

LEGAL NOTICE

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