Oregon's Instructional Frameworks | Transformative Social and Emotional Learning

Transformative Social and Emotional Learning in

Science

Oregon Teacher's Guide and Lesson Sparks

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About This Guide

In Oregon, leaders envision Transformative Social and Emotional Learning (SEL) as extending beyond a specific curriculum or standalone program, moving from a focus on each individual's development to an approach that is fully integrated with other aspects of teaching and learning and that supports all members of a school community in learning and thriving. To spark inspiration and provide guidance for teachers as they plan lessons that integrate Transformative SEL into their curricular focus, this resource offers examples of K–12 learning activities tailored to specific Science and Transformative SEL standards in Oregon.

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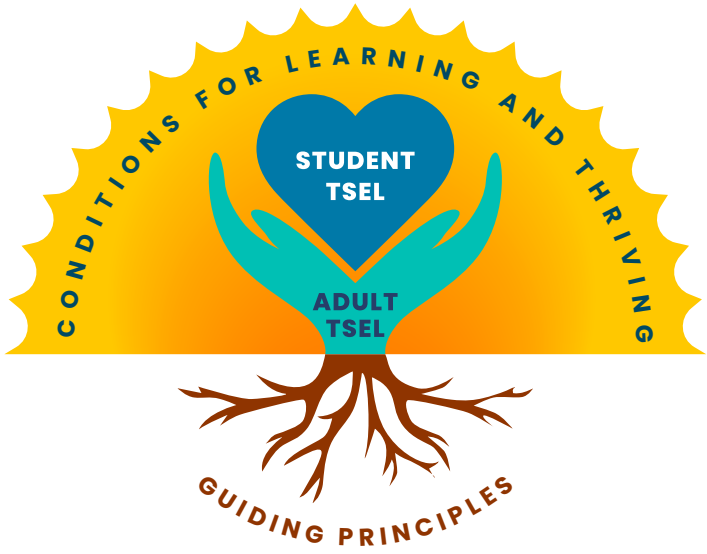
Teacher's Guide to Transformative SEL Instruction

Just as an environmental ecosystem requires a balance of sunshine, water, nutrients, and a healthy atmosphere for plants to flower and bear fruit, the school ecosystem needs individuals, relationships, and the environment to work in interdependence so that everyone can flourish and thrive (Figure 1). For Transformative SEL to take root in schools, adults can reflect as learners on their own social, emotional, and cultural competencies so they can provide responsive, inclusive, and engaging learning opportunities for students. Teachers play an essential role as the gardeners of the learning ecosystem, creating an environment where learning can flourish, developing relationships with and between students, and guiding students in their personal and academic journeys.

Figure 1. Oregon's Transformative SEL Framework



Academic instruction serves as the soil in this learning ecosystem, as instruction is full of opportunities for integrating Transformative SEL so that students can experience consistent, high-quality learning. A transformative approach to SEL instruction must consider not just individual students, but also the social systems around them by recognizing that student actions and attitudes are influenced by systemic conditions. Conditions for learning and thriving therefore act as nutrients for instructional soil, as teachers should cultivate authentic partnerships, equitable policies, and thriving learning environments in order to meet the full range of students' social, emotional, and academic needs.

The Transformative Social and Emotional Learning in Science Guide aims to help teachers build vibrant, engaging classroom communities that celebrate identity, build agency, cultivate belonging, foster collaborative problem-solving, and encourage curiosity. Rather than offering one-size-fits-all lesson plans, this resource provides "lesson sparks"—ideas and practices that are intended to spark inspiration in teachers and can be used dynamically to help shift classroom practices and policies toward transformation. The guide refers frequently to the accompanying **Transformative SEL Lesson Spark Tool** which teachers can use as they engage in the processes of reflection, integration, and lesson planning.

This guide includes:

- Guiding Principles from the Oregon Department of Education
- Guidance on Transformative SEL, including how to embed it into instruction
- Information on and examples of Signature Practices grounded in Transformative SEL and Science, organized by grade band
- Additional resources and inspiration for units and lesson plans

The companion Lesson Spark Tool offers:

- Reflection questions to demonstrate the necessary mindsets, values, and beliefs for Transformative SEL
- Guidance for instructional and Transformative SEL alignment
- A resource for planning Signature Practices

Guiding Principles

Figure 2. Oregon's Transformative SEL Guiding Principles

This guide is grounded in the guiding principles outlined in Oregon's Transformative Social and Emotional Learning Framework and Standards (Oregon Department of Education, 2023). The principles are the roots of the learning ecosystem, serving as foundational values and beliefs that can lead to fruitful interactions, communication, and decision-making. The principles include **culturally responsive** education as a powerful pedagogical approach to cultivating Transformative SEL practices in students and adults by affirming and honoring their ways of being, knowledge, experiences, and cultures to promote engagement and learning. The principles also encourage teachers who bring a culturally responsive lens to their instruction to be **community responsive** and **strengths based** by centering and affirming students' lived experiences, perspectives, and contributions as assets for learning academic content. Finally, the framework is grounded in instruction that is **trauma informed** and in the **science of learning and development**, acknowledging the importance of recognizing behavior as communication while building consistent, positive routines to ensure all students are primed for new learning.

What is the relationship between culturally responsive education and Transformative SEL?

A transformative approach to SEL invites adults and students to see and understand the systems and structures that influence their attitudes, beliefs, behaviors and interactions. Culturally responsive education offers an essential pedagogical approach for creating the conditions in which Transformative SEL can take root. Culturally responsive education stems from a long history of pedagogical research by scholars such as Gloria Ladson-Billings, Django Paris, Geneva Gay, in addition to Shawn Ginwright, who brings a focus on healing-centered engagement, and Liza Talusan, who offers identity-conscious practices. By nurturing their self-identity, agency, and curiosity, culturally responsive teachers committed to Transformative SEL can harness the innate capacity of youth to actively create change in their own lives and the world.

How do teachers take a culturally responsive approach to their TSEL instruction?

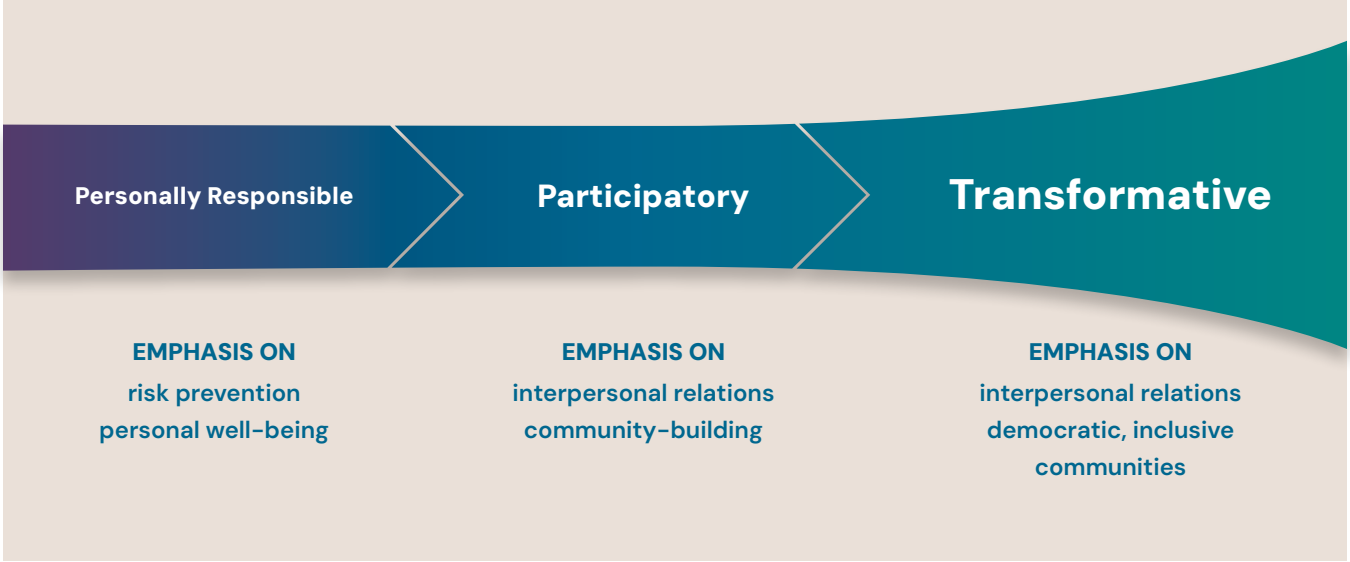
- Teachers build on students' cultural identities, perspectives, and contributions as key assets in the classroom
- Teachers encourage intellectual risk-taking and emotional connection to academic content
- Teachers understand and address the role that toxic and traumatic stress (including racial oppression) can play in shaping students' histories as learners, without seeing them as victims
- Teachers support students to make sense of the world around them, so they can name and act upon the norms, values, institutions, and systems that produce and maintain inequities
- Teachers practice critical self-awareness by reflecting on how their multiple and intersecting identities inform and affect how they act, how they interact with others, and how they see the world around them

Each of these guiding principles is built into the sample activities throughout the guide. Teachers can use **Step 1** of the Transformative SEL Lesson Spark Tool to reflect on the current strengths and skills they bring to enacting Transformative SEL in your classroom. The tool's prompts are designed to get teachers thinking about their own learning journey in preparation for working with their students.

Continuum of Transformation

A transformative approach to SEL is not confined to a single person, lesson, or specific time of the day and is not a one-size fits all program or curriculum. Instead, it is an ongoing process and practice of how adults and students show up for one another in moments throughout the school day. SEL practices exist on a continuum, moving from personally responsible and participatory SEL to a Transformative SEL approach (Figure 3). Transformative SEL was developed to shift the focus of educators away from behavior management and toward creating the conditions that support respectful, dignifying, and affirming interactions among all students and adults along the continuum of transformation. Once conditions for learning and thriving are put in place, students can learn to set goals, manage their own behaviors, and ultimately participate, improve, and change institutions and systems in ways that promote equitable outcomes (Jagers et al., 2019). When Transformative SEL is embedded throughout the day, it has the potential to humanize the learning environment by honoring students' and adults' lived realities of race, class, culture, and other intersectional identities.

Figure 3. Continuum of Transformation



Transformative SEL in Science

The science classroom is an ideal place to cultivate students' Transformative SEL practices. Since the 2012 release of the NRC's **Framework for K–12 Science Education**, science instruction has shifted to focus on authentic connections to students' lives and interests while also building a deep understanding of the knowledge and skills that scientists and engineers need in highly

social professions. In classrooms that have already made this shift, students' own questions and prior experiences are seen as valuable assets throughout every part of the learning sequence, and their ideas drive instruction.

The natural connections between science and Transformative SEL result in extensive alignments between the science and engineering practices and Transformative SEL practices. For example, when students define problems, they will need to learn to recognize and acknowledge when there is harm to self and others. When students plan investigations, they will need to recognize that various situations and environments may require different approaches for achieving personal and collective goals and aspirations. Learning activities include explicit training in recognizing and valuing diverse perspectives during scientific argumentation and problem-solving.

Teachers can refer to **Step 2** of the Transformative SEL Lesson Spark Tool to help determine how instructional goals align with Transformative SEL standards. See Appendix A for a more detailed Standards Crosswalk to support curricular integration.

Explore Integrated Signature Practices

Oregon's Transformative SEL standards include guidance on practices and growth indicators. The guidance is intended to be broad enough to support adaptation while also specific enough to provide useful takeaways for adults to use with students across all contexts. Teachers may choose to adapt Transformative SEL from many different entry points, including:

- Aligning Transformative SEL standards with academic objectives by emphasizing student skillsets and outcomes in lesson planning
- Building a climate and culture for Transformative SEL, by placing student interests, needs, and learning styles at the center of instructional decision-making
- Integrating Transformative SEL through Student-Centered Instruction that puts collaborative problem-solving and student curiosity at the center of learning

Because Transformative SEL is an ongoing process, this guide describes how teachers can use Signature Practices as an entry point to Transformative SEL in the classroom by embedding predictable opportunities for relationship- and community-building and moving their practices along the continuum of transformation. Developed by the Collaborative for Academic, Social, and Emotional Learning (CASEL), the three Signature Practices are Inclusive Welcome, Engaging Strategies, Intentional Close.

For each Signature Practice, this guide provides universal and content-specific examples of how Transformative SEL might look in the classroom. These examples are intended to demonstrate how teachers can weave classroom routines and strategies that align to their learning objectives and the Transformative SEL focal constructs.

Step 3 of the Transformative SEL Lesson Spark Tool provides space to identify how Signature Practices can help support student outcomes, and **Step 4** includes a template for teachers to sketch their own practices.

CASEL developed the Signature Practices in response to frequently asked questions such as "What does SEL look like? How can we start?" After teachers choose a curricular focus, using CASEL Signature Practices can help teachers instill their classroom with routines and interactions that nurture Transformative SEL focal constructs while also connecting to disciplinary learning outcomes.

The following sections provide guidance and examples for teachers to use in integrating Signature Practices into their classrooms.

SIGNATURE PRACTICE:

Inclusive Welcome

Consider opening each class period with a welcome that is inclusive and respects cultural and linguistic diversity, builds community, and sets the stage for learning.

Examples include:

- **Whole-group greeting activities**
- **Deep breathing or mindfulness**
- **Morning circles or rituals**
- **Interactive do-nows,** such as peer-to-peer homework help or quick pair assignments

Engage students in square breathing as an **Inclusive Welcome** to help them focus on their breath and release tension before a lesson that might elicit strong emotions, such as taking an assessment or conducting an experiment.

TRANSFORMATIVE SEL IN SCIENCE 3–5 LESSON SPARK:

Synectics

Students reflect on their emotions and share their initial ideas and questions as they are introduced to the phenomenon of beach debris through a photo. Students build engagement and curiosity about the lesson content and understand that their own thoughts and perspectives are valuable to the class.

See the 3-5 Lesson Spark in Appendix B for a more detailed lesson activity.

SIGNATURE PRACTICE:

Engaging Strategy

Consider embedding interactive or reflective opportunities that vary in complexity and style to allow students to grasp content while connecting learning to their experiences throughout the school day.

Examples include:

- **Think, Ink, Pair, Share** — silent time to reflect; time to write; partner discussions; close with a group share out
- **Mindful Minute Brain Break** — a calming activity, promoting focus and readiness to learn
- Gallery Walk
- Pass It On

Use a gallery walk as an **Engaging Strategy** to facilitate a discussion about a unit's essential questions.

TRANSFORMATIVE SEL IN SCIENCE 9–10 LESSON SPARK:

What's It To Me?

Students build a deep understanding of natural selection and engage in individual and small-group reflections on prior knowledge, ideas, and associations. Students communicate their understanding in a way that builds relationships and adds to the collective learning of the classroom.

See the 9-10 Lesson Spark in Appendix B for a more detailed lesson activity.

SIGNATURE PRACTICE:

Intentional Close

Consider closing each learning experience by highlighting an individual or shared understanding of the lesson, reflecting on the process or the content, helping students identify next steps, or encouraging students to show appreciation for one another.

Examples include:

- Future Me
- One-minute Accolade
- My Next Step — invite students to commit to an action based on the lesson topic or experience
- One Word Whip Around — invite students to respond to a prompt or question with a one-word answer

Use My Next Step to connect students' conceptual understandings to their everyday lives by asking students how they might observe chemical reactions at home (e.g., in cooking, in nature, through cleaning).

TRANSFORMATIVE SEL IN SCIENCE 6-8 LESSON SPARK:

One-minute Accolade

Students engage in reflection using a structured prompt. The One-minute Accolade provides an opportunity for teachers to gather informal feedback on students' experience in the lab activity, promoting positive collaborative behavior through peer feedback as well as metacognitive reflection.

See the 6-8 Lesson Spark in Appendix B for a more detailed lesson activity.

Additional Inspiration

The external links below provide inspiration as teachers work to incorporate Transformative SEL into their science lesson plans. Please note that these resources are neither affiliated with nor endorsed by the Oregon Department of Education.

RESOURCE & DESCRIPTION	K-5	6-8	9-12
STEM Teaching Tools This large and growing group of resources provides guidance on many different aspects of science and engineering instruction.	◉	◉	◉
Integrating Social and Emotional Learning into 3-D Science Classrooms This article describes ways that science instruction can help students develop the core competencies of social and emotional learning. .	◉	◉	◉
Social Emotional Learning and STEM Backgrounder This article from Let's Talk Science offers example activities to incorporate SEL strategies into science class.	◉	◉	◉
NGSS Lessons and Units This collection of classroom resources is vetted for alignment with science standards and for pedagogy that supports all students, serving as a starting point for integrating Transformative SEL standards.	◉	◉	◉
OpenSciEd High School C.3 Molecular Processes in Earth Systems This example science unit incorporates Transformative SEL principles and practices into several of its lessons. his unit is not intended to be an instruction exemplar it is a starting place for incorporating Transformative SEL into science instruction.			◉

Conclusion

Having now seen a variety of integrated activities and model units or lesson plans, teachers can next use Step 4 of the Transformative SEL Lesson Spark Tool to plan Signature Practices that aim to move their instruction, student relationships, and the overall classroom culture and climate toward Transformative SEL.

As Transformative SEL is a process and approach rather than a discrete strategy or program, there is no singular, correct way to implement the approach in your classroom. Instead, Transformative SEL should be embedded throughout your content area learning and school day interactions. This guide and its accompanying tool are designed to demonstrate the several different entry points and strategies teachers can adapt to build a Transformative SEL ecosystem in their school. Transformative SEL invites adults in the educational ecosystem to see themselves as co-learners alongside youths by learning about and critically reflecting on their own social, emotional, and cultural competencies (Jagers et al., 2019). As co-learning is essential to Transformative SEL, teachers might consider who they would identify as the members of their learning community and invite them to collaboratively explore this guide and tool.

Step 4 of the Transformative SEL Lesson Spark Tool provides space for teachers to design their own Signature Practices

References

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Oregon Department of Education. (2023). *Oregon's transformative social and emotional learning framework and standards*. https://www.oregon.gov/ode/educator-resources/standards/SEL/Documents/ODE_Oregon%27s%20Transformative%20SEL%20Framework%20%20Standards_FINAL%20(2).pdf

Ball State University. (n.d.). *Square breathing*. https://www.bsu.edu/academics/centersandinstitutes/practicum/community-resources#accordion_mentalhealth

APPENDIX A:

Crosswalk of Oregon Science and Transformative SEL Standards

This crosswalk includes examples of alignments between the Oregon Science and Engineering Practices and the Transformative SEL practices. The alignments are not exhaustive; rather, they include areas that are likely to be natural instructional matches.

SCIENCE AND ENGINEERING PRACTICE (SEPS)	EXAMPLE ALIGNMENT WITH TSEL STANDARD
1 – Asking Questions and Defining Problems Scientific inquiry involves the formulation of a question that can be answered through investigation, while engineering design involves the formulation of a problem that can be solved through design.	**Practice 1A:** Identify and label emotions, thoughts, strengths, and potential (both personal and cultural). **Practice 2A:** Manage and express thoughts, emotions, impulses, and stressors in ways that affirm one's identity. **Practice 3A:** Demonstrate awareness and understanding of the similarities and differences that define, influence, and affirm personal and collective identities. **Practice 4C:** Recognize and acknowledge when there is harm to self and others and identify when support, agency, and practices to repair and restore are needed.
2 – Developing and Using Models A practice of both science and engineering is to use and construct models as helpful tools for representing ideas and explanations. These tools include diagrams, drawings, physical replicas, mathematical representations, analogies, and computer simulations.	**Practice 2A:** Manage and express thoughts, emotions, impulses, and stressors in ways that affirm one's identity. **Practice 5A:** Demonstrate curiosity and open-mindedness while using critical thinking skills across various situations and environments.

SCIENCE AND ENGINEERING PRACTICE (SEPS)	EXAMPLE ALIGNMENT WITH TSEL STANDARD
3 – Planning and Carrying Out Investigations Scientists and engineers plan and carry out investigations in the field or laboratory, working collaboratively as well as individually. Their investigations are systematic and require clarifying what counts as data and identifying variables or parameters.	**Practice 2B:** Use management strategies while recognizing that various situations and environments may require different approaches for achieving personal and collective goals and aspirations in ways that affirm one's identity. **Practice 2C:** Plan, evaluate, and achieve personal and collective goals and aspirations. **Practice 2D:** Develop personal and collective agency by using various forms of communication (i.e. verbal, body language, written, etc.) to make choices and take initiative. **Practice 3B:** Apply social skills (i.e., empathy, compassion, etc.) to develop and maintain healthy relationships that collectively achieve mutual goals while affirming identities and perspectives.
4 – Analyzing and Interpreting Data Scientific investigations produce data that must be analyzed in order to derive meaning. Because data patterns and trends are not always obvious, scientists use a range of tools—including tabulation, graphical interpretation, visualization, and statistical analysis—to identify the significant features and patterns in the data. Scientists identify sources of error in the investigations and calculate the degree of certainty in the results.	**Practice 5A:** Demonstrate curiosity and open-mindedness while using critical thinking skills across various situations and environments. **Practice 5C:** Anticipate, reflect and evaluate the impacts of one's choices and contributions in promoting personal, family, and community well-being.
5 – Using Mathematics and Computational Thinking. In both science and engineering, mathematics and computation are fundamental tools for representing physical variables and their relationships. They are used for a range of tasks such as constructing simulations; solving equations exactly or approximately; and recognizing, expressing, and applying quantitative relationships.	**Practice 5A:** Demonstrate curiosity and open-mindedness while using critical thinking skills across various situations and environments. **Practice 5C:** Anticipate, reflect and evaluate the impacts of one's choices and contributions in promoting personal, family, and community well-being.

SCIENCE AND ENGINEERING PRACTICE (SEPS)	EXAMPLE ALIGNMENT WITH TSEL STANDARD
6 – Constructing Explanations and Designing Solutions The end-products of science are explanations and the end-products of engineering are solutions. The goal of science is the construction of theories that provide explanatory accounts of the world. A theory becomes accepted when it has multiple lines of empirical evidence and greater explanatory power of phenomena than previous theories.	**Practice 2B:** Use management strategies while recognizing that various situations and environments may require different approaches for achieving personal and collective goals and aspirations in ways that affirm one's identity. **Practice 2C:** Plan, evaluate, and achieve personal and collective goals and aspirations. **Practice 3B**: Apply social skills (i.e., empathy, compassion, etc.) to develop and maintain healthy relationships that collectively achieve mutual goals while affirming identities and perspectives. **Practice 3C:** Foster a sense of belonging that cultivates acceptance, support, inclusion, and encouragement of others within a diverse community, while addressing the impact of systemic injustices across situations and environments. **Practice 4B:** Demonstrate empathy and affirm other's perspectives during teamwork and collaborative problem solving. **Practice 5B:** Make informed choices and identify solutions for personal and social injustices after analyzing all types of information.
7 – Engaging in Argument From Evidence Argumentation is the process by which evidence-based conclusions and solutions are reached. In science and engineering, reasoning and argument based on evidence are essential to identifying the best explanation for a natural phenomenon or the best solution to a design problem.	**Practice 1C:** Reflect on and evaluate how one's emotions, thoughts, and perspectives (including values, biases, and prejudices) can influence behavior. **Practice 1D:** Analyze personal and social intersectional identities and positionality, and how they relate to one's interests, purpose, and sense of belonging. **Practice 3A:** Demonstrate awareness and understanding of the similarities and differences that define, influence, and affirm personal and collective identities. **Practice 3B:** Apply social skills (i.e., empathy, compassion, etc.) to develop and maintain healthy relationships that collectively achieve mutual goals while affirming identities and perspectives. **Practice 5C:** Anticipate, reflect, and evaluate the impacts of one's choice and contributions in promoting personal, family, and community well-being.

SCIENCE AND ENGINEERING PRACTICE (SEPS)	EXAMPLE ALIGNMENT WITH TSEL STANDARD
8 – Obtaining, Evaluating, and Communicating Information Scientists and engineers must be able to communicate clearly and persuasively the ideas and methods they generate. Critiquing and communicating ideas individually and in groups is a critical professional activity.	**Practice 2A:** Manage and express thoughts, emotions, impulses, and stressors in ways that affirm one's identity. **Practice 2D:** Develop personal and collective agency by using various forms of communication (i.e., verbal, body language, written, etc.) to make choices and take initiative. **Practice 3A:** Demonstrate awareness and understanding of the similarities and differences that define, influence, and affirm personal and collective identities. **Practice 4A:** Form authentic relationships that encourage autonomy while building cultural awareness and empathy through various forms of communication.

APPENDIX B:

Science Lesson Sparks

Grades K-2

SIGNATURE PRACTICE	Engaging Strategy: Seed Planting Inquiry

Context

In a 2nd grade science block, students are conducting an investigation with plant seeds. Student ideas and prior experiences are elicited through small-group and whole-group brainstorming and argumentation.

Learning Outcome

Students practice arguing scientifically, respecting and affirming the perspectives of their peers.

Classroom Format

- Whole group
- Small groups

Time

15 minutes

Teacher Moves

- Explain to the class that they will be preparing plant pots to try to grow plant seeds. In this activity, the class engages in scientific argumentation to determine where the best place is in the classroom for the plants to grow.
- Ask students to individually reflect on the following prompt: Now that we have our plant pots, where should we put them to make sure they grow?

Small groups

- Split the classroom into small groups and ask students to share their ideas and talk about why they think their chosen spot would be best.
- Give students discussion time and use the following routine:
  - Students work together in groups of four.
  - Provide think and discussion time.
  - Students discuss the prompt and their own ideas.
  - Students ensure that any member that is called on can represent the group's thinking.
- Raise your hand silently to bring the whole class back together. Wait until all groups stop

talking and most students have their hands in the air.

- Note: If this is the first time you have used an attention signal with the class, preface it before the small-group work by telling the class that there will be times you need their attention, and that you will do so by raising your hand. Let students know that when they see your hand raised, they can help by raising their own hand and bringing their group conversations to a close.

Whole group

- Choose a student from each group to share what they discussed. Prompt students to react to a sharing with the following routine. Encourage students to respectfully critique their peers' claims (assessment opportunity).
- Use this routine for claims and critiques:
  - Who else thinks <this> is a good place for the plant? Why do you think that?
  - Does anyone have any information to add about why <this> is a good place?
  - Does anyone have evidence about light to support your claim about this place?
  - Does anyone disagree with <this> as a place for our seeds?
  - Does anyone have another idea? This is a strategic time to involve students who have not participated yet.
- Use your judgment about whether to move the class to consensus or to call a vote. The place for the seeds is less important than having a science argument about the best place to grow the plants.

Student Experiences & Identities

Draw on students' different ideas and ways of approaching problems. These differences can be elicited to build a large pool of ideas, which will help the class determine a plan for their experiment. Students' prior experiences related to plant growth can provide valuable information to the class discussion.

Content Connections

2.LS2.1: Plan and conduct an investigation to determine if plants need sunlight and water to grow.

Clarification Statement: *Plants depend on air, water, light, and minerals (in the soil) to grow. Examples of an investigation could include plant growth with different amounts of sunlight or water.*

Assessment Boundary: *Assessment is limited to testing one variable at a time. Assessment is limited to the effects of sunlight and water on plant growth.*

Transformative SEL Connections

Practice 2D: Develop personal and collective agency by using various forms of communication (i.e., verbal, body language, written, etc.) to make choices and take initiative.

Practice 4B: Demonstrate empathy and affirm other's perspectives during teamwork and collaborative problem-solving.

References or Attributions

Adapted from the Portland Public Schools grade 2 unit: **Seeds, Scat, and Habitat**

Grades 3–5

SIGNATURE PRACTICE | **Inclusive Welcome: Synectics**

Context

In a grade 4 science block, students begin a unit intended to build an understanding of waves and scientific modeling by sharing their initial ideas and questions as they are introduced to the phenomenon of marine debris through a photo.

Learning Outcome

Students practice identifying their emotions and questions in relation to a phenomenon and sharing these emotions and questions with others.

Classroom Format

- Whole group
- Partners
- Individual

Time

10–15 minutes

Teacher Moves

Whole group

- Gather students together with their science notebooks so everyone can see the images, hear the conversation, and easily see each other (such as in a close group or half-circle in the front of the room). Share a picture of a beach, ocean, or lake near your town, and ask students if they would like to share something about a time they have visited a natural body of water. Allow a couple of students to briefly share.
- Announce that you recently heard about a situation that caught your attention. Display a photo of hundreds of empty chip bags on the beach, and tell them it's an abandoned beach where people never go.

Individual

Give students a bit of time to write what they notice and wonder in their science notebooks. Encourage students to reflect on how the image makes them feel.

Partners

Once students finish writing and reflecting, ask them to share their observations, questions and emotions with a partner.

Whole group

- After two minutes of partner discussion, bring the class back together and facilitate a discussion with the following questions:
  - "What do you wonder?"
  - "What do you think might have caused this?"
  - "Where else have you seen anything like this?"
- Welcome and value all students' ideas. Depending on where students have lived or experienced, they may not have background knowledge about things washing up on beaches. If so, they may bring in ideas about tides and ocean currents. Students might alternatively discuss experiences in swimming pools, bathtubs, ponds, puddles, or sinks. It might be helpful to remind students that people were not anywhere near the beach so the trash was not thrown out by people on the beach.

Visual or Supporting Materials

- Student science notebooks
- Photo of a body of water near your town
- Example image of marine debris

Student Experiences & Identities

Draw on students' prior experiences with ocean waves and objects floating in water. These different experiences can be elicited to help the class determine why trash washed up on a beach. Students' curiosity about how the trash got to the beach is a valuable motivator to drive the learning in the subsequent activities.

Content Connections

4.PS4.1: Develop a model of waves to describe patterns in terms of amplitude and wavelength and that waves can cause objects to move.

Clarification Statement: *Examples of models could include diagrams, analogies, and physical models using wire to illustrate wavelength and amplitude of waves.*

Assessment Boundary: *Assessment does not include interference effects, electromagnetic waves, non-periodic waves, or quantitative models of amplitude and wavelength.*

Transformative SEL Connections

Practice 1A: Identify and label emotions, thoughts, strengths, and potential (both personal and cultural).

Practice 4A: Form authentic relationships that encourage autonomy while building cultural awareness and empathy through various forms of communication.

References or Attributions

Adapted from NextGen Science Storylines Grade 4 Unit: Why do some things wash up on the beach and others don't?

Grades 6-8

SIGNATURE PRACTICE **Intentional Close: One-minute Accolade**

Context

At the end of an investigation or lab activity, a middle school class engages in peer reflection through a structured prompt, sharing feedback on their lab experiences while participating in metacognitive reflection on their learning.

Learning Outcome

Students identify the social and emotional skills exhibited by peers that helped their learning in the process of investigating energy fields.

Classroom Format

- Whole group
- Individual

Time

3-5 minutes

Teacher Moves

Whole group

Recap the day's learning objectives and activities. Share that the class will be engaging in a One-minute Accolade to reflect on how they collaborated to complete their group lab activity. For example, "In today's lab activity, you used a simulation to determine what happens in the space between magnets when they're not in contact. In this process, you had to work with your group to conduct an investigation that gathered evidence. In today's closing activity, we will reflect on how our peers helped us to make progress toward our learning goals."

Individual

- Provide 1 minute for students to individually think about the reflection question: What helped you to make progress toward your learning in today's lab?
- Provide some sentence starters. For example, It was really helpful when _____ (name of student) helped me by _____ (action) during the lab activity. I noticed that I was able to help myself by _____ (action) during class today.
- Provide examples of helpful behaviors to students as they think through their responses. For example, explain directions, operate the simulation, record the group's responses.

Whole group

Once students reflect on the questions, ask for a volunteer to start the whole-group reflection. Set a timer for 2–3 minutes. Once the first person starts, students will continue until time is up. Thank students for sharing their accolades. Not every student will be able to share; there should be future opportunities to repeat the activity so all students can participate.

Student Experiences & Identities

Draw on the assets of students by providing an opportunity for prosocial behaviors such as collaboration to be celebrated and acknowledged. This encourages students to recognize that positive social behavior is an integral component to successful academic learning.

Content Connections

8.PS2.5: Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

Transformative SEL Connections

Practice 2C: Plan, evaluate, and achieve personal and collective goals and aspirations.

Practice 4B: Demonstrate empathy and affirm other's perspectives during teamwork and collaborative problem-solving.

Grades 9–10

SIGNATURE PRACTICE | **Engaging Strategy: What's It to Me?**

Context

In a 9th grade unit that aims to help students build a deep understanding of evolution and natural selection, the class engages in individual and small-group reflections on prior content knowledge to make personal connections to a phenomenon being introduced.

Learning Outcome

Students reflect on their own knowledge, ideas and associations with the concept of natural selection and communicate that understanding in a way that builds relationships and adds to the collective learning of the classroom.

Classroom Format

- Whole group
- Small groups
- Partners
- Individual

Time

5–10 minutes

Teacher Moves

Have students engage in explaining a phenomenon that piques students' interest and curiosity such as an image of peppered moths before and after the Industrial Revolution. Remind students of prior learning from middle school about this phenomenon, in this case, teachings on how the Industrial Revolution in the United Kingdom during the 1800s resulted in soot blackening the trunks of trees, which are the peppered moths' habitats.

Individual

Ask students to take 3 minutes to view the image and write a response to the following questions:

1. What do you notice?
2. What do you think caused this change?
3. What words, ideas or concepts can you think of that relate to this phenomenon?

Partners or small groups

Have students partner or move into small groups. Ask them to share their responses for 2–3 minutes.

Whole group

- Reconvene the whole group and ask students to share something they learned. Allow for two or three responses. Emphasize that everyone comes with different kinds of knowledge and experience and that sharing and receiving knowledge helps the class learn collectively.

- Note: Depending on the background and identities of students, cultural and religious tensions with the idea of biological evolution might arise. A resource for approaching this topic with cultural and religious sensitivity is linked in the resources.

Visual or Supporting Materials

- Smithsonian National Museum of Natural History's guide on **Cultural and religious sensitivity in the teaching of evolution.**
- Image illustrating the phenomenon of peppered moth population distribution before and after the Industrial Revolution (**Source**)

Student Experiences & Identities

Draw on students' prior knowledge about natural selection. Set the stage for future learning by providing an opportunity for students to share their knowledge and ideas.

Content Connections

HS.LS4.3: Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait.

Clarification Statement: *Emphasis is on analyzing shifts in numerical distribution of traits and using these shifts as evidence to support explanations.*

Assessment Boundary: *Assessment is limited to basic statistical and graphical analysis. Assessment does not include allele frequency calculations.*

Transformative SEL Connections

Practice 4A: Form authentic relationships that encourage autonomy while building cultural awareness and empathy through various forms of communication.

Practice 5A: Demonstrate curiosity and open-mindedness while using critical thinking skills across various situations and environments.

Grades 11–12

SIGNATURE PRACTICE | **Inclusive Welcome: Ask Me About**

Context

Students choose three topics they would like to discuss with their classmates for multiple rounds. This activity can focus on students getting to know each other or content. This example focuses on previous learning about the properties of periodic table elements.

Learning Outcome

Students demonstrate understanding of the structure of the periodic table and its elements through sharing and receiving information from their peers.

Classroom Format

- Whole group
- Partners
- Individual

Time

10 minutes

Teacher Moves

Recap prior learning about the periodic table and emphasize that the activity's purpose is to further process learning through dialogue with peers. Share that it is often helpful to hear concepts explained in different ways from peers to aid in forming new content connections.

Individual

Ask students to individually write down at least three topics they would like to talk about on a 3x5 card or a sticky note. Provide the parameter that the topics should include applications of their learning (e.g., application of elemental properties to use in everyday materials such as batteries and cookware, etc.) or explanations of phenomena that have been covered in previous learning (e.g., iron feels cool to the touch). Provide 2 minutes for students to think about and write the topics down.

Partners

Ask students to find a random partner and exchange cards. Each person chooses a topic or phenomenon from their partner's card and says "Tell me about _____ (chosen topic or phenomenon)." For 1–2 minutes students explain that phenomenon and how their understanding of the periodic table helped them explain it. Once time is up, provide a verbal signal for partners to repeat the process by switching roles.

- Repeat the partner sharing for one or two more rounds if there is time.

Whole group

- Explain to the group that reflecting on what we do and do not know are important parts of the learning process. Invite students to reflect on which phenomena they feel they can explain best and which ones they are less comfortable explaining (2–3 minutes).
- Thank students when they share what they feel less confident about to reinforce the importance of self-reflection. Ask students to thank their partners for sharing their knowledge.

Student Experiences & Identities

Draw on students' prior knowledge and engage them as active agents in collective learning.

Content Connections

HS.PS1.1: Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.

Transformative SEL Connections

Practice 2D: Develop personal and collective agency by using various forms of communication (i.e. verbal, body language, written, etc.).

Practice 3B: Apply social skills (i.e., empathy, compassion, etc.) to develop and maintain healthy relationships that collectively achieve mutual goals while affirming identities and perspectives.