AUGUST 2021

Science

Section 2C.

The purpose of this document is to support effective science instruction that includes student- centered practices. Educators are encouraged to facilitate collaborative sensemaking - a critical component of understanding phenomena and solving problems - in ways that honors student interest and identity.

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2C. Science

Effective instruction in science engages students in making sense of the world around them, asking questions, exploring and investigating ideas, and collaboratively creating authentic products that demonstrate standards-based learning. There are three distinct and equally important dimensions to learning science. These dimensions are the integration of disciplinary core ideas, science and engineering practices, and cross-cutting concepts. Each dimension works with the other two to help students build a cohesive understanding of science over time.

Science learning should be student-centered and consistently engage students in the practices of science and engineering. Instruction facilitates collaborative sensemaking — a critical component of understanding phenomena and solving problems — in ways that honors student interest and identity.

All students, including elementary students, should experience high-quality science instruction regularly. Ensuring educators have time, resources, and support to engage all students in meaningful science experiences is critical for broadening participation in science and building a scientifically literate population.

Focus	Considerations and Resources
Content What is the essential learning?	**Developing Scientific Literacy** The Framework for K–12 Science Education establishes a vision of **science for all** students, with a goal of developing a scientifically literate society and preparing students with the skills, habits and understanding to be college, community, and career ready. The Oregon Science Standards are built on the notion of learning as a **developmental progression**. It is designed to help children continually build on and revise their knowledge and abilities, starting from their curiosity about what they see around them and their initial conceptions about how the world works. Keep science **teaching and learning coherent**, by considering bundling standards and storylining. Address requisite skills and knowledge in ways that are focused on grade-level learning. Developing science learning should integrate a focus on **leveraging student interests and identity**. Chapter 11 of the Framework for K–12 Science Education highlights how "all science learning can be understood as a cultural accomplishment." Cultural perspectives can transform learning experiences to make them more engaging and meaningful for learners.
Resources	• CSSS Back-to-School Considerations • Learning progressions • Science in Early Years • Vision of Science Education

Focus	Considerations and Resources
Instructional Materials What tools and resources do I use?	**Start with what you already have in place:** Build from the curricular content and lesson planning already in use. Supplement or re-align the district-adopted curriculum as needed for supporting students in distance learning and for, if applicable, an adapted scope and sequence. Consider the use of cross-curricular units, particularly at elementary, to bundle standards and maximize learning time.
Resources	● #Going 3D with Gathering, Reasoning & Communicating ● Adoption Criteria for Science Instructional Materials ● Digital Access of State Adopted Science Instructional Materials ● NextGenTime ● NGSS Lesson Screener ● OpenSciEd Middle School Units ● Oregon Open Learning Hub ● SB 13 Tribal History Grade 4 -- Grade 8 -- High School ● PMSP High School Units ● STEM@Home™
Instructional Practices and Student Engagement How do I adapt instruction to engage students in learning?	**Leverage the expertise and resources of STEM community partners including your local Regional STE(A)M Hub.** Local informal institutions, businesses, and universities can offer resources to support with the design, facilitation, and evaluation of professional learning and increase opportunities for out-of-school STEM engagement. Your local Regional STE(A)M Hub already has established partnerships with many of these community partners and can help you. **Equitable science learning environments** must include activities that prioritize multiple ways of knowing, doing, and expressing understanding. This includes encouraging students to engage and share at home in meaningful and authentic ways. Some examples could be to anchor units with a justice-centered phenomena where they use science to develop ideas, solutions, and opinions on real world events—connecting science and society. Science instruction should help students understand **“why does this matter to me?”** By connecting to high-leverage science teaching and learning practices, such as phenomena, science discourse, and student’s interests and identities, educators create inclusive learning spaces. In science, evidence-based effective instruction focuses on students engaging in science investigations and design to **explain phenomena** or **develop solutions**. To support student engagement, here is a description of the cycle of science learning or routine for effective instruction.

Focus	Considerations and Resources
	Integration across disciplines can serve as a valuable instructional strategy for providing **rich learning experiences** that reinforce concepts and skills throughout the school year. Certain elements of the practices and related instructional approaches can be beneficial for students learning science while also learning the language of instruction. **Prioritize safety** when considering which science activities can be completed at home or in the classroom. Determine which materials and supplies students will require to engage in learning at home and consider which activities can be completed without family guidance.
Resources	● Ambitious Science Teaching ● ¡Colorin Colorado! - Science ● Engaging Emergent Bilingual Students in Science ● Engaging Student Experiencing Disabilities in Science ● Learning in Places ● NSTA Safer Science ● Phenomena Driven Instruction ● Regional STEM Hubs ● Role of E-Learning in Science Education ● Science Notebooks and Science Talk Moves ● STEM Oregon Connections ● SB 13 Tribal History/Shared History Professional Learning
Assessment How will I measure learning?	**After attending to establishing a class culture of learning, here are some considerations around assessment of science:** ● Provide students with multiple opportunities and modalities to showcase their science/engineering practices, cross-cutting concepts, and science content expertise thinking throughout the cycle of learning. ● Options to gather evidence of learning can include teacher observation, questioning, and noticing, detailed rubrics, virtual or videotaped laboratory experiences and related reports, projects/experimentation, and interactive websites. An OSAS Science Interim Bank that aligns with our summative assessment design and technical features is **available to all Oregon school districts** free of charge for the 2021-2022 school year. Please see the Oregon Department of Education interim assessment webpage for more information. Please see formative assessment information in ODE's Formative Assessment Supplement for focused considerations and resources.
Resources	● NGSS Assessment Portal

Focus	Considerations and Resources
	• ODE Official State Scoring Guides and Student Language Scoring Guides • Stanford Assessment Project, Uncovering Student Ideas in Life Science • Strategies for Collecting Evidence of Learning • STEM Teaching Tools • The Right Assessment for the Right Purpose Guidance Document