

## Science and STEM Education: Spotlight on Equity Resources

This Spotlight on Equity provides a list of considerations for the purpose of supporting equity and access in science and STEM education, emphasizing high quality, and culturally sustaining science and STEM learning for all students. These considerations can help provide an equity lens to teaching and learning that recognizes the historic exclusion and marginalization of minority groups and communities, supports racial justice, and works to eliminate ongoing prejudice within the field of science.

Feedback on the draft versions of the Spotlights on Equity was solicited from the field between October 11th and November 22nd of 2021. A link to a Cognito form with focus questions created by content specialists at the Vermont Agency of Education was sent out through their networks. Additionally, feedback was requested from members of the Vermont Curriculum Leaders Association (VTCLA), the Equity Literacy and Equitable Education Systems grant awardees, the Vermont Foreign Language Association, the Vermont Principals Association, and the chairperson of the Act 1 Advisory Working Group. Thirty-two educators submitted feedback that was used to improve and refine the draft documents.

These considerations, along with their compiled resources below, are not a full and complete list, but rather a starting point on which to begin dismantling historically inequitable science practices.

### Considerations for Supporting Equity and Access

**Identify Examples of Bias and Racism:** Provide educators with historical and modern-day examples of bias and racism in science so they may recognize the work of science and scientists as cultural, not objective, and that science has been complicit in perpetuating racism and other forms of bias.

Resources	Why it Matters
<a href="#">The Eugenics Crusade American Experience</a> . (2018). PBS: American Experience.	This video examines the historical connection between science, politics, social movements related to eugenics in the US and how bias created harmful outcomes for many individuals.
<a href="#">The Mismeasure of Man</a> , Gould, S.J. (1996)	A historical examination of how science was used to create and justify racial hierarchies.
<a href="#">The Madame Curie Complex: The Hidden History of Women in Science</a> , Des Jardins, J. (2010)	Explores the disregard of female scientists and their contributions to the field. Touches on both feminism and ethnicity.

### Contact Information:

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Resources	Why it Matters
<a href="#"><i>Superior: The Return of Race Science</i></a> , Saini, A. (2019)	Examines the re-emergence of beliefs in biological racial differences in modern science.

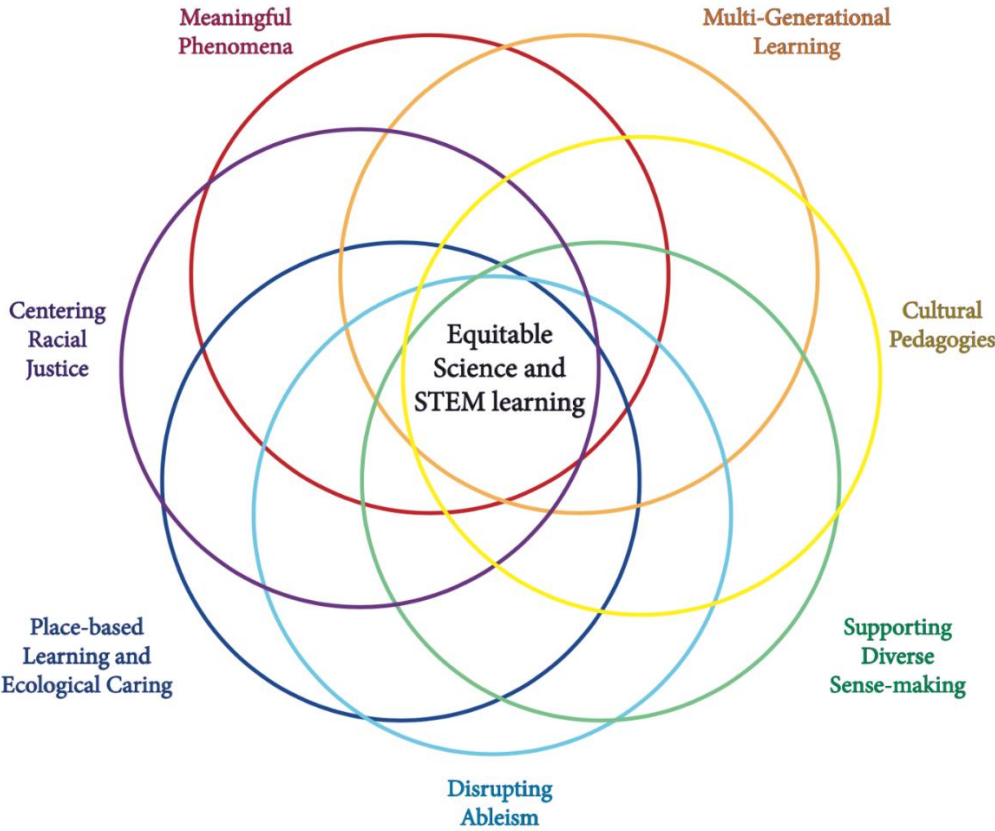
**Value a Multicultural Approach:** By valuing students’ cultural thinking, language, and voices about science, and purposefully including students’ curiosity and experiences, educators can expand their definition of what “counts” as scientific knowledge, language, and practices in order to move beyond White Supremacist, heteronormative, misogynistic science.

Resources	Why it Matters
Engaging English Learners in the Science and Engineering Practices (SEPs) ( <a href="#">Practice Brief 27</a> ) <i>STEMTeachingTools.org</i>	Strives to change the perception from the SEPs being seen as a barrier for ELs to an opportunity to provide rich instruction that builds competencies and identities.
Why You Should Stop Pre-Teaching Science Vocabulary and Focus on Students Developing Conceptual Meaning First ( <a href="#">Practice Brief 66</a> ) <i>STEMTeachingTools.org</i>	Encourages teachers to elicit, value, and leverage students’ ways of observing, communicating, and sense-making rather than front-loading scientific vocabulary.
<a href="#"><i>Valuing the “Everyday” Practices of African American Students K-12 and their Engagement in STEM Learning: A Position</i></a> , Wright, B.L. (2011) pp. 5-11	A call to action for researchers to look again at community-based meaning-making practices that African American students K-12 routinely use in navigating everyday life out of school, and how these relate to learning and achievement in science and mathematics in school.
Creating Science Learning Experiences that Support Learners Receiving Special Education Services ( <a href="#">Practice Brief 59</a> ) <i>STEMTeachingTools.org</i>	Provides actionable steps for educators to design instruction to enable multiple opportunities and avenues for engaging in deep and meaningful sense-making about the natural and designed worlds, rather than creating cognitive, physical, behavioral, neurological, developmental and emotional barriers.

**Have Courageous Conversations About Race and Bias:** Bring diverse representations of science into curriculum, regardless of school population, to encourage courageous conversations about bias and racism in science with colleagues, families, and students.

Resources	Why it Matters
Addressing Controversial Science Topics in the K-12 classroom ( <a href="#">Practice Brief 44</a> ) <i>STEMTeachingTools.org</i>	Helps educators teach topics that, though they may be relevant to topics of social importance, may be controversial inside and outside the scientific community.
<a href="#">The Underrepresentation Curriculum Project</a>	Includes curricular resources for science educators of all levels, addressing underrepresentation in STEM, systemic racism, sexism, etc.
<a href="#">Kicking it Up a Notch: Becoming a Culturally Relevant Science Educator</a> , Butler, V. (2017) <i>The Node- Biology Blog</i>	Contains useful information for educators that are beginning to examine their classroom practices and align them with more culturally relevant and sustaining pedagogy.
Focusing Science and Engineering Learning on Justice-Centered Phenomena across PK-12 ( <a href="#">Practice Brief 671</a> ) <i>STEMTeachingTools.org</i>	Offers recommendations for educators and educational leaders to support justice-centered, science and engineering investigations that address intersecting systems of oppression (e.g., racism, heteropatriarchy, poverty, settler colonialism, ableism, Islamophobia, etc.)

**STEMTeachingTools Brief 71: How Can You Advance Equity and Justice Through Science Teaching?**



The above image outlines ways educators can engage in seven equity lenses that can support science and STEM learning:

- **[Centering Racial Justice](#)**: Disrupt racist assumptions, practices, policies, and systems that uphold dominant, European culture by focusing on the contributions of BIPOC and other historically marginalized groups.
- **[Meaningful Phenomena](#)**: Position students as experts learning to make meaningful action in their world by engaging students in making sense of phenomena that is culturally meaningful, globally significant, justice-centered, everyday and/or based in contemporary science.
- **[Multi-Generational Learning](#)**: Transcend age-segregated approach to schooling by bringing in powerful learning experiences through multiple histories, life experiences, and values by ways of community groups, family life, cross-grade collaborations, and/or visiting experts.
- **[Cultural Pedagogies](#)**: Diversify learning by anchoring instruction in cultural knowledge, worldviews, and ways of knowing of students' communities. Deep learning happens in ways that are culturally significant and sustaining to learners and their communities.
- **[Supporting Diverse Sense-Making](#)**: Elicit and leverage multiple ways students make sense of phenomena (e.g., multiple languages, everyday talk, perspective-taking, gesture, ethical reasoning, drawing, poetry).
- **[Disrupting Ableism](#)**: Leverage students' intellectual strengths and contributions regardless of their school recognized disability status. Disrupt narrow views of ability and prejudices against those perceived to have disabilities.
- **[Place-Based Learning](#) and [Ecological Caring](#)**: Focus instruction on environmental and climate justice, especially for the most impacted communities. Disrupting human exceptionalism and extractive uses of nature helps students engage in intersectional environmentalism.

## Additional Resources

[Global Scientists](#) – From the Wisconsin Department of Education: A compiled list of current scientists from various cultures and backgrounds across the world, with details on which standards their research relates to and [related classroom resources](#) such as lesson plans, books, articles, and videos.

[Project READY: Reimagining Equity and Access for Diverse Youth](#) - Provides a series of short learning modules on racism, implicit bias, equity, colonialism, instruction, and relationships. The coalition is made up of the North Carolina library leadership and K-12 and higher education school leaders.

[Doing and Talking Math and Science](#) - Resources that support effective science classroom dialogue for all students, particularly for multilingual learners.

The [Advancing Coherent and Equitable Systems of Science Education \(ACESSE\) project](#) supported by the University of Colorado, University of Washington, and the Council of State Science Supervisors.

- Session A: [Introduction to Formative Assessment to Support Equitable 3D Instruction](#)
- Session C: [Making Science Instruction Compelling for All Students: Using Cultural Formative Assessment to Build on Learner Interest and Experience](#)
- Session E: [Selecting Anchoring Phenomena for Equitable 3D Teaching](#)
- Session G: [Learning to See the Resources Students Bring to Sense-Making](#)

### **Additional Vermont Agency of Education Resources**

[Cultural Diversity and Equity Resources \(June 2020\)](#)

[Educational Equity Webpage](#)

[Equity Literacy Resources – Fall 2019](#)

[Equity Literacy Resources – Spring 2019](#)