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All young people should be able to decide their futures.

INSTITUTE for Science + Math EDUCATION

How to Cultivate a State-level, Equity-focused Science Implementation Team and Approach

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Session Overview

- Group Brainstorm of Questions or Topics Related to Equity-Focused, State-Level Implementation
- Equity-Focused Implementation Commitments
- WA State Timeline & Activities

  ➔ Discussion
- State-level Strategies
- Implementation Exemplars & Linked Learning Principles
- Sample Initiative

  ➔ Discussion

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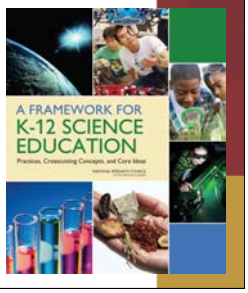
Equalizing Opportunities for Science Learning

"Promoting scientific literacy among all of the nation's people is a democratic ideal worthy of focused attention, significant resources, and continuing effort. To help achieve that end, the committee thinks not only that *standards should reflect high academic goals for all students' science and engineering learning*—as outlined in this framework—but also that all students should have *adequate opportunities to learn*."

"All students should be able to learn about the broad set of possibilities that modern life offers and to pursue their aspirations, including their occupations of interest."

— NRC Framework, 2011, pp. 277-8



What questions or topics related to equity-focused implementation of the new vision do you want to discuss?

Core Commitments in the Work

Our effort is working to ensure that all residents in Washington can become scientifically literate as a civil right. We seek to…

- Engage in educational improvement as a sustained, community-driven process accomplished through the work of a collaborative network.
- Focus on increasing the 'degrees of freedom' for youth in their educational and occupational pathways.
- Work to improve learning opportunities for youth in non-dominant communities.
- Build capacity of the entire PK-12 educational system both in and out of school to do this work.

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Washington's Vision for Education

Every Washington public school student will graduate from high school globally competitive for work and postsecondary education and prepared for life in the 21st century.

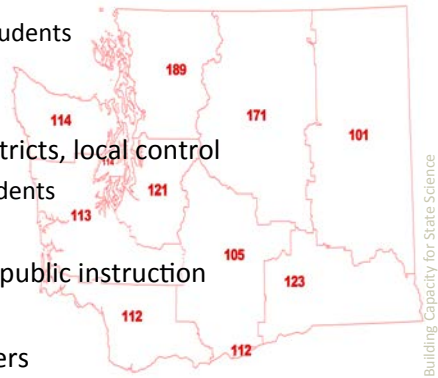
Building Capacity for State Science Education, Pittsburgh June 2013

6

Report High School

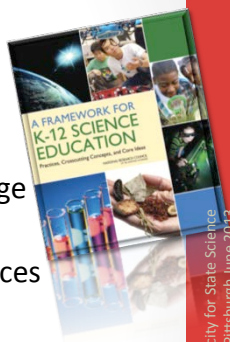
Washington State's Schools and Structures

- Over 1 million students
  - 40% free and reduced- qualified students
  - 9% bilingual/migrant population
  - 13% special education qualified
- ~70,000 educators, 295 school districts, local control
  - ~200 districts with under 5000 students
- 9 Educational Service Districts
- 1 elected state superintendent of public instruction
- Charter schools new in 2013-14
- Countless stakeholders and partners



The Framework Principles Complement WA Vision

- Children are born investigators
- Understanding builds over time
- Science and Engineering require both knowledge and practice
- Connecting to students' interests and experiences is essential
- Focusing on core ideas and practices
- Promoting equity



WA NGSS implementation plans are guided by lessons learned from the Common Core Transitions…

"These standards are not intended to be new names for old ways of doing business."

-CCSS-M, page 5

Washington's K-12 Learning Standards Landscape

(CCSS-M, CCSS-ELA, EALRS, GLEs, PEs,)

Washington's Reading (2005), Writing (2005) and Math (2008) Standards	**Common Core State Standards for English Language Arts and Mathematics** **Adopted July, 2011** **Assessed 2014-15**
Washington's Science Standards (2009)	**Current Standards Continue as WA Considers the Next Generation Science Standards (NGSS)** **NGSS Final Spring 2013** **Adoption may occur in summer 2013** **Assessment of NGSS 2016-17, more likely 2017-18.**
Learning Standards/Guidelines in: Social Studies The Arts Health and Fitness World Languages Ed Tech Early Learning and Development, B-Gr.3	**Current Standards Continue** **Intentional connections will be made across subjects focused on building literacy skills across content areas**

Implementing the Common Core State Standards in Washington State → NGSS Transition

Our Vision: **Every student will have access** to the CCSS standards through high quality instruction aligned with the standards every day; and **every educator is prepared and supported** to implement the standards in their classrooms every day.

Our Purpose: To develop a **statewide system** with resources that supports all school districts in their preparation of educators and students to implement the CCSS. *

**This includes building system-wide capacity for sustained professional learning for all educators that can support CCSS implementation now and be applied to other initiatives in the future*

Our Work with Internal/External Partners

- Develop common understandings about Equity (Framework Chapter and NGSS Appendix D)
- Calibrate and share messages and resources
- Write a Bias and Sensitivity Report with Student Profiles and Teaching Strategies
- Jointly develop robust Transition Plans and Year-by-Year PD Materials
- Energize statewide capacity-building efforts
  - ELA and Math Teacher Leader Fellows Network
  - Regional Science Coordinators/LASER Alliances/CTE

WA Bias and Sensitivity Process

- The purpose of convening a committee was to engage in a process around the NGSS and equity.
- The primary focus was on how the NGSS could be implemented in a way that will ensure equity through consideration of the needs of diverse students.
- We used the 4 major NCLB reporting groups and 3 identified sub-groups listed in Appendix D.

Economically disadvantaged students	Students from major racial and ethnic groups	Students with disabilities	Students with limited English proficiency

The Activity

NGSS and Equity ("All Standards All Students") Assessment

Directions: Choose a standard. Identify a diverse (non-dominant) student group (reference: NGSS Appendix D page 12-13). Analyze the standard in terms of meeting the needs of a non-dominant group.

Group Members: _____

Grade, DCI, and Topic:
(e.g., K-PS2 Motion and Stability: Forces and Interactions) _____

Select & circle a primary accountability group below. Then select zero, one or more additional student diversity characteristics in that row.		Additional Student Diversity Characteristics						
		Gender	Students in alternative education programs	Gifted and talented students	Economically disadvantaged students	Students from major racial and ethnic groups	Students with disabilities	Students with limited English proficiency
Primary NCLB/Accountability Group	Economically disadvantaged students							
	Students from major racial and ethnic groups							
	Students with disabilities							
	Students with limited English proficiency							

Describe the student group characteristics this case study is addressing:

How could the standard be taught in a way that addresses the needs of students from diverse backgrounds (non-dominant group)?

Effective Classroom Strategies (ref: NGSS Appendix D page 7-8):

Home and Community Connections to School Science (parent involvement, community context, informal environments) (ref: NGSS Appendix D page 8-10):

School Resources for Science Instruction (material resources, human capital, and social capital) (ref: NGSS Appendix D page 10-12):

Overall Questions: How does this case study resonate with you and your experiences with diverse student groups?
What questions does this case study raise for you?
What implications does this have for science education?

Building Capacity for State Science Education, Pittsburgh June 2013

15

State-Level Strategies

We have been engaged in…

- Assembling the implementation network
- Informing stakeholders broadly (via print and online channels, presentations to groups, summits)
- Activating relevant networks (e.g., WA LASER, Teachers of Teachers of Science, Informal Ed)
- Building strategic capacity to understand the new vision (e.g., PD teams, funded STEM ed projects)
- Cultivating new collaborative projects on specific initiatives (e.g., WA MSPs, NSF MSP)
- Engaging research + practice communities in collaborative implementation (newer strategy)

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Research+Practice Collaboratory

Long-term and large-scale improvement of STEM education will require significant shifts in practice across communities of educators, researchers, and policymakers.

Collaborating Organizations:
- ✧ Exploratorium
- ✧ Univ of Washington Institute for Science + Math Education
- ✧ EDC
- ✧ TERC
- ✧ Univ of Colorado, Boulder
- ✧ Inverness Research Associates

Focus on Four High-Leverage Themes

STEM Practices	**Formative Assessment**
Cyberlearning	**Learning Across Settings**

Research+Practice Collaboratory

Basic Approach

1. Disrupt the "research to practice" model. *Cultivate sustained collaborations* between communities of researchers and teachers to support implementation going to scale.
2. Identify *shared problems of practice* associated with educational improvement.
3. *Leverage academic and practitioner knowledge* to develop an understanding of the problems.
4. *Develop instructional tools and practices* to help teachers work through the problems.
5. Have *people share tools and practices across networks*. Encourage others to localize and refine the tools for local use —and to continue sharing them.

Build on Seattle-Renton State MSP

90 teachers from grades 3 to 8 across two districts working in collaboration with a network of research teams, staff from other other district, PD teams

Focused on the disciplinary practices; e.g., the coordination of argumentation and explanation is a "shared problem"

Draw upon practitioner knowledge and academic literature

Develop instruction planning tools so teachers can adapt existing curricula

Cultivate and leverage teacher leaders. Also plan to use TeachingChannel.org to support documentation of classroom practice and share relevant tools

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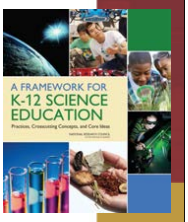
Attending to Diversity & Equity: Inclusive Science Instruction

- Science Learning as Cultural Accomplishment
- Relating Youth / Community Discourses to Scientific Discourses
- Building on Prior Interest and Identity of Learners
- Leveraging Students' Cultural Funds of Knowledge



Exemplar 1: Supporting Learner Agency through Curriculum Adaptation

Teams of teachers, district staff, and researchers have collaborated weekly over the past six years redesigning elementary science kits to incorporate principles of how, why and where people learn.

- **Promoting Learner Agency** is an overarching goal of these curriculum adaptations. Design Principle: "Position learners as developing experts."
- Agency takes three forms (NRC, 2011, 2009, 1999):
  1. Support active knowledge construction through engagement in the practices
  2. Focus (or "overlap") the curriculum on the cultural lives of youth in their communities.
  3. Leverage funds of knowledge of learners (interests, language, knowledge, reasoning, identities)

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Why Focus on Disciplinary Practices?

- The practices in the Framework are considered to be central to science and engineering.
- Practices…
  - engage students productively in inquiry,
  - support important learning processes, and
  - help students understand aspects of the science and engineering enterprises

The Focus on Practices Can Promote Educational Equity & Social Justice

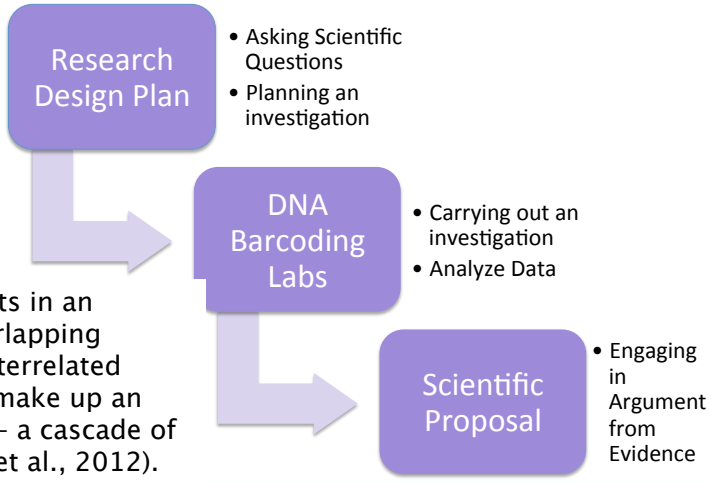
Practices can…

- Support extended, active, and local learning processes that attend to social, cognitive, and cultural dimensions
- Provided multiple entry points for learners
- Build upon learner interests, everyday language, knowledge, practices, and identities (i.e., an asset-based view)
- Promote an expanded view of "What counts as science?"

Exemplar 2—Investigating Contemporary Genetics in Educurious: Using DNA Barcoding to Identify an Unknown Species

Designing Instruction as a Cascade of Practices

Practices do not operate in isolation in instruction.



Engage students in an unfolding, overlapping sequence of interrelated practices that make up an investigation — a cascade of practices (Bell et al., 2012).

Exemplar 3: Designing Early Childhood Science Education

The new vision calls for supporting more ambitious learning goals with our youngest learners. UW Institute faculty and staff have worked with with the Menominee Nation, the Chicago Native community, and Northwestern University to co-design preschool science experiences.

- *Young Ones* is focused on developing children's sense of "Living in Relations" with all things by having them investigate connections across settings.
- Children collect evidence for species that are symbionts for healthy environments, connect their "fieldwork" inquiries across contexts, and develop narratives and explanations for ecological phenomena.

Building on Cultural Funds of Knowledge of Communities

"A culturally responsive approach to science instruction involves the recognition of community practices and knowledge as being central to the scientific endeavor" (NRC, 2012, p. 285).

"Everyday experience provides a rich base of knowledge and experience to support conceptual changes in science. Students bring cultural funds of knowledge that can be leveraged, combined with other concepts, and transformed into scientific concepts over time. Everyday contexts and situations that are important in children's lives not only influence their repertoires of practice but also are likely to support their development of complex cognitive skills" (NRC, 2012, p. 284).

Science Apprenticeship Program
(Déana Scipio, Shelley Stromholt, Andy Shouse, Amanda Bruner, Philip Bell)

COSEE Ocean Learning Communities
CENTERS FOR OCEAN SCIENCES EDUCATION EXCELLENCE

- Partnered with Science Lab
- Authentic Investigation
- Mentors
- Public exhibition

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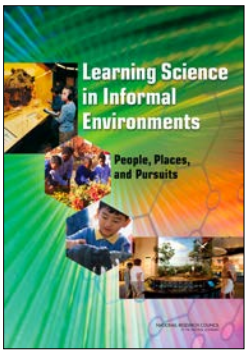
Broadening Participation in STEM

In terms of broadening participation in STEM, studies do suggest that informal learning environments may be particularly effective for youth from historically non-dominant communities.

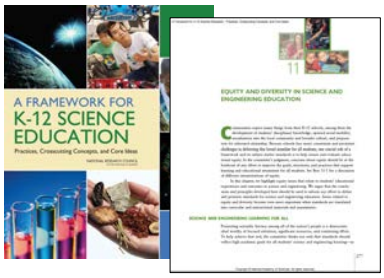


Initiative: Brokering NGSS Implementation within Indigenous Communities

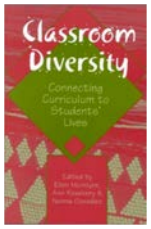
Convening a collaborative network from 29 federally recognized indigenous communities in WA. All have deep, vested interests in STEM education—related to youth development, cultural heritage preservation, workforce development, ecosystem management, and health management.

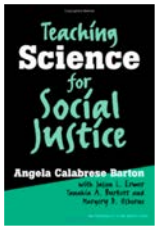
- **Goal: Coordinate NGSS learning goals with local indigenous knowledge systems**
  - Strategy: Convene stakeholders to develop the articulation of local knowledge to NGSS learning goals
- **Goal: Increase Capacity for Inclusive Science Instruction**
  - Strategy: Develop online courses on culturally expansive instruction for educators serving indigenous youth (in urban, suburban and rural areas); sharing resources and tools

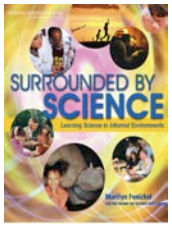
Select Resources to Inform Equity-Focused Implementation

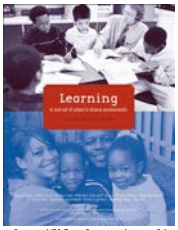


Appendix D: "All Standards, All Students"









http://life-slc.org/panel/

Wrap Up Discussion

What advice do you have on the approach we are taking?

How Do These Elements Relate to Your State Context?

- Assembling your equity-focused implementation network
- Informing stakeholders broadly
- Activating relevant networks
- Building strategic capacity to understand the new vision—esp. inclusive science instruction
- Cultivating new collaborative projects on specific initiatives
- Engaging research & practice communities in collaborative implementation

UW Institute for Science & Math Ed
http://ScienceMathPartnerships.org/

OSPI NGSS Portal
http://

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