NASBE’s Webinar Series

Communicating about New Science Standards

NASBE’s Center for College, Career and Civic Readiness

November 17, 2014
Moderator

- Dr. Francis Eberle, Deputy Executive Director, NASBE
Panelists

- Patricia A. Maunsell, Widmeyer Communications and Principal at M2 Communications Consulting
- Dr. Ellen Ebert, Science Director, Teaching and Learning at Office of the Superintendent of Public Instruction, WA
- Stephen Wright, Connecticut State Board of Education
Agenda

1. What is so Important about Communications and Science?
2. Patricia Maunsell – Communications and Science Standards
3. Ellen Ebert- Washington State
4. Stephen Wright- State Board Perspective
5. Q & A
6. Adjourn
Communications and...
...and Science Standards

Communicate to:

- Answer many questions
- Make others aware of your actions or intent
- Enroll others to join you
- Clarify misinformation
- Address specific concerns
- Be transparent about the process
COMMUNICATIONS AROUND IMPROVED SCIENCE/STEM EDUCATION & THE NEXT GENERATION SCIENCE STANDARDS

November 17, 2014
The Question of the day…

What do State Boards of Education need to think about in terms of communicating about improved science/STEM education and the Next Generation Science Standards (NGSS)?
Questions that will help you answer our question of the day…

- How does improved science/STEM education and the NGSS fit into your state board of education’s goals and communications efforts?
- Who does your state board of education need to hear from/talk to about science ed/NGSS?
- What questions does your state board of education need to be able to answer?
- What are the action items to implement a communications plan around improved science/STEM education and the NGSS?
How does improved science/STEM education and the NGSS fit into your state board of education goals and communications efforts?

Think about your state board’s overall goals and how to integrate improved science/STEM education and the NGSS into other priorities…

Examples

- Turnaround schools
- College and career readiness
- Supporting equity
Who does your state board of education need to hear from/talk to about science ed/NGSS?

State Boards need to communicate with their State Education Agencies
- Schedule a standing meeting with your SEA

State Boards also need to communicate with a range of stakeholders
- Business and industry
- Legislators
- Media
- Parents, community members, voters
What questions does your state board of education need to be able to answer?

• Why?
• What?
• When?
• How?
• What will be done to support students who don’t meet higher standards?
Why?
The #1 question to be answered

➢ Why now?

➢ Why NGSS?
Top messages that work with parents/general public

• *It has been nearly two decades since the last update.* This compelling argument also generates a sense of urgency for implementing the new standards.

• *The U.S. and our kids need to be able to compete in a global economy.* Statistics about American performance and rankings in math and science help reinforce and highlight the need to better prepare our children.

• *The new standards will benefit BOTH those going to college and those going directly into the workforce.* The benefits of developing critical thinking and real-life skills are universal, not just for a select few students.
Top messages that work with parents/general public cont’d

• **Teachers were a big part of the development of the NGSS.** The science supervisors in the 26 lead states worked with 41 writers, all of whom were education experts and more than half of whom were practicing K-12 teachers, to develop the standards. Teachers also provided comments to the draft standards during the two public review periods.

• **The public provided a lot of feedback on the NGSS.** The draft standards also received comments from more than 10,000 individuals during two public review periods. These comments came from teachers, school and school district discussion groups, scientific societies, parents, and students.
What are the action items needed to implement a communications plan around improved science/STEM education and the NGSS?

- Alignment of key stakeholders and messages
- Identify/create materials needed to support effective communications
- Develop communications priorities and a timeline
Thanks for inviting me today!

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NASBE
Communications Webinar Nov. 17, 2014

Ellen K. Ebert, PhD
Director, Teaching and Learning Science
Office of the Superintendent of Public Instruction
Olympia, WA
Next Generation Science Standards
State Boards of Education and Communications Planning
A State Perspective
Following the final release of the Next Generation Science Standards (NGSS), state boards of education are the entities that will be charged with examining them based on their merits and the needs of their states, as well as with implementing the standards following adoption through policy, practice, and communications.
Our Time Today

- What was the process in Washington State?
- What communication strategies are being developed and used?
WA was a lead state partner

2 NGSS writers

>4000 reviewers during Public Draft Releases

Superintendent Dorn and Governor Inslee jointly adopted NGSS Oct, 2013
Washington’s Learning Standards Development, Adoption, Implementation: Process and Authority

**Development Process**
- Exploration: Statewide Review & Input (bias and sensitivity; comparisons)

**Build Awareness & Statewide Capacity**

**Approval & Adoption**

**Classroom Transitions, Application, Assessment**

**Authorities:**
- **RCW 28A.655.070**: Essential academic learning requirements and assessments (development/revision)
- **RCW 28A.655.071**: Common Core State Standards (ELA/Math)
- **RCW 28A.655.068**: Science
Key steps during adoption

- Reviewed all of drafts; held “Cookies and Coffee: Meet the NGSS” across the state (grant sponsored by Battelle)
- Conducted a Comparative Analysis (WA and NGSS)
- Conducted a Bias and Sensitivity process
- Involved / Updated key stakeholders – sought support and buy-in
  - Ed. Opportunity Gap Oversight and Accountability Commission
  - Legislative Committees
  - State Board of Education
  - State Curriculum Advisory and Review Committee
  - Education Associations
  - State Business and Industry / Private Partners
- Considered policy implications (HS assessments and course requirements)
Common Core ELA and Math and Next Gen Science are Washington State Learning Standards

Phase 1: CCSS and NGSS Exploration

Phase 2: Build Awareness & Begin Building Statewide Capacity

Phase 3: Build Statewide Capacity and Classroom Transitions

Phase 4: Statewide Application and Assessment

Ongoing: Statewide Coordination and Collaboration to Support

Washington’s NGSS Involvement & Process
Summer 2011 to Present

**DEVELOPMENT**
K-12 Framework for Science Education
NGSS Drafting Process Confidential Drafts

**Summer 2011**

**WA INVOLVEMENT:**
- WA Selected as NGSS Lead State – Fall 2011
- Drafting Process – Fall 2011 – Spring 2012
- Statewide educator, stakeholder input

**REVIEW/INPUT**
Public Review
Revision Process

**WA INVOLVEMENT:**
- Statewide educator, stakeholder input
- Student input
- National input
- Comments on Final Drafts

**ADOPTION**
States have discretion to voluntarily adopt NGSS

**Final April 2013**

**WA STATUS:**
- Comparisons
- Bias and Sensitivity
- SBE Presentations
  - Adoption
  - October 2013

**BUILD AWARENESS & CAPACITY**
State Collaboration and Sharing

**WA STATUS:** Part of 8 state collaborative (early adopters)

**TRANSITION & APPLICATION**
- Intentional transition plans
- Examination of instructional materials and resources
- Assessment system adjustments

We are here

NASBE_Communications_Webinar

11/17/2014 26
Ongoing: Statewide Coordination and Collaboration to Support Implementation
(Professional Learning Providers and Partners Across WA)

- School Districts
- Higher Education
- Education and Educator Content Associations
- Business Partners
WA Transition Plan

Key Components

- Communication
- Statewide Capacity and Network Building
- Professional Learning
- Instructional Practices and Shifts
- Instructional Materials and Curricula
- Assessment Systems
- Policy Shifts
## Elements, Leads, and Tasks

### PHASE 1
Spring 2014
- **Exploration, Awareness, and Statewide Capacity Building**

### PHASE 2
2014 - 2015
- **Classroom Transitions, Equity, and Practices**

### PHASE 3
2015 - 2016
- **Leveraging Resources, Materials, and Expertise**

### PHASE 4
2016 - 2017
- **Statewide Implementation, Assessment, and Coordination**

### Communication (OSPI, State Science Leadership Team, LASER)
- **Develop messages**
- **General outreach on shifts**
- **Ongoing messaging**

### Statewide Capacity/Network Building (OSPI Programs; State Science Leadership Team)
- **Identify existing expertise and gaps**
- **Develop NGSS support networks**
- **Ongoing support of leadership network**

### Professional Learning (OSPI Programs, State Science Leadership Team, ESD Regional Science Coordinators, STEM teachers, Administrators, Informal/Community Educators)
- **Identify Professional Learning needs (teachers, administrators, and community educators)**
- **Professional Learning designed for all stakeholders**
- **Professional Learning Implemented for teachers and administrators**
- **Professional Learning Implemented for informal/community educators and ongoing adaptation of Professional Learning**

### Instructional Practices/Shifts (OSPI Programs, State Science Leadership Team, ESD Regional Science Coordinators, STEM teachers)
- **Focus on equity and integrating Science and Engineering Practices**
- **Continued focus on equity and integrating SEPs and Cross Cutting Concepts**
- **Integration of three dimensions (SEPs, CCCs, and DCIs)**
- **Instructional shifts in place**

### Instructional Materials and Curriculum (OSPI Programs, State Science Leadership Team, ESD Regional Science Coordinators, LASER)
- **Examine existing materials**
- **Adapt existing materials and explore (e) Innovations**
- **Evaluate placement of instructional materials and leverage materials and curriculum**
- **Develop/evaluate new materials**

### Assessment System (OSPI)
- **Review Board on Testing and Assessment Report (NRC)**
- **Study assessment system opportunities with NGSS adopted states**
- **Develop new assessments and resources**
- **Field test new assessments**

### Data Collection (OSPI)
- **Determine metrics to be tracked (e.g., course taking, student achievement, STEM, etc.)**
- **Develop data collection plan**
- **Track and report science related data**

### Policy Shifts (OSPI, SBE, PESB, Legislature)
- **Identify policy changes necessary to implement NGSS (e.g. PESB teacher competencies, secondary pathways, assessment)**

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*(Each phase is continuous with the next)*
Next Steps...

- Focus on NGSS key messages
- Build communication capacity through partnerships, strategies and tools
Thank you for your time!

Questions / thoughts / comments?
OSPI Contact Information

- Science Teaching & Learning:
  - Ellen Ebert, Ph.D., ellen.ebert@k12.wa.us
  - Amber Farthing, amber.farthing@k12.wa.us

- Environmental and Sustainability Education:
  - Gilda Wheeler, gilda.wheeler@k12.wa.us

- Science Support Staff:
  - Sultana Shah, sultana.shah@k12.wa.us

- NGSS OSPI Website:
  - [http://www.k12.wa.us/Science/NGSS.aspx](http://www.k12.wa.us/Science/NGSS.aspx)

- Report from Symposium on Science Assessment:
  - [http://www.k12center.org/rsc/pdf/bybee.pdf](http://www.k12center.org/rsc/pdf/bybee.pdf)
Next Generation Science in Connecticut

Presentation to State Board of Education Committee on Academic Standards and Assessments
November 12, 2014

Liz Buttner, Jeff Greig, Ron Michaels, CSDE Science Education Consultants
Presentation Topics

• Hallmarks of Next Generation Science
• Equity: All Standards for ALL Students
• Stakeholder Engagement and Feedback
• Adoption: Opportunities and Challenges
• Building State Capacity
• Assessments: A State and Local System
Why Upgrade Science Standards?

“The overarching goal of our framework for K-12 science education is to ensure that by the end of 12th grade, ALL STUDENTS...

- have some appreciation of the beauty and wonder of science;
- possess sufficient knowledge of science and engineering to engage in public discussions on related issues;
- are careful consumers of scientific and technological information related to their everyday lives;
- are able to continue to learn about science outside school; and
- have the skills to enter careers of their choice, including (but not limited to) careers in science, engineering, and technology.”
S.T.E.M. = JOBS

STEM OPENS DOORS

<table>
<thead>
<tr>
<th>All Occupations</th>
<th>STEM Occupations</th>
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<tbody>
<tr>
<td>JOB</td>
<td>JOB</td>
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Number of Unemployed

Overall, unemployed people outnumbered job postings by 3.6 to one.

In the STEM occupations, job postings outnumbered unemployed people by 1.9 to one.

HEALTHCARE WEATHERS THE STORM

<table>
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<tr>
<th>STEM Occupations in Healthcare</th>
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<tr>
<td>JOB</td>
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Number of Unemployed

In healthcare occupations requiring STEM, job postings outnumbered unemployed people by 3.2 to one.
ENGINEERING PAYs OFF

$79,000
annual mean wage for Engineering
(Engineering occupations includes all engineering and architecture occupations, including Engineering Technical occupations, which most often require less than a bachelor's degree)

$45,790
annual mean wage for all occupations

Engineers Enjoy Greater Security

3.8% Unemployment rate for engineers
7.0% Unemployment rate for all occupations

Next Gen Science Key Shifts
Key Shifts for CT in Next Generation Science: From Remembering Facts to Reasoning with Evidence

Shift 1: **3 Integrated Dimensions of Science**: Students explain phenomena by using science and engineering practices to develop and demonstrate understanding of core ideas and crosscutting concepts;

Shift 2: **Engineering design** in science class introduces ALL students to applying science to engineer solutions to real world problems;

Shift 3: **Sense-making**: More emphasis on students piecing together evidence to construct explanations of phenomena; insufficient to know only isolated details or skills;

Shift 4: **Critical thinking**: More emphasis on discourse and critique of evidence-based conceptual models, arguments and explanations;

Shift 5: **K-12 Content Changes**: More focus on designated “core ideas”; less focus on details. *From naming conductors and insulators to arguing that energy can be transferred from place to place and transformed from motion or chemical energy to thermal or light energy.*
SHIFT 1: THREE INTEGRATED “DIMENSIONS” OF SCIENCE LEARNING: New Approaches to Teaching, Learning and Assessing Earth’s Rotation & Revolution

NGSS Performance Expectation – Grade 5 Earth/Space Science:
“Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.”

CT Expected Performance – Grade 5 Earth/Space Science:
“Explain the cause of day and night based on the rotation of Earth on its axis.”

CT Elementary CMT Sample Inquiry Question:
“Which of the following questions could be answered through scientific observations?”

CONNECTICUT CONTENT AND PRACTICES ASSESSED SEPARATELY
## Comparison of NGSS to CT Performance Expectations

<table>
<thead>
<tr>
<th>Connecticut Expected Performance on CMT/CAPT</th>
<th>NGSS Performance Expectation on state or local assessment</th>
</tr>
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<tbody>
<tr>
<td><strong>Grade 4:</strong> <em>Describe</em> the effects of the strengths of pushes and pulls on the motion of objects.</td>
<td><strong>Grade 3:</strong> <em>Plan and conduct an investigation</em> to provide evidence of the effects of balanced and unbalanced forces on the motion of an object.</td>
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<tr>
<td><strong>Grade 7:</strong> <em>Describe</em> the basic structures of an animal cell, including the nucleus, cytoplasm, mitochondria and cell membrane, and how they function to support life.</td>
<td><strong>6-8:</strong> <em>Develop and use a model</em> to describe the function of a cell as a whole and ways parts of cells contribute to the function.</td>
</tr>
<tr>
<td><strong>Grade 9:</strong> <em>Describe</em> the effects of adding energy to matter in terms of the motion of atoms and molecules, and the resulting phase changes.</td>
<td><strong>9-12:</strong> <em>Create a computational model</em> to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known.</td>
</tr>
</tbody>
</table>
Shift 2: Engineering Design Tasks Tied to Content

Sample Learner Outcomes from NGSS:

**KINDERGARTEN PHYSICS:** Analyze data to determine if a design solution works as intended to change the speed or direction of an object with a push or a pull.*K-PS2-2.

**GRADE 3 LIFE SCIENCE:** Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.*3-LS4-4.

**GRADE 6-8 PHYSICS:** Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.*MS-PS3-3.

**GRADE 9-12 LIFE SCIENCE:** Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*HS-LS2-7.
Shifts 3 & 4: Sense-making Through Discourse with Evidence

• Listen to sense-making discourse in action:

  “Is it weight or volume that makes the water level rise when you drop an object that sinks into a glass of water?”

https://www.dropbox.com/sh/72az27pbc1m9461/AAAIdorYGWjKZ71XIrHTmExa#lh:null-TP01_Classroom_Discussion_Final_v2_sub_sm_H264.mov

What do you notice that is different from a traditional classroom?
Shift 5: Changes in K-12 Science Content

- ALL high school students will learn life, physical & Earth/space science
- Content Crosswalk Study compared NGSS K-12 concepts to CT K-10 standards;
- Identified standards matches
  - Same grade, higher grade, lower grade
  - Strong, partial or no match
- Greater conceptual emphasis in NGSS: Engineering design, evidence for evolution and climate change, wave properties, electromagnetic radiation, the universe and history of planet Earth.
- Less conceptual emphasis in NGSS: Bacteria, viruses, infectious disease, human body systems, optical technologies, biotechnology, polymers, nutrition and rock formation/types.
“Implementing the NGSS will better prepare high school graduates for the rigors of college and careers. In turn, employers will be able to hire workers with strong science-based skills—not only in specific content areas, but also with skills such as critical thinking and inquiry-based problem solving.” (NGSS Front Matter Executive Summary).
“...when provided with equitable learning opportunities, students from diverse backgrounds are capable of engaging in scientific practices and constructing meaning in both science classrooms and informal settings.” (NGSS, App. D)

NGSS Appendix D and its “Case Studies” suggest teaching strategies effective for different groups:

- Economically disadvantaged
- Races and ethnicities
- Disabilities
- English language learners
- Girls
- Alternative education
- Gifted and Talented
Connecticut’s NGSS Stakeholder Engagement
CSDE Collaborations Since 2010

1. State NGSS Leadership Team - Framework draft review and feedback (July 2010)
2. State Content Review Committee – NGSS draft feedback to Achieve (May 2012; January 2013)
3. NGSS-CT Content Crosswalk Study (April 2013)
4. District Adoption Implications Survey (September 2013)
5. State Board Committee (April and May 2014)
6. Commissioner Updates (May and October 2014)
7. SDE District Advisory Council
8. SDE State Assessment Committee
9. SDE Performance Task Development Group
10. CABE contract for outreach to local Boards of Education
Please select the District Reference Group (DRG) to which your district belongs. Refer to the chart below.

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<tr>
<th>Answer Options</th>
<th>Response Percent</th>
<th>Response Count</th>
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<td>4</td>
</tr>
<tr>
<td>B</td>
<td>15.3%</td>
<td>9</td>
</tr>
<tr>
<td>C</td>
<td>8.5%</td>
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<tr>
<td>D</td>
<td>18.6%</td>
<td>11</td>
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<tr>
<td>H</td>
<td>6.8%</td>
<td>4</td>
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<tr>
<td>I</td>
<td>11.9%</td>
<td>7</td>
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<tr>
<td>n/a - charter school (multiple districts)</td>
<td>1.7%</td>
<td>1</td>
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<tr>
<td>n/a - magnet school (multiple districts)</td>
<td>1.7%</td>
<td>1</td>
</tr>
<tr>
<td>Other (please specify)</td>
<td>1.7%</td>
<td>1</td>
</tr>
</tbody>
</table>

answered question 59
2014 Stakeholder Feedback

- CT teachers and administrators are generally in favor of adopting standards in common with other states*;
- Most science teachers and district administrators polled support NGSS adoption;
- Most families are not aware of NGSS;
- Most district reps polled agree that teachers want and had a chance to comment on NGSS drafts.
- Most educators recommend ADOPTING without making “Connecticut” changes to NGSS.
Connecticut’s NGSS Adoption Decision
1. Based on current research on how students learn science
2. Increase student interest and aspirations
3. Alignment to College Board AP Science standards
4. Greater equity and consistency across CT districts
5. Enhanced teaching practices reflecting current research
6. Collaboration across states on instructional materials, assessments and professional development
7. Clarify identity of “STEM” education in CT
8. Restoration of ample instructional time for K-5 science
Designed to “perturb” the current ways of teaching and learning
New system of innovative state assessments to be designed; no multistate consortia yet
No NGSS-aligned instructional materials available yet
ALL students would need 3 years of HS life, physical and Earth/Space science for all: staffing, space & scheduling demands; assessment questions
Impact on AP and elective courses in Gr. 11-12?
Difficult to interpret instructional intention of some NGSS standards
Time and priority for NGSS-specific PD for elementary and secondary teachers
Veteran teachers unprepared to adopt “3-Dimensional” teaching and learning strategies
Pre-service faculty and courses will need to reflect NGSS approaches
Resources required to develop new district curriculum and instructional materials
Requires more time for K-5 science learning; more expertise for teachers
Will need more teachers qualified (in new ways?) to integrate concepts in physics, chem, life and Earth/space science
Building State Capacity for Next Gen Science

Phase 1: Standards Development Input

**Phase 2: Building Statewide Capacity for Implementing**

Phase 3: Phased-in Curriculum Transition

Phase 4: Phased-in Assessment Transition
During the Summer of 2014, 12 CT teachers were trained to develop PT’s closely aligned to NGSS.

2 types of structured tasks were developed:

- **E-D-T** (Experiment-Design-Test) and;
- **R-D-W** (Research-Debate-Write)

4 teachers in each grade band K-5, 6-8, 9-12 representing urban, suburban and rural communities/DRG’s.

6 tasks developed that will provide a basis for CT teachers to model PT types of activities.

PT’s will be piloted by trained teachers during 2014/15 school year.

Larger constituent groups have volunteered to field test. (UConn, CCSU)
Building a Foundation for Change: Sustainable, Consistent Professional Learning

Partnership with CT Science Center and CSDE MSP grants:

- develop on-line and in-person short courses and learning modules
- empower JOB-EMBEDDED, ON-DEMAND, district-led Next Gen Science professional learning:
  - Next Gen Science-CT: Web-based learning modules for K-12 educators and leaders focused on Framework pedagogical shifts.
  - Next Gen Science Exemplar System (NGSX): Web-based learning modules for IHE science ed faculty and K-12 teachers focused on modeling, argument with evidence and developing NGSS curriculum units.
  - Inquiry Pedagogy Institute: Next Gen upgrade to in-person summer institutes
  - Curriculum Development Institute: In-person summer or school-year institutes for district teams to collaborate and share curricula.

- Ready for scale-up by 2015-16 school year
Science Assessment

Current Status in Connecticut

- CMT and CAPT Science at grades 5, 8 and 10
- Curriculum-embedded science performance tasks
- Does not currently reflect the vision of the NRC Science Framework and 3-Dimensional Performance Expectations in NGSS

NRC BOTA Report: “Developing Assessments for the NGSS”

Influencing science assessment improvement efforts around the country and calls for new system of science assessments:

- Local Classroom Assessments
- External Monitoring Assessments
- Indicators of Opportunity to Learn Science

New types of assessment items and tasks are needed
NGSS System of Assessments of “Three-Dimensional Science Learning”

- Assessments to Support Classroom Instruction
- Assessments to Monitor Science Learning on Broad Scale
- Indicators to Monitor Students’ Opportunity to Learn Science as Envisioned in NRC Framework
Science Assessment

Transition to a New Science Assessment System

• Development will likely take 3-4 years (gradually phased in)

CT State Science Assessment Advisory Committee:

• Advising the CSDE on the design, development and implementation of new science assessment system
• Includes 45 science educators representing grades K-12 from all DRGs in the state

CT Participates in SCASS Science

• Multi-state collaborative focused on science assessment issues
• Considering development of NGSS-aligned assessments to be shared by participating states
DISCUSSION and NEXT STEPS
Questions and Answers?
Join us for upcoming webinars!

Anaphylaxis and State Policy (Center for Safe and Health Schools) (December 9th)

A 21st Century State Assessment Strategy: The Role of Performance Assessments in Preparing Students for College, Career, and Civic Success or Performance Assessments (Center for College, Career and Civic Readiness) (January, TBA)

Thank You for Your Participation!

Francis Eberle: francise@nasbe.org