

**ADVANCE MEETING**

Terry Bergeson, Superintendent of Public Instruction  
Lexie Domaradzki, OSPI Assistant Superintendent Teaching and Learning  
Mary McClellan, OSPI Science Director  
Joe Willhoft, OSPI Assistant Superintendent Assessment and Research  
Cary Sneider, Cary I. Sneider Consulting  
Kathe Taylor, SBE Policy Director  
Jeff Vincent, SBE Board Member  
David Heil, DHA Team  
Rodger Bybee, DHA Team  
Kasey McCracken, DHA Team

The teams involved in the revision of the Washington science standards met in advance of the full panel meeting to discuss possible approaches to developing standards that clearly detail the content of the science standards and set well defined performance expectations for students. Terry Bergeson indicated that it is essential that the final document contain performance expectations and that these statements and the content standards must not be housed in separate documents. The DHA team recommended an approach, shown below, that would present performance expectations alongside content standards. The group generally agreed on the merits of this approach, and in the subsequent Science Advisory Panel meeting the Panel was informed that this is the likely direction that the standards will take.

**Proposed Format for Presenting Content Standards and Performance Expectations in a Single Document**

<b>Core Content Statement</b>		
<b>Content Standard Detail</b> <ul style="list-style-type: none"><li>• Fundamental concepts/ principles</li><li>• Understandings</li><li>• Abilities</li></ul>	<b>Performance Expectations</b> <p>One-to-one match to science content standards</p>	<b>Examples</b> <p>Specific Examples that map back to Performance Expectations and Content Standard</p>

**WASHINGTON SCIENCE ADVISORY PANEL**

September 19, 2008 Meeting Notes

**Welcome and Introductions**

***Jeff Vincent, Panel Chair, SBE Board Member***

***Terry Bergeson, Superintendent of Public Instruction***

Jeff Vincent welcomed the group, reminding them that the day's meeting would be devoted to reviewing an early draft of the revised science standards. He noted that the interest in convening the panel early in the process was to ensure that their feedback could be incorporated into subsequent revisions of the document, with the final document being produced in November. Jeff commented that the development of the revised Washington science standards has been a collaborative process between the Washington State Board of Education (SBE) and the Office of Superintendent of Public Instruction (OSPI).

Jeff introduced the Superintendent of Public Instruction, Terry Bergeson, who provided context for the work of the science revision process. Terry noted that OSPI has recently completed the curriculum review for mathematics, and that they discovered that approximately 80% of students have been using materials that are not adequately aligned with the math standards. She indicated that the next step will be piloting the K-8 math assessment and working to revise the 10<sup>th</sup> grade assessment based on the new standards. Terry said this is relevant to the panel's work because a similar process will be undertaken in science over the next year. The current process of delineating the standards will be followed by a phase during which publishers are invited to present curricula for review. Terry presented the members of her team in attendance:

- Joe Willhoft, OSPI Assistant Superintendent of Assessment and Research
- Mary McClellan, OSPI Science Director
- Lexie Domaradzki, OSPI Assistant Superintendent of Teaching and Learning

Terry also introduced Cary Sneider and briefly described the role of his team and the science revision team, indicating that they have been hired to base their revision and re-write process on the work that the DHA team undertook with the Science Advisory Panel. Finally, Terry said that the team at OSPI and the team at the SBE have been discussing the functions of content standards and performance expectations in the

current document so that a single document becomes a guide across the education system.

Jeff Vincent turned the meeting over to David Heil who requested that the members of the Science Advisory Panel take a moment to introduce themselves:

**Washington Science Advisory Panel Members in Attendance:**

- Pinky Nelson
- Kristen White
- Georgia Boatman
- Judy Morrison
- Judy Kjellman
- Barbara Taylor
- Chris Carlson
- Theresa Britschgi
- Brian MacNevin
- Steve Olson
- Michael McCaw
- Len Adams

**Other Participants:**

- Terry Bergeson, Superintendent of Public Instruction
- Jeff Vincent, SBE Board Member
- Steve Dal Porto, SBE Board Member
- Kathe Taylor, SBE Policy Director
- Mary McClellan, OSPI Science Director
- Cary Sneider, Cary I. Sneider Consulting
- David Heil, DHA Team
- Rodger Bybee, DHA Team
- Kasey McCracken, DHA Team

**Guest Observers:**

- Suzanne Montgomery
- July McCrane
- Judy Hartmann

**Overview of the Washington Science Standards Revision Process**

***David Heil, David Heil & Associates, Inc.***

***Mary McClellan, OSPI***

***Cary Sneider, Cary I. Sneider Consulting***

David Heil reviewed the history of the science standards revision process, noting that the Science Advisory Panel has served the role of providing advice and counsel in the process. The science standards review included a process to benchmark the original Washington standards to the National Science Education Standards (NSES) and

documents from selected states and nations. The final report from the review was submitted to and unanimously adopted by the SBE. OSPI currently has a similar group of advisors that is guiding the writing team in the revision process. The first draft of the Revised Standards was released in August, and the DHA team reviewed the draft and provided a round of feedback. The Advisory Panel received Draft 2.6 in advance of the panel meeting.

David Heil walked the group through their handouts before asking Cary Sneider and Mary McClellan to discuss the revision process. Mary McClellan reported that the leadership team was assembled in July, including representatives from OSPI, the community, and universities. The composition of the SSRT team was guided by Recommendation 1 from the Final Report of the Science Standards Review. The leadership team sought representation from teachers, Career and Technical Education (CTE) professionals, higher education, and curriculum specialists at each grade level. The full SSRT met for 4 days during July. The DHA team facilitated the first two days as a means to explain the recommendations that were submitted in the Final Report. The subsequent two days were used to develop a format of Big Ideas in Science, looking back to the original science GLEs.

Mary also discussed the review process for the draft documents to date. The first draft of the revised standards was reviewed by the leadership team, the superintendent, and the DHA team. The Advisory Panel received Draft 2.6 in advance of the meeting and Draft 3.0 at the meeting. Mary noted that both drafts reflect feedback from the DHA team that suggested strengthening the content statements in the standards. She also said that the writing team recognizes the need for performance expectations to support a variety of educators, including teachers, assessment specialists, and curriculum specialists.

### *Additional Highlights:*

- The SSRT will meet on Tuesday and Wednesday of the week of September 22<sup>nd</sup> and will review the feedback from the Science Advisory Panel meeting.
- Mary and Cary are scheduling a meeting with math staff to ensure that the science standards reflect appropriate connections to math concepts.
- A subsequent draft will be posted online on October 6<sup>th</sup>, which will begin a public review period. During this period, OSPI will host three public forums and will work

with an independent contractor to facilitate a number of focus groups regarding the revised science standards.

- The feedback from the public review period will be incorporated into a subsequent draft for final review by the Science Advisory Panel and the SSRT team.

Cary Sneider discussed his role and the role of the writing team in the process, noting that it is challenging to incorporate feedback from multiple sources and multiple groups. He plans to take all of the recommendations to the SSRT. Cary noted that the SSRT needs to feel ownership of this document. For two days the SSRT will discuss issues about overall structure and what should be in the document. Cary briefly described the backgrounds of members of the Core Writing Team and the SSRT.

#### Core Writing Team:

- Mike Atkin, former Dean of Education at Stanford
- Senta Raizen, National Center for Improvement of Science Education
- Art Sussman, WestEd, San Francisco
- Sally Luttrell-Montes, Washington educator

#### *Additional Highlights:*

- Four teachers (one from each grade band) advise the core writing team.
- Mary noted that the SSRT looked at the strengths of the current document to make sure that systems, inquiry, and applications were strong -- so that the document would reflect both of those recommendations.
- Cary mentioned that one thing that comes out in a number of reviews of science education research is the idea that EALRs give people focus. Highly performing schools look at EALRs and take them seriously, and we hear a lot about the EALRs.
- Cary said that the Big Ideas grew out of the National Assessment of Educational Progress (NAEP) document, but that the SSRT group refined them for Washington.

### **Panel Member Feedback on Drafts 2.6 and 3.0**

***Facilitated by David Heil, David Heil & Associates, Inc.***

After the morning discussion David Heil asked panel members to break into small groups to facilitate a closer review of Drafts 2.6 and 3.0. The groups were organized by the grade spans K-3, 4-5, 6-8, 9-10, and 11-12, and each group contained two to three participants. Each small group was asked to review the draft document for their grade span with the goal of addressing the following questions (related to Recommendations 6 and 11 in the Final Report of the Review of the Washington Science Standards):

1. Has the document improved the clarity and specificity of the content standards statements? (Recommendation 6)

2. Do the standards reflect the balance and depth of content found in the National Science Education Standards (NSES)? (Recommendation 11)

In addition to these questions, panel members were requested to note any inaccuracies that they discovered in the draft documents. Panel members were allotted one and a half hours to meet (over a working lunch) to review their sections of the document with regard to the questions listed above.

When the group reconvened David Heil framed the discussion by reminding panel members to focus on the questions related to Recommendations 6 and 11, noting that the intent of the session was not to resolve all of the issues related to the standards. He said that the intent was not to provide a response to the panel members' questions or concerns, but rather to record them so that they could be used to guide the development of the next draft.

Panelists were requested to report their feedback by grade-span group. However, the report-outs often resulted in overall comments related to the entire document. The following section summarizes feedback from the discussion. Comments that applied to multiple grade spans are summarized in a final section related to the overall document.

### **Summarized Feedback**

#### **Grade Spans K-1 and 2-3**

- Core content paragraphs match the fundamental concepts well.
- The statements are clear and specific.
- The absence of content for Matter in the Physical Sciences at grade spans K-1 and 4-5 is a concern. We recommend moving Matter content from grade span 2-3 to K-1.
- In general the breadth and depth appear to be in good shape.
- Splitting the K-3 grade span into two grade spans (K-1 and 2-3) as in the current draft seems appropriate.
- The math connections provided in Draft 3.0 are useful.

### **Grade Span 4-5**

- There are only 2 Physical Science Big Ideas for grade span 4-5. Properties of Matter seems to have been excluded: We would like to see more physical sciences content at this grade span, but acknowledge that there is a lot of Energy content.
- The content for 2-3 INQA appears to be more sophisticated than the content for 4-5 INQA.
- The parenthetical examples are helpful for clarifying the content.
- The math connections provided in Draft 3.0 are useful.
- Specific comments for the grade span group:
  - **4-5 PS3 (pg 33):** The term “energy transformation” should be included here, as this content is about transformation in addition to conservation and transfer.
  - **4-5 PS3C (pg 33):** Would like to use “light energy” rather than just “light” for the sake of elementary school teachers with limited physical science backgrounds.
  - **4-5 LS2C (pg 38):** The statement “organisms are found in linear food chains,” is inaccurate.

### **Grade Span 6-8**

- This grade span appears to contain “hidden content.”
  - 6-8 PS3A (pg 48): “Nuclei” and “chemical bonds” appear here without explanation.
  - 6-8 PS3H (pg 48): New content is introduced here.
  - 6-8 LS2F (pg 53): New vocabulary is introduced.
- Standard 6-8 PS3C is written in performance expectation language.
- For Structure and Function of Living Organisms the content for grade span 6-8 appears to be more sophisticated (especially LS1E) than for grade span 9-10.
- When a lot of examples are included (as in 6-8 LS1E and 6-8 LS3G), it becomes unclear whether the teacher is responsible for all of the content related to the expectations. Sometimes the standard itself needs to be stated more clearly (rather than relying on the examples).
- Specific comments for this grade span group:
  - The biosphere concept could be discussed in more detail (**6-8 ES2, pg 50**).
  - **6-8 ES3G (pg 51)** should not be written in the past tense.
  - **6-8 ES3D (pg 51):** Badlands National Park is in South Dakota.
  - **6-8 LS1A (pg 52):** Include the immune system and the neurological system in the list of example systems.

### **Grade Span 9-10**

- The content in the 9-10 and 11-12 grade spans does not appear to be distinct enough.

- Some of the content for the 9-10 grade span appears to be vague and written at a 6-8 level (e.g. 9-10 PS1, pg 60), with the exception of the life sciences content. Additional example: For 9-10 PS3 the concepts of potential and kinetic energy could be introduced earlier.
- The group discussed whether the high school science standards should be organized into a single 9-12 grade span or 9-10 and 11-12 grade spans. One group of panel members advocated a single grade span with a formatting device used to indicate which standards would be tested at grade 10 and the other group advocated separate 9-10 and 11-12 grade spans. Most panel members appeared to favor the separate 9-10 and 11-12 grade spans option.

Terry Bergeson noted that from a testing perspective (with the WASL given at grade 10), there must be a distinction in the grade spans. She informed the group that the SBE and OSPI are currently looking at a third year requirement for science, and considering different assessment options (end-of-course vs. comprehensive).

Panel members also discussed the purpose of the 11-12 standards. One panel member suggested that they should be for lifelong learners. Another panel member indicated that they might be explicitly included only for those continuing on to post-secondary education. As a part of this discussion panel members highlighted two major goals of the of the science education system: 1) to encourage all citizens to be scientifically literate; and 2) to prepare students to pursue STEM careers. One panel member noted that the current draft standards address scientific literacy but not advancing STEM careers. Regardless of the approach, panel members indicated that it is very important to clearly articulate the intent of these standards in the document.

Terry Bergeson noted that the high school science standards may serve to redefine high school course requirements and offerings. She noted that while schools may not have materials immediately necessary, publishers may need to redefine materials to ensure that students are being taught what is relevant.

***DHA Note:*** *The Final Report of the Review of the Washington Science Standards recommends developing standards that prepare all students for a post-secondary education program or career path (Recommendation 2).*

- Specific comments for this grade span group:
  - **9-10 SYSE (pg 70)** could contain additional opportunities to move beyond previous grade span material.
  - The applications content should include “global collaboration” content.

### **Grade Span 11-12**

- One panelist noted that this grade span should include opportunities to use math beyond basic algebra and should build relevance to college level courses.

- One member noted that the Environmental Change content (e.g. 9-10 LS4, pg 69) receives a lot of attention in the Life Sciences, and that some of this content may have another, more appropriate home (e.g. earth science).

### **General Comments about the Document**

- **Performance Expectations.** Performance expectations may help to clarify the standards for some teachers.

**Example: 2-3 LS1E**

The concept of microscopes seems advanced for this grade span, but using performance expectations would help to indicate the level of expectation.

Several panelists voiced support for the development and inclusion of performance expectations, noting that the expectations clarify how the content applies at the specific grade span. One panel member did express concerns about the inclusion of performance expectations, noting that you want students to be able to perform a lot of different things related to a given content standards, rather than a few specific examples. He recommended an approach in which the full range of performance expectations are developed for a few standards as examples of what performance expectations for other standards might look like.

Terry Bergeson indicated that the current document contains declarative knowledge and that the final documents must also contain performance expectations to meet requirements for NCLB and to ensure that there is an action that can be defined on an assessment. She noted that while teachers do not need to be able to use the standards to create a year-long program, they do need to be able to see the roadmap.

One panel member noted that in addition to lacking performance expectations which can serve to inform assessment development, the current draft also lacks pedagogy. Terry Bergeson commented that there are a lot of things that teachers will need to support the implementation of the standards.

**DHA Note:** *The DHA Team recommends including narrative in the front-matter that clearly describes the nature of content standards and performance expectations and provides guidance for how each should be used.*

- **Avoiding Value-Laden Statements.** The Ecosystems and Environmental Change standards appear to be value-laden, particularly at the elementary grade levels.  
**Example: 2-3 LS2D**  
“Environments change and some are good, some bad and some neither.”
- **Connections to Other Documents.** The group found the math connections that are provided in Draft 3.0 to be helpful, and they support the inclusion of additional connections (e.g. to social studies standards). In addition, one panelist noted the importance of noting connections to state curricula where applicable to ensure consistency with other OSPI requirements.

- **Vocabulary.** A useful rule is that if vocabulary is introduced (and defined) earlier then it can be used subsequently in the standards. It is also important to be consistent with the use of vocabulary within one grade span Big Idea. Examples that could be improved for consistency include 6-8 LS3H and 6-8 PS2. Panelists also supported italicizing vocabulary when it is used for the first time in the document, and would like to see a glossary provided for this vocabulary.
- **Front matter.** The front matter is critically important because it gives the frame of reference of the group that produced the document.
- **Systems EALR.** Although pulling out the Systems content as its own EALR clarifies the systems content (an improvement over the original document), it also elevates this content to a position that draws attention to missing content such as the use of models in science.
- **Applications EALR.** The applications sections appear to lack a lot of attention to design and other important concepts. If this is intentional, then the rationale should be explicitly stated in the front matter (e.g. “we’re focusing on…”).
- **Revised Science Symbol.** One panel member questioned whether the revised science symbol would communicate well to teachers. Terry Bergeson commented that she likes the symbol because it retains some of the old and yet is updated to reflect the approach of the revised science standards. The educators in the group indicated that they are comfortable with the revised science symbol.
- **Additional Comments:**
  - Panel members did not find the diagram on pg 4 to be particularly informative (due to its repetitive nature) and recommended providing additional detail at each grade span.
  - One panelist who participated in the revision of the Washington Math Standards noted that important content was omitted from the Math Standards that should be included in the Science Standards. He noted that graphing, analysis, and probability got short-shrift in the math standards.
  - The level of granularity is much higher in the life sciences than in other content areas.
  - It is important to be aware of the requirements for specific tools (e.g. binoculars, telescope, or a magnifying lens) that a standard may imply. A DHA team member noted that context is important for determining whether students must have access to a specific tool that is mentioned in a standard. Terry Bergeson indicated that providing classrooms with the required tools is a part of the implementation plan for the standards.
  - One panelist objected to the phrase “to do scientific inquiry” and recommended using the term “the ability to inquire scientifically.”