

# Nevada Educator Performance Framework

## Workshop Series Guide for SCIENCE Educators

<b>STANDARD 1</b> New Learning is Connected to Prior Learning and Experience <span style="font-size: 2em; opacity: 0.5;">1</span>	<b>STANDARD 2</b> Learning Tasks have High Cognitive Demand for Diverse Learners <span style="font-size: 2em; opacity: 0.5;">2</span>	<b>STANDARD 3</b> Students Engage in Meaning-Making through Discourse and Other Strategies <span style="font-size: 2em; opacity: 0.5;">3</span>	<b>STANDARD 4</b> Students Engage in Metacognitive Activity to Increase Understanding of and Responsibility for Their Own Learning <span style="font-size: 2em; opacity: 0.5;">4</span>	<b>STANDARD 5</b> Assessment is Integrated into Instruction <span style="font-size: 2em; opacity: 0.5;">5</span>
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### Standard 1: New Learning is Connected to Prior Learning and Experience

**Indicator 1** - Teacher activates **all** students' initial understandings of new concepts and skills

**Indicator 2** - Teacher makes connections explicit between previous learning and new concepts and skills for **all** students

**Indicator 3** - Teacher makes clear the purpose and relevance of new learning for **all** students

**Indicator 4** - Teacher provides **all** students opportunities to build on or challenge initial understandings

### Science Teacher Professional Development Sessions Sequence:

#### Session I (20 min.)

- Introduction
- Video

#### Session II (20 min.)

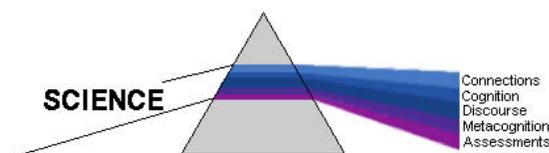
- Video
- Strategy Highlights

#### Session III (20 min.)

- Strategy Highlights
- Team Talk
- Applications

#### Session IV (20 min.)

- Applications
- Reflection



#### Key Ideas from Theory and Research:

- Learners select and transform information using existing cognitive structures – *schemata* – that enable them to organize knowledge and experiences, and apply their knowledge to new situations (Anderson, 1977; Bruner, 1966; Rumelhart & Norman, 1978, 1982).
- Experts have extensive stores of knowledge and skills, but most importantly they have efficiently organized this knowledge into well-connected schemata (e.g., Chi & Roscoe, 2002; Newell, 1990). It is this “organization of knowledge that underlies experts’ abilities to understand and solve problems” (National Research Council, 2005, p. 15).
- Prior knowledge itself does not guarantee its usefulness in learning new concepts unless it is activated in an appropriate context prior to presentation of new knowledge (e.g., Bransford & Johnson, 1972; Chiang & Dunkel, 1992).
- In situations where students’ prior knowledge is not engaged and preconceptions are not revealed, students often retain new information long enough to perform well on tests, and then revert back to their preconceptions, correct or not (National Research Council, 2000).
- To connect new learning with prior knowledge, teachers need to be able to take account of the social and cultural prior knowledge with which students enter schools (e.g., Cazden, 2001; Gee, 1989).
- Multiple modes, forms, and methods should be used to get a complete characterization of students’ prior knowledge (Valencia et al., 1991).



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#### Session I:

##### Introduction: 2 min.

This video shows a teacher, Mrs. Sjoberg, starting a unit of instruction about the behavior of gases in an 11<sup>th</sup> grade Chemistry class. She is a 2<sup>nd</sup> year teacher. The student demographics are: 64% Free/Reduced Price Lunch, 8% English Language Learners, 5% Hispanic, 20% White, 75% Black, 13.6% Special Education Students.

Videos from: <http://ambitioussciencelearning.org/video-series/high-school-gas-laws-legacy-series/>

##### Video: 18 min.

[https://www.dropbox.com/s/rxz7p3dtluu81ub/Beth\\_Day\\_1\\_s1%20-%20Broadband.mp4?dl=0](https://www.dropbox.com/s/rxz7p3dtluu81ub/Beth_Day_1_s1%20-%20Broadband.mp4?dl=0)

Video segments with independent, teacher focus questions.

1. Topic and setting the environment for learning  
**Time: 0:00 - 6:56**

What strategies for student engagement is the teacher using to provide context and relevance to the concept of air pressure?

2. Individual thought:  
**Time: 6:56 - 8:55**

What strategies for eliciting prior knowledge is the teacher using?

3. Initial group work:  
**Time: 8:55 - 12:24**

Why do you think the teacher asks the groups to create representations (models) to explain their prior knowledge?

Why do you think the teacher does not just tell the students to model air pressure crushing the tanker?

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#### Session II:

**Video (continued): 20 min.**

[https://www.dropbox.com/s/le3k5tz4qlbwi4p/Beth\\_Day\\_1\\_S2\\_1%20-%20Broadband.mp4?dl=0](https://www.dropbox.com/s/le3k5tz4qlbwi4p/Beth_Day_1_S2_1%20-%20Broadband.mp4?dl=0)

4. Students develop models, teacher questions student initial models, elicits deeper prior knowledge application, and reflection:

**Time: 0:00 - 15:10**

Notice how the teacher moves from group to group. She is asking clarification questions about the representations and uses scaffolded questions to guide, not tell, student thinking. She is letting the students struggle with using their prior knowledge to explain the phenomena.

Why do you think she asks the students to explain their models and what is she doing when they are explaining their models?

Why do you think the teacher asks the students to modify their models based upon the group discussion and her guiding questions?

5. Teacher Explicitly Guides Student Prior Knowledge and helps students clarify and represent thoughts:

**Time: 0:00 - 3:58**

[https://www.dropbox.com/s/bar6wazcssc7ig1/Beth\\_Day\\_1\\_S2\\_2%20-%20Broadband.mp4?dl=0](https://www.dropbox.com/s/bar6wazcssc7ig1/Beth_Day_1_S2_2%20-%20Broadband.mp4?dl=0)

What strategies does the teacher use to challenge the students' representations? Are they effective?

What evidence can you cite from the video to support the claim, "the teacher is supporting students as they use their prior knowledge to explain the tanker phenomenon"?

#### **Strategy Highlights: 10 min. (in conjunction with the video)**

After watching the video and addressing each of the teacher focus questions in Sessions I and II, what general science classroom strategies did you see the teacher use that you believe were or were not effective at achieving the indicators of Standard 1? Use examples to support your claims.

<b>Strategies that were effective:</b>	<b>Strategies that were ineffective:</b>

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#### Session III:

##### Strategy Highlights (continued): 3 min.

After watching the video, addressing each of the teacher focus questions in Sessions I and II, and identifying general science classroom strategies, identify what challenges and successes you would expect if you were to implement one of the strategies that you thought was effective in your classroom. Remember, your focus is just on strategies that you believe will help you achieve the indicators of Standard 1.

I would like to think about implementing...

I think a challenge to this strategy would be...

I think a success to this strategy would be...

##### Team Talk: 10 min.

Using your colleagues as professional resources, share your thoughts about a strategy represented in the video that you would like to try in your classroom to target achievement of the indicators of Standard 1.

**Discuss as a group the perceived benefits and challenges to the strategy.**

**Central Ideas for the Group Discussion:**

##### Applications: 7 min.

Using the feedback from your peers, determine if you still value the strategy enough to try it out, or if you would like to choose another based upon the group discussion.

- Create a list of the materials, student steps/directions, and resources that you will need to implement the strategy in your classroom.
- Describe the big science idea you will target with your strategy.
- Describe when you will implement the strategy (tomorrow, start of next lesson, etc.).
- **You must implement the strategy before moving to Session IV.**

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### Standard 1: New Learning is Connected to Prior Learning and Experience

#### Session IV:

##### Applications (continued): 10 min.

Work in small, non-discipline specific teams. Describe the application of your strategy to your peers so they understand what you did, what the students did, and your goal for the strategy implementation.

Discuss the list of the materials, student steps/directions, resources that you created, and the over all experience of implementing your strategy.

Describe how the strategy did or did not help you target the indicators for Standard 1.

Describe the aspects of your strategy implementation that you believe were **effective** at achieving the indicators of Standard 1.

Describe the aspects of your strategy implementation that you believe were **ineffective** at achieving the indicators of Standard 1.

##### Reflection: 10 min.

After your small group discussion, think about your implementation and the results. Effectiveness should be measured based upon the indicators for Standard 1:

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What would you change to make your implementation more effective? What evidence do you have to support your claims?

What went well in the implementation of your strategy? What evidence do you have to support your claims?

Is this a long-term strategy that you can implement at the start of every thematic unit? Why or why not?