Seminar Overview
During the four-day seminar *How Science Teaching Matters,* participants will gain knowledge and strategies about effective research-based teaching practices for K-12 science. Participants will engage in study, inquiry-based science experiences and reflection about these "best" practices" and then craft personal action plans to implement during the school year.

Day One
During day one participants will explore the conceptual and research framework of the seminar, engage in a science investigation that illustrates Scientific Habits of Practice and Scientific Habits of Interaction, the use of Teacher and Student Reflection Tools, and how these practices can be applied to instructional reflection and planning.

Day Two
Participants will take on the role of learners for the next three sessions to engage in inquiry-based science "mini-unit" that will highlight all the teaching and learning aspects of "best" practices. The unit is designed to illustrate how to develop deeper conceptual understanding of science content and practices for both students and teachers. Emphasis will be placed on how to embed five scientifically productive teaching routines into an effective instructional design for science (the inquiry learning cycle).

Day Three
On day three participants will continue investigations that exemplify the effective use of embedded formative assessment, student discourse, and strategies to foster a productive classroom culture. Emphasis will be placed on the three scientific practices of (a) constructing explanations and solutions, (b) engaging in argument from evidence, and (c) obtaining, evaluating, and communicating information through the use of strategies for increasing productive student discourse and effective scientific writing.

Day Four
During the last day of the seminar participants will explore how "best practices" contribute to deeper conceptual understanding and the science learning progressions outlined in the *Framework for K-12 Science Education.* Teachers will also consolidate the ideas they have been recording regarding the Lesson Planning Framework and Planning for Action to complete their personal action plan for "best practices" they intend to implement during the school year.

Facilitator
Brownie Lindner is an experienced professional developer who has collaborated with numerous schools and district to develop and support implementation of sustainable systemic science reform. She previously was a middle school science classroom teacher, district science coordinator, and Project Director at the Science and Mathematics Learning Center at Northern Arizona University. She has facilitated BPTS seminars in Georgia, Arizona, Oregon, and Washington and currently works with several school districts in Arizona and California.

References and Resources
A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas (National Research Council 2012)
How Students Learn Science in the Classroom (National Research Council 2005)
Taking Science to School: Learning and Teaching Science in Grades K-8 (NRC 2007)
Knowing What Students Know: The Science and Design of Educational Assessment (NRC 2001)
Ready, Set, SCIENCE! Putting Research to Work in K-8 Science Classrooms (NRC 2008)

BEST PRACTICES IN TEACHING SCIENCE SEMINAR SERIES
HOW SCIENCE TEACHING MATTERS 2012
Teachers Development Group

PURPOSE

Together we will develop –

- A research-based lens for assessing the extent to which our teaching practices foster meaningful, appropriate, scientifically productive student engagement in meaningful science and engineering content and practices.
- A plan for implementing evidence-based teaching practices that are highly likely to produce increased and equitable understanding of and achievement in the natural sciences and engineering by all students.

GOALS

To achieve our purpose, seminar activities will include opportunities to experience and learn to implement –

- Teaching practices that align with how students learn science and promote understanding of core ideas in science by engaging students in the practices and discourse of scientific inquiry and engineering design.
- Discourse strategies that foster scientific explanations, evidence, representation, modeling, and argumentation.
- Research-based tools that support intensive reflection about our students' learning as basis for instructional planning and decision-making.
- Sharpen our "critical eye" for instructional design and materials that:
  - promote understanding and sensemaking by all students.
  - foster a respectful, rigorous, and intellectually engaging classroom culture.
  - emphasize core science ideas/concepts and practices.
  - support deepened teacher content knowledge.
- Learn to enhance and implement science and engineering lessons to maximize learning.

In addition, each participant will --

- Design a personal Best Practices Action Plan for refining our science and engineering teaching practices to better align with the high-quality teaching defined by research and *A Framework for Science Education: Practices, Crosscutting Concepts, and Core Ideas* (National Research Council 2012).