

# Improving Science Teaching Practices



Teachers' Domain Professional Development courses give science teachers methods and strategies to develop effective and innovative instruction.

Inquiry and exploration drive the pedagogy of these courses. Teachers learn through inquiry, which they can use with their students after experiencing its impact on their own learning.



Each research-based course uses a constructivist approach to enhance learning. The courses include:

- Active involvement in the learning process
- Surfacing prior knowledge before learning new subject matter
- Making and testing predictions
- Collecting, organizing, and analyzing evidence to support a hypothesis
- Describing, drawing, charting, and concept mapping to effectively communicate
- Building communities of learners through online discussions
- Monitoring progress through instructor/facilitator and peer feedback
- Making generalizations from knowledge gained and applying what's been learned to new instances
- Applying new content, pedagogy, and knowledge in the classroom

Throughout each course, videos—filmed live in actual classrooms—show teachers and students exploring science concepts together. These videos correlate to specific teaching methodologies and illustrate a variety of strategies and activities. Watching the videos helps participants integrate what they've learned into their own teaching, to create meaningful learning experiences for their students.

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*"These courses are a great resource for new teachers. And for more seasoned teachers, this is a wonderful way to revisit and rethink their teaching practices and access some helpful multimedia resources."*

— Marilyn D.,  
Science Dept. Chair

#### References:

Black, et al. (2003). *Assessment for Learning: Putting It into Practice*. Maidenhead: Open University Press.  
Harlen, Wynne. (2000). *Teaching, Learning, and Assessing Science 5–12*. London: Sage Publications Inc  
National Resource Council. (2000). *How People Learn: Bridging Research and Practice*. Washington, DC: National Academy Press.

## Course Structure

Teachers' Domain Professional Development courses are developed with the assumption that adults, like children, acquire knowledge by building upon what they already know. Each 8-session, 45-contact-hour course guides participants toward a deeper understanding of science which can then be applied to new situations. Modeling the constructivist inquiry-based model, each session is divided into the following 5 sections:

### Invitation:

Participants assess the depth of their own understanding and begin to exchange feedback through discussions with other participants and facilitator.

- participants gain a clear view of the session's purpose and become engaged in a particular topic
- participants uncover their own prior knowledge so that they are aware of existing understanding

### Exploration:

Participants get directly involved with content and are exposed to metacognitive strategies to enhance their learning and teaching.

- participants develop a common base of information about the topic through active hands-on activities
- metacognitive strategies for learning and understanding are presented throughout the session

### Explanation:

Reflecting on their newly acquired knowledge, participants reach their own conclusions and make the abstract concrete.

- participants give feedback to each other and discuss what they explored
- participants enhance scientific vocabulary for effective communication

### Application:

Participants expand on the skills they've acquired and observe phenomena with fresh senses, leading to further inquiry and new understandings.

- participants apply what they've learned earlier in the session to a new instance and their own experiences
- participants consider and discuss how they might apply new insights into their own classrooms

### Putting It into Practice:

Metacognitive strategies and concepts from previous sections are reviewed as participants watch skilled teachers in action.

- participants integrate content and strategies learned throughout the session
- examples of teachers using inquiry in the classroom in innovative ways and sharing best practices are presented

