Smithsonian
Science Education Center

Course Overview

This online workshop: **Conceptual Change: How New Ideas Take Root** is based on ideas presented in *Good Thinking!*, an original animated series developed by the Smithsonian Science Education Center (SSEC) and FableVision Studios as a professional development resource for K-12 science educators.

Research over the past 30 years has documented what teachers have known from experience that students do not come to class as "blank slates", but most often with a diverse set of ideas, concepts, and mental models that they have already developed from their life experiences. These ideas are called preconceptions, which are student ideas constructed before having formal instruction. Students use their own rules and mental models to make sense of their observations, and to explain phenomena that they encounter every day. One of the critical and ongoing challenges for educators across all grades is to discover students' understandings and their mental models about phenomena, and when these models are based on misconceptions to provide opportunities for students to develop new understanding based on scientifically accepted concepts.

The activities in this workshop are designed to help teachers identify student misconceptions and understand their thought process, and to provide strategies that can lead students to develop sound reasoning and to experience conceptual change.

The format and organization of the workshop are designed to allow individuals to successfully complete the online learning activities independently as a self-paced class, without the need for outside input or feedback. At the same time, this format was designed to flexibly fit into PLC meetings, PD workshops, or any time that you and your colleagues can meet to absorb some new ideas and discuss your experiences as educators. While the students in the *Good Thinking!* classroom are identified as being in the 5th grade, the pedagogical strategies are relevant to all levels of instruction.

Session 1 – Introduction to Course

This session serves as an introduction to the course. The objectives for this course are:

- Identify student misconceptions and mental models in science.
- Develop a deeper understanding of what student misconceptions and mental models are.
- Develop plans for using the identified student misconceptions and mental models to teach new ideas.
- Identify instructional strategies presented in the video to support conceptual change in science.
- Apply the strategies to planning new instruction.

Session 2 – Teaching for Conceptual Change

In this session, you will watch the *Good Thinking!* video and reflect on clips to think more deeply about how new ideas take root, mental models and conceptual change.

Session 3 – Classroom application

In this session, you will apply the ideas and lessons from the video to complete a lesson plan using a related scenario.

Session 4 – Wrap Up

This session is a conclusion to the course. The final assessment will be the creation of a lesson plan for your own classroom based on a student misconception you have identified.

There will be the option of earning a Science of Teaching Science 1 certificate upon completion of four Smithsonian Science Education Center Pepper Online Workshops.