



## Good Thinking! The Science of Teaching Science

*Professional Development Discussion Guide*

### **About *Good Thinking!***

*Good Thinking!* is 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. The series brings viewers into the classroom of science educator Isabella Reyes as she explores “the science of teaching science.” Drawing from peer-reviewed research in science, cognition, and pedagogy, *Good Thinking!* distills valuable findings from hard-to-access journal articles to reveal common student misconceptions and promote effective classroom practices.

### **How to use this guide:**

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.

The students in the *Good Thinking!* classroom were designed as 5<sup>th</sup> graders, but research has shown that student ideas about major topics in science are remarkably similar across K-12 grade levels, mainly due to common misconceptions being inadequately addressed or unintentionally reinforced during formal education. While the content of the series is relevant to all levels of instruction, teachers working at the oldest and youngest ends of the K-12 range may need to include additional discussion during the post-viewing conversation that addresses the implications of the videos for their specific grade level.

### **Requirements:**

- Access to a strong internet connection for streaming video
- A screen large enough for group viewing
- Copies of this guide for each participant

### **Discussion objectives: *Good Thinking! – Science: A Work in Progress***

- Examine the role of the scientific method in the teaching of classroom science
- Discover new references and concepts to describe the process of scientific discovery
- Find new opportunities to incorporate scientific practices into classroom science and pick up tips for presenting the scientific method to groups of students

## Procedure

1. Establish ground rules to create an environment conducive to professional development:
  - a. Introduce yourself to any participants you may not know. In a large group it may be helpful to select one individual to serve as the facilitator for the session.
  - b. Agree upon a brief outline of session length, goals and structure. This module is designed to promote exchanges of knowledge between a group of peers, so it may be helpful to divide participants into smaller subgroups by similar academic levels or content area.
  - c. Establish guidelines for productive participation and distribute writing materials to each participant.
  
2. **Before Viewing** – Each participant should take some time to respond to the questions below on their paper. The amount of time needed to answer these questions may vary, but thorough responses are encouraged, as they will be helpful to the discussion later in the session:
  - How would you describe the scientific method to a group of students in simple terms?
  - Do you most often see students following steps of a linear scientific method?
  - How do you think the teaching of classroom science relates to the practice of real scientific research? How are they similar? How do they differ?
  
3. **Watch the Episode:** *Good Thinking! – Science: A Work in Progress*  
Streaming video links available via:
  - a. YouTube
  - b. Smithsonian Science Education Center
  - c. PBS LearningMedia
  
4. **After Viewing** – Once you have finished watching the episode, begin a discussion using the following questions as a framework. For larger groups, it may be helpful to have the PD facilitator read the prompts aloud and actively manage the time and flow of the conversation:
  - **Option:** Return to the video and re-watch section: **2:07-2:37**. How do you think the linear ‘baking a cake’ model of the scientific method influences students’ understanding of science?
  - **Option:** Return to the video and re-watch section: **3:33-5:57**. How does the more complicated taxi metaphor shown in the clip compare to your experiences with the scientific method in your classroom?
  - **Option:** Return to the video and re-watch section: **7:41-9:01**. Is the puzzle metaphor shown in the clip similar to your own understanding of science? Do you have an alternative concept or framework for understanding the processes of science?
  - What techniques or strategies can teachers use to bring the experience of classroom science closer to the realities of real world scientific research?

- 5. After the Discussion** – Once your group has finished discussing the prompts and exchanging experiences, give a brief recap of the major takeaways from the conversation. For larger groups, it may be useful for the facilitator to collect one or two salient points from each subgroup's discussion to share on a large sheet of paper. Conclude the session by highlighting any suggestions for effective practices that were shared by the group.

*Thanks for tuning in to Good Thinking! We hope you found this session to be informative, and appreciate the contribution of your experience, time, and ideas.*

**References:**

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The mission of the **Smithsonian Science Education Center** is to improve K–12 teaching and learning of science for all students in the United States and throughout the world. The center is nationally and internationally recognized for the quality of its programs and its impact on K–12 science education.