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 5th 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! – Attack the Knack*

- Gain a more nuanced understanding of the factors the affect student motivation and persistence in science
- Learn about the findings of education research into intrinsic motivation and student grit, and discuss how these factors relate to the practice of scientific inquiry
- Develop strategies for providing feedback that promotes a growth mindset in all 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. If time allows, participants may benefit from briefly discussing their responses in small groups:

   • Do you think you have a "knack" for certain academic subjects? How has this belief affected your performance in this subject, and in other academic areas?
   • What forms of feedback to you typically use to encourage students that are struggling in science?
   • How do talent and persistence (sometimes called "grittiness") compare as predictors of academic achievement?

3. **Watch the Episode**: *Good Thinking! – Attack the Knack*
   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:

• Student ideas about innate "knack" or talent can significantly affect their persistence and academic achievement in school. How have you encountered these ideas as a teacher? Where does this type of mindset come from? What impact does it have?
• **Option**: Return to the video and re-watch section: **3:58-4:46**. In the clip, Gummerson explains how to give feedback that promotes a "growth mindset". What role do you think feedback has in motivating students? Have any feedback strategies been particularly effective for encouraging your students to overcome an academic challenge?
• **Option**: Return to the video and re-watch section: **5:25-6:31**. In the clip, Gummerson explains that failure is an essential part of the process of scientific discovery. How can educators create a climate where failure can be embraced as something to learn from?

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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