Learning About the Moon: Results from a First-Year Pilot Study
Doug Lombardi, Elliot Bickel, Tyron K. Young, and Janelle M. Bailey
Temple University

Abstract
Students often encounter alternative explanations about a phenomenon. However, inconsistent with scientific practice, students may not be critically evaluative when comparing alternatives. Critical evaluation is the process of weighing connections between evidence and explanations, and we have been developing instructional scaffolds, called model-evidence link (MEL) diagrams, to facilitate critical evaluation about Earth and space science topics. MELs were originally developed by researchers at Rutgers University and we have applied their design to new topics. Here focus on one of these, covering a topic related to our Solar System’s evolution: the Moon Formation MEL. In it, students critically evaluate evidence toward either a great impact or capture event in creating Earth’s Moon. We will discuss the results of a study revealing how the instructional scaffold impacts student understanding about how our Moon came to be.

Background
- Students need to deepen their ability to critically evaluate scientific knowledge and weigh alternative explanations (National Research Council, 2012).
- However, few high school graduates exhibit the reflective thinking needed to critically evaluate alternative explanations about a particular scientific phenomenon (King & Kitchener, 2004).
- Critical evaluation may be especially important for understanding scientific topic with a large plausibility gap (Lombardi, Sinatra, & Nussbaum, 2013).
- Plausibility Gap: Where individuals find competing—but non-scientific—ideas more plausible than explanations offered by scientists.

Research Question
- Does the weighing of connection between lines of evidence and an alternative explanation result in increased understanding about how the Moon is formed?

Methods
- Participants.
  - High school students enrolled in Earth Science (Nevada, n = 71; New Jersey, n = 62)
- Materials & Procedures
  - Intervention: Model-evidence link (MEL) diagram to promote critical evaluation (Chinn & Buckland, 2012) of two competing theories regarding the Moon.
  - Moon knowledge assessment; 30 items reading concepts about the Moon and its formation.

Moon Knowledge
- The MEL resulted in increased understanding about the Moon.
- The MEL is a short-term activity that instructors can use in place of lecture.

Discussion
- The MEL resulted in increased understanding about the Moon.
- The MEL is a short-term activity that instructors can use in place of lecture.

References