



# Learning About the Moon: Results from a First-Year Pilot Study

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## 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.

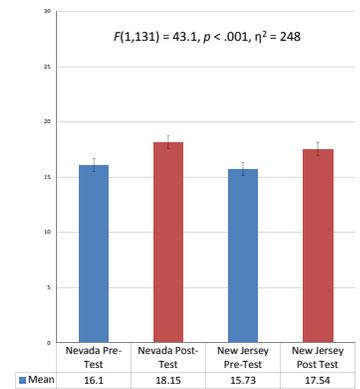
## Background

- ❖ 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 explanations result in increased understanding about how the Moon is formed?

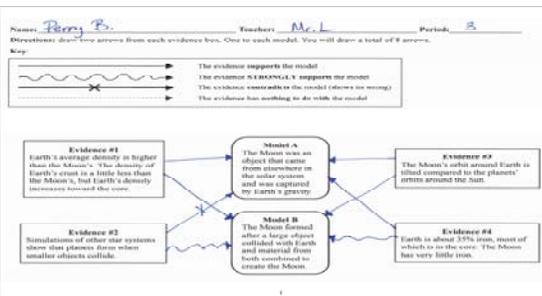
## Moon Knowledge



## 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 MEL



An example of how a student might complete a model-evidence link (MEL) diagram about explanations of the Moon's formation.

## 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

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## Increasing Knowledge

- ❖ Lombardi, Sinatra, and Nussbaum (2013) found that the model-evidence link (MEL) diagram promoted critical evaluation, plausibility reappraisal, and knowledge reconstruction in grade 7 students.
- ❖ Researchers at Rutgers University developed the structure and mode of the MEL (Chinn & Buckland, 2012).

## Evidence Texts

