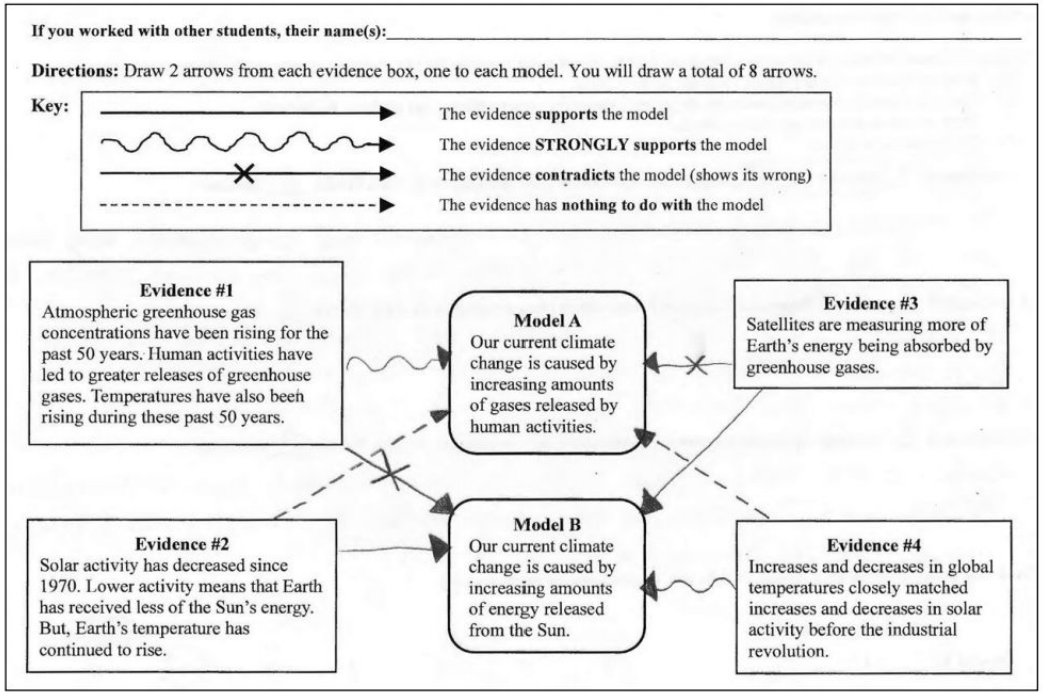
Does The Evidence Support The Model? Examining The Effectiveness Of Two Instructional Scaffolds In Science Classrooms

Josh Medrano*, Joshua Jaffe, Doug Lombardi
University of Maryland
** Presenting Author*

This research was funded, in part, by the US National Science Foundation (Grant Nos. 1721041 and 2027376).

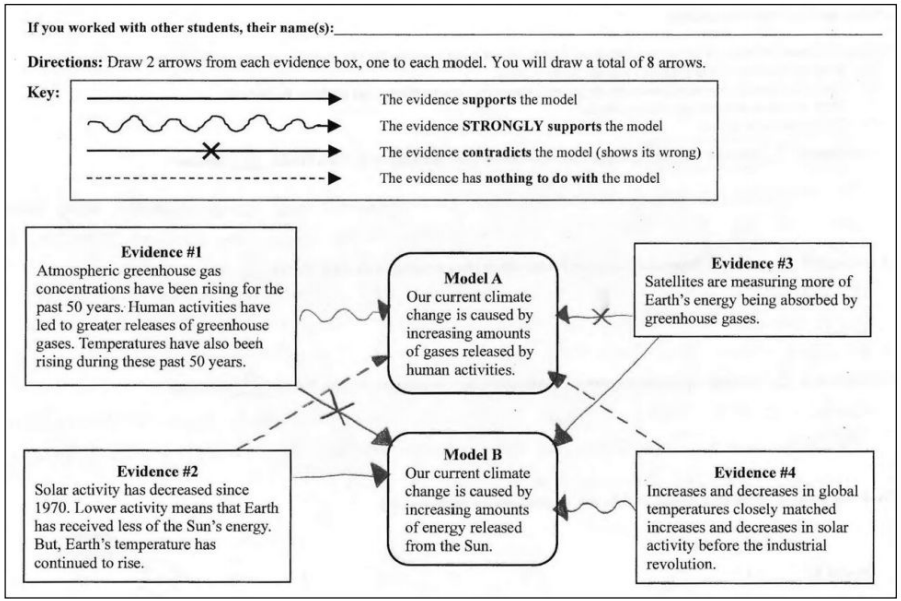
Study Goals

1. Design instructional scaffolds that promotes scientific evaluation, scientific understanding, and engagement in scientific practices
2. Investigate whether differences in two instructional scaffolds (pcMEL and baMEL) reflects differences in evaluation, knowledge, and plausibility judgments

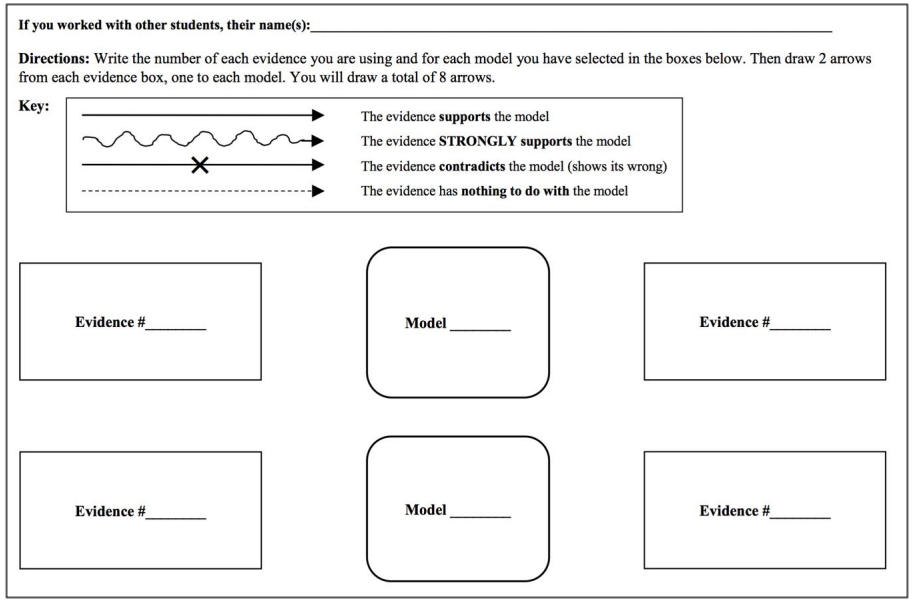


Example of a completed preconstructed Model Evidence-Link (pcMEL) diagram

Goal: Investigate whether differences in two instructional scaffolds (pcMEL and baMEL) reflect differences in evaluation, knowledge, and plausibility judgments



Example of a completed preconstructed Model Evidence-Link (pcMEL) diagram



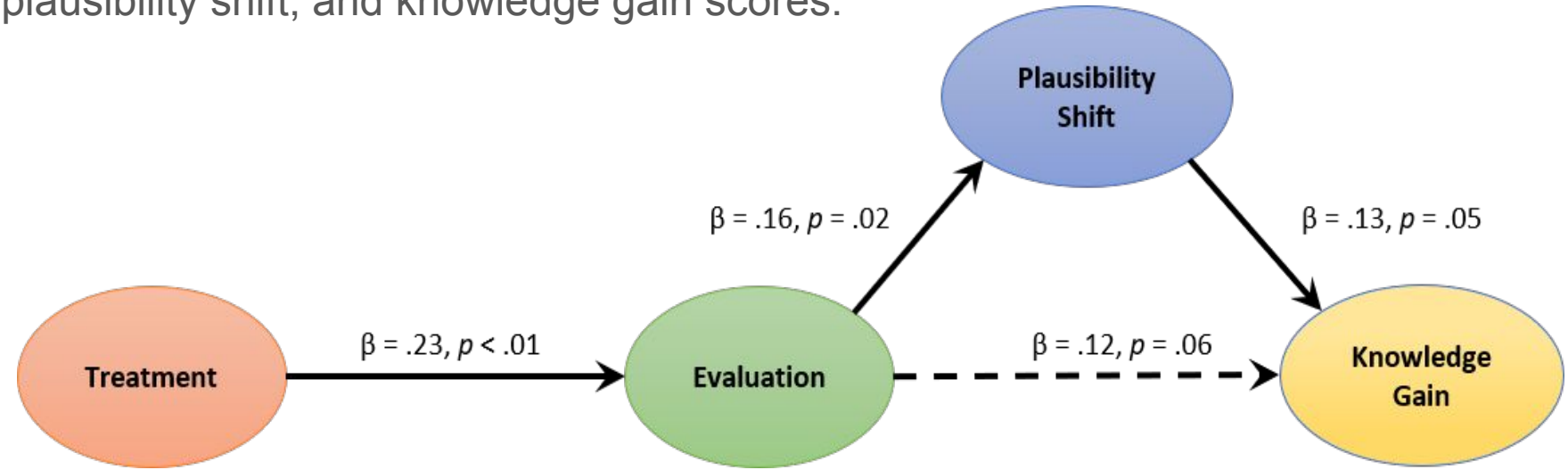
Example of a blank build-a-Model Evidence-Link (baMEL) diagram

Methods

- Conducted during 2 of 4-year NSF-funded project
- *N* = 94 middle, high school, and college students from mid-Atlantic and Southeastern regions of the US
- Topics: causes of climate change, availability of freshwater resources, and origins of the universe
- Outcomes:
  - Evaluation score (1-4, based on accuracy of the link and quality of explanation)
    - 1 = incorrect link and/or low quality of explanation;
    - 4 = correct link and high quality of explanation
  - Plausibility shift (post - pre instruction; higher values = more scientific plausibility judgment)
  - Knowledge gain (post - pre; higher values = greater shift in knowledge)

Results

Partial least squares structural equation modeling (PLSEM) showing relationship between treatment (preconstructed MEL v. build-a-MEL), and evaluation, plausibility shift, and knowledge gain scores.



Conclusion

- The build-a-MEL related to higher evaluation scores, greater scientific shifts in plausibility, and increased knowledge gains, when compared to the preconstructed MEL
- Enhanced conceptual agency may facilitate students' engagement in scientific practices and understanding of socio-scientific issues
- This pilot test is exploratory, but is critical to informing refinements in the overall design-based research project