Seeking Models and Evidence in Research Articles
Teacher Guide

Background:
Refer to the "Theory to Practice Teacher Guide" for this project which cites evidence that students can transfer skills garnered from engaging in MELs: "Recent theoretical work provides promise for transferring MEL evaluation beyond the context of the activity. Specifically, Nussbaum & Asterhan (2016) suggest that students may become *conceptual agents* (i.e., students who exercise epistemic agency are authors of their own contributions, accountable to the classroom learning community, and have the authority to think about and solve problems; Nussbaum & Asterhan, 2016; Pickering, 1995) when they engage in both constructing and using MEL activities. Such construction and use may promote substantial cognitive and agentic engagement (Sinatra et al., 2015), which in turn, could help students internalize the MEL scaffold into a mental representation for application and transfer to real-world situations." This transfer task determines how well students transfer these skills to new situations, such as evaluating the claims in a science article.

Steps for Implementation:
1. Students read the article either by themselves or in small groups using "low-voice" read-aloud technique. Encourage the students to mark up the article to highlight important points. If this is a summative assessment, consider having students work individually.

2. Students complete the table and answer Questions 1-3.

3. Students meet in groups to discuss the article and contents of their tables.
- How did the evaluation classification (Question 1) vary among your group members?
- What were the key lines of evidence presented?
- How well did each line of evidence support the research individually and when coupled with the other lines of evidence?

4. Whole Class Discussion
- Review table contents and answers to questions, followed with questions such as these:
    - How did your discussion with your group help your understanding of the content of the article?
    - Did you identify additional lines of evidence after your group discussions?
    - Were there any alternative models presented in this article? If so, how did you rate them? Why?

Teacher Reflection:
Review student work and consider the following questions when assessing their responses.
- How do your students evaluate models and evidence when presented with evidence? In what ways might you modify this activity to help students think more critically about models and evidence?
- What did students do differently when evaluating articles compared to the MEL task? What similarities?
- What are some of the challenges for students in evaluating evidence?
- How do students consider alternative models in relationship to the model at the focus of the article?

Seeking Models and Evidence in Research Articles - *Students*

For this activity, you will first identify the claim or explanatory model presented in a science news article. Then, identify evidence statements that support the model. The number of evidence statements may vary depending on the article you read.

Article Title:	
Claim or Model Presented:	
Evidence #1:	
How does the evidence support the model?	
Evidence #2:	
How does the evidence support the model?	
Evidence #3:	
How does the evidence support the model?	
Is an **alternative model** presented? If so, what is it? Also provide the evidence supporting it.	

Questions:

1. How would you rate the plausibility of the model presented in the article based on the evidence you gathered? Use a scale of 1 (low plausibility) and 10 (highly plausible) and explain why you rated the model as such. If there is an alternative model, also rate the plausibility of the alternative on a scale from 1 to 10.

2. What evidence did you use to rate the plausibility of this model/claim?

3. What questions would you ask the author or scientist about the model and/or lines of evidence?

Possible Articles:
Here is a list of suggested articles for this task; however, the topics do not necessarily mirror the content of the MELs and baMELs. The criteria used to select these articles included readability level, the research behind the investigations and some of its findings (as opposed to an encyclopedic entry), and the articles being contemporary/engaging. Consider these criteria when seeking your own articles to use for this task.

Title: An ancient cold snap causes heated debate: The claim that a comet was responsible just won't die
Date: August 9, 2018
Article focus: Astronomy
Link: https://www.sciencenewsforstudents.org/article/ancient-cold-snap-causes-heated-debate
Readability: Grade 8 (https://www.webpagefx.com/tools/read-able/)

Title: Antarctica's melting speeds up: The continent has lost about 3 trillion metric tons of ice since 1992, raising global sea levels
Date: July 18, 2018
Article focus: Weather and Climate
Link: https://www.sciencenewsforstudents.org/article/antarcticas-melting-speeds
Readability: Grade 7 (https://www.webpagefx.com/tools/read-able/)

Title: Is Zealandia a continent? Landmass lies mostly beneath the Pacific Ocean
Date: March 13, 2017
Article focus: Geology
Link: https://www.sciencenewsforstudents.org/article/zealandia-continent
Readability: Grade 8 (https://www.webpagefx.com/tools/read-able/)

Title: What killed the dinosaurs? New rocky evidence has been emerging about the dinos' final days
Date: January 30, 2017
Article focus: Fossils with Animals, Earth Science
Link: https://www.sciencenewsforstudents.org/article/dinosaurs-extinction-asteroid-eruptions-doom
Readability: Grade 9 (https://www.webpagefx.com/tools/read-able/)

Title: Oxygen-rich air emerged super early, new data show: If correct, it occurred before the evolution of animal life
Date: August 21, 2016
Article focus: Earth Science with Chemistry, Evolution
Link:https://www.sciencenewsforstudents.org/article/oxygen-rich-air-emerged-super-early-new-data-show
Readability: Grade 7 (https://www.webpagefx.com/tools/read-able/)

Title: Western U.S. on the rise: Ongoing drought-induced uplift in the western United States
Date: September 26, 2014 (AAAS Science article date)
Article focus: Water use
Link: https://www.scienceintheclassroom.org/research-papers/western-us-rise
Readability: Grade 8 (https://www.webpagefx.com/tools/read-able/)

Title: Distant galaxy seems filled with dark matter
Date: September 21, 2018
Article focus: Astronomy, physics, deep space
Link: https://www.sciencenewsforstudents.org/article/distant-galaxy-seems-filled-dark-matter
Readability: Grade 8 (https://www.webpagefx.com/tools/read-able/check.php)

Title: New tools aim to better predict blooms of toxic algae
Date: September 19, 2018
Article focus: Oceans, ecosystems
Link: https://www.sciencenewsforstudents.org/article/new-tools-aim-better-predict-blooms-toxic-algae
Readability: Grade 8 (https://www.webpagefx.com/tools/read-able/check.php)

Title: Ocean heat waves are on the rise - and killing coral
Date: May 18, 2018
Article focus: Oceans, climate, animals
Link: https://www.sciencenewsforstudents.org/article/ocean-heat-waves-are-rise-and-killing-coral
Readability: Grade 7 (https://www.webpagefx.com/tools/read-able/)

Title: Water waves can have literally seismic impacts
Date: January 12, 2018
Article focus: Earth, geology, physics
Link: https://www.sciencenewsforstudents.org/article/water-waves-can-have-literally-seismic-impacts
Readability: Grade 7 (https://www.webpagefx.com/tools/read-able/)