Argumentation Toolkit: Resources for Developing a Classroom Culture for Scientific Argumentation

THE
**ARGUMENTATION
TOOLKIT**

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Agenda

1. Introduction and overview of The Argumentation Toolkit

2. Video & Discussion: Designing argumentation tasks

3. Presentation: Criteria for rich argumentation tasks

4. Activity: Evaluating evidence with the evidence gradient tool

5. Using the Learning Modules

This presentation's PowerPoint and handouts can be found at argumentationtoolkit.org *under the "About" tab*

1. Introduction and overview of The Argumentation Toolkit

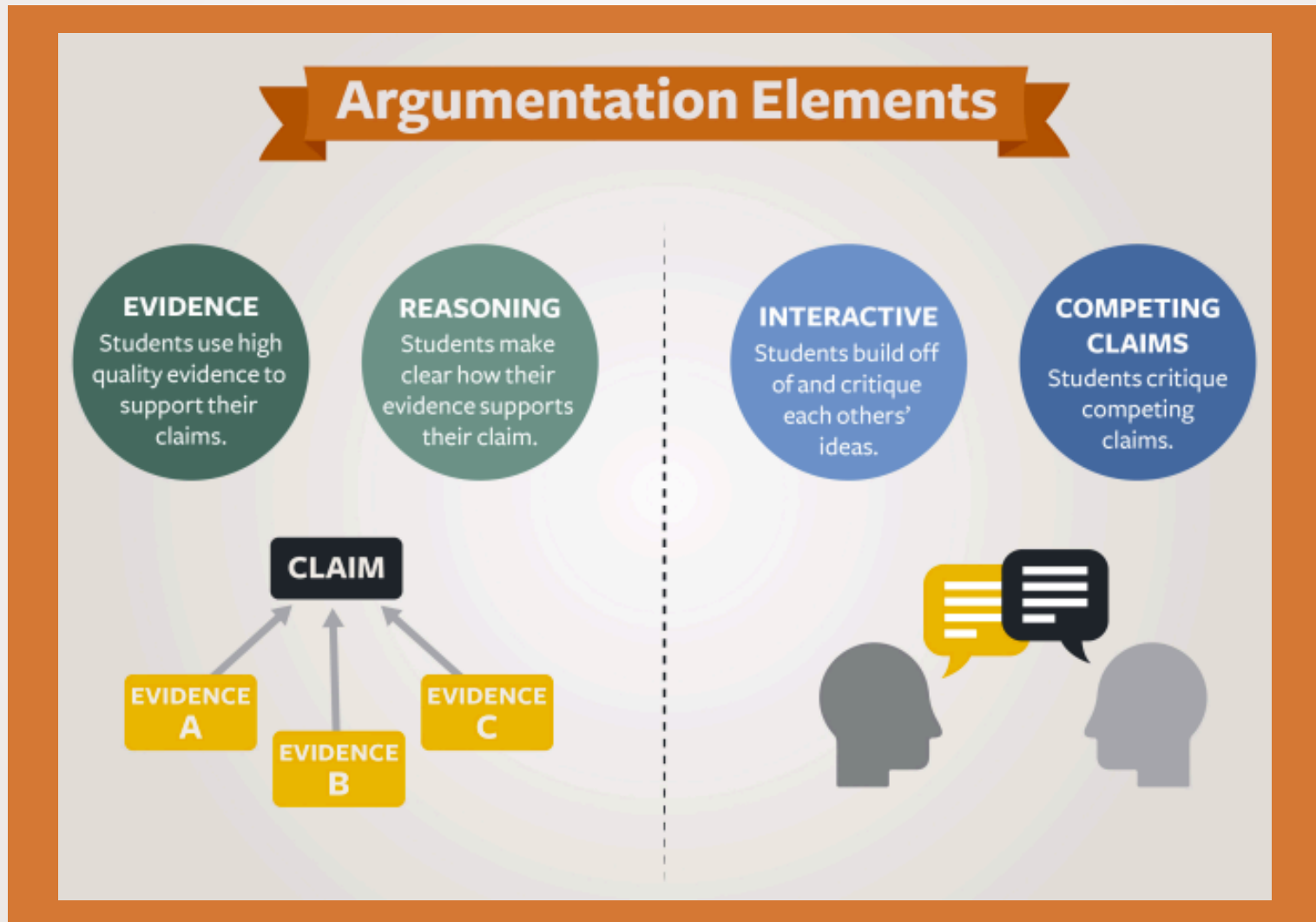This work has been a collaboration between Boston College and the Lawrence Hall of Science

We're going to start by watching a video that introduces The Argumentation Toolkit

1. Introduction and overview of The Argumentation Toolkit

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4 Design Features for the Learning Modules:

- Providing images of practice

- Problematizing instruction

- Offering the student perspective

- Encouraging Teacher Reflection

2. Video & Discussion: Designing argumentation tasks

We're going to watch a video of 7th grade students engaged in a partner discussion

Students used a metabolism simulation to gather data and were considering which of the following two claims was better supported by their evidence:

- Abdi's claim – Eating a lot of food before you exercise will give you more energy than eating small amounts of food during exercise

- Desiree's claim – Eating small amounts of food more frequently during exercise will give you more energy than eating a lot of food before you exercise

2. Video & Discussion: Designing argumentation tasks

Discussion Questions:

- The Toolkit covers four elements of argumentation that students may require extra support with (evidence, reasoning, student interactions, and competing claims). Which of these elements did you see in the video? Where did you see them?

- What criteria do you think the teacher had in mind when designing this rich argumentation task?

- What different criteria do you consider when designing tasks that engage students in argumentation?

3. Presentation: Criteria for rich argumentation tasks

Key criteria:

1. Include a clear guiding question
2. Include multiple potential claims
3. Necessitate the use of evidence
4. Encourage student-driven argumentation

Other things to consider:

- What argumentation elements do you want to emphasize in the lesson?
- What are the needs of your students?
- What are the opportunities in existing curriculum for having students engage in argumentation?
- What kind of evidence is available, and how can you make it accessible to students?
- How do you want students to engage in an argumentation task?
- What types of supports might your students need?

How the four design criteria unfolded in the video just watched

Design Criteria #1: *Include a clear guiding question*

- Although not explicitly articulated in the video, the task was grounded in the guiding question – *Which option gives you more energy for exercising: 1) eating a lot of food before exercising, or 2) eating small amounts of food more frequently while exercising?*

Design Criteria #2: *Include multiple competing claims*

- Students considered which of two claims is better supported by their evidence:
  1. Abdi's claim – Eating a lot of food before you exercise will give you more energy than eating small amounts of food during exercise
  2. Desiree's claim – Eating small amounts of food more frequently during exercise will give you more energy than eating a lot of food before you exercise

Design Criteria #3: *Necessitate the use of evidence*

- Students gathered evidence from a metabolism simulation, which they needed to use to answer the guiding question

Design Criteria #4: *Encourage student-driven argumentation*

- Students led and carried out the argumentation task, debating over which claim was best supported by their evidence. The teacher was not involved in the task.

4. Activity: Evaluating evidence with the Gradient Tool

Before conducting this activity, consider and discuss the following questions:
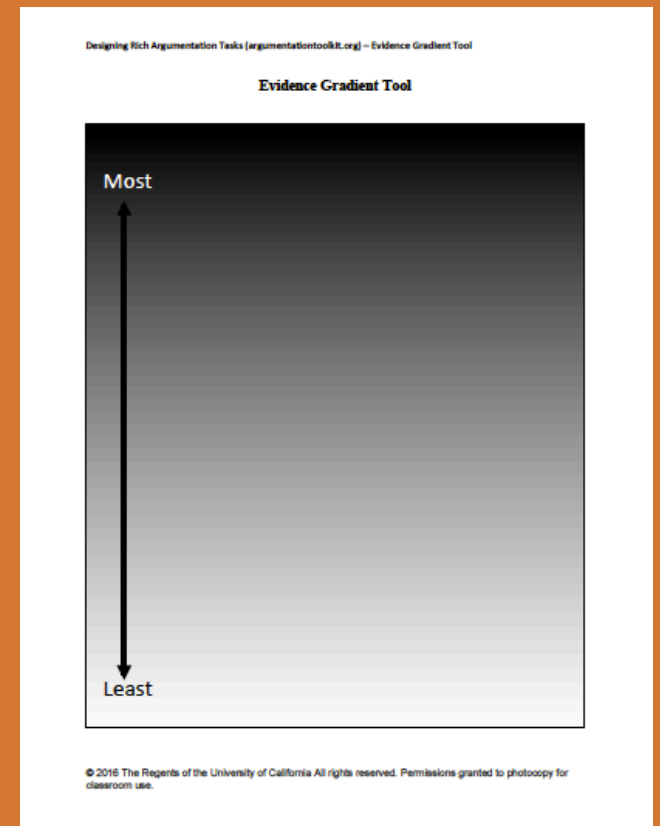
- What are sources you would trust to provide high quality evidence? Why would you trust these sources?

- What are sources you would not trust to provide high quality evidence? Why would you not trust these sources?

4. Activity: Evaluating evidence with the Gradient Tool

The Task (Part 1):

- Use the Evidence Gradient Tool to sort the possible evidence cards according to their source. Place those that are of higher quality at the top of the Gradient Tool, and those that are of lower quality at the bottom

- Make sure you articulate *why* you rank cards as you do

- Once you have completed the task, share your work with another group and discuss any disagreements you may have

Designing Rich Argumentation Tasks (argumentationtoolkit.org) – Evidence Gradient Tool

Evidence Gradient Tool

Most

Least

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4. Activity: Evaluating evidence with the Gradient Tool

The Task (Part 2):

- Eliminate cards that you ranked of low quality in terms of source

- Use the Evidence Gradient Tool to rank the remaining evidence cards in terms of how well they support the claim – <u>Ocean currents impact baby American eels' chances of survival.</u> Place those that best support the claim at the top of the gradient tool, and those that support it least at the bottom

- Make sure you articulate *why* you rank cards as you do
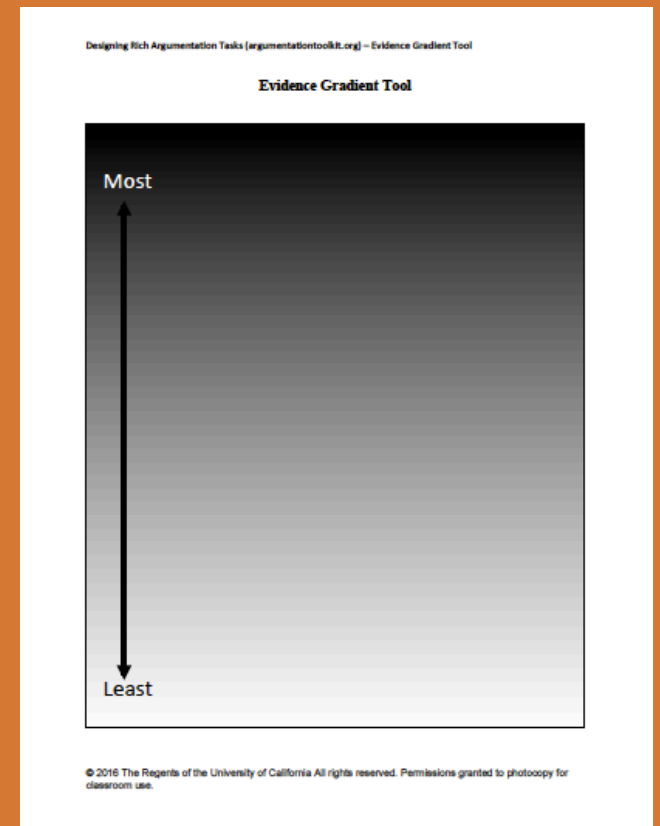
Discussion about the Evidence Gradient Tool

- What did you talk about when you were discussing the source of the possible evidence?

- Were any cards difficult to rank? Why?

- How can you envision your students engaging in this activity? What would work well? What challenges would they have?
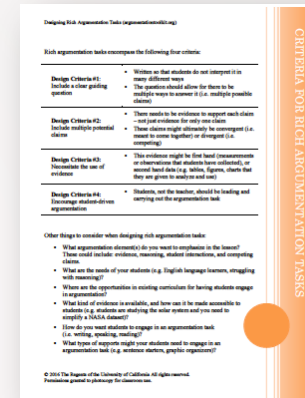
Designing rich argumentation tasks

Key criteria:

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- What kind of evidence is available, and how can you make it accessible to students?

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5. Using the Learning Modules

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Organized by Learning Module

The modules each include a sequence of four 45-minute sessions for a total of 3 hours. These can be used for one longer meeting (i.e. 3 hours) or used over multiple sessions (4 sessions 1 month apart, each for 45 minutes). We recommend using the Introductory Module on Scientific Argumentation first. Any of the other modules may be used after the first one depending on the needs and interests of teachers.

Module Name	Description
• Introductory Module on Scientific Argumentation	• Goal - Introduces the four argument elements. • DCI - Life science focused on fossil record (MS-LS4-1, MS-LS4-2) and the human body systems (MS-LS1-3)
• Advanced Module - Science Seminar	• Goal - Introduces the science seminar, an argumentation activity. • DCI - Earth science focused on weather (MS-ESS2-5) and climate (MS-ESS2-6)
• Advanced Module - Designing Rich Argumentation Tasks	• Goal - Introduces four criteria and other considerations when designing rich argumentation tasks • DCI - Life science focused on growth, development and reproduction of organisms (MS-LS1-5) and fossil record (MS-LS4-1)
• Advanced Module - Evidence and Reasoning	• Goal - Supports teachers in helping students overcome common challenges in using evidence and reasoning in scientific arguments. • DCI - Earth science focused on earth processes, such as earthquakes (MS-ESS2-2), the cycling of earth materials (MS-ESS2-1), and the force of gravity (MS-ESS2-4).

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5. Using the Learning Modules

Agenda

The agenda for this module's sessions can be found within each session's page. However, you can also click here for a downloadable version of the agenda that cuts across all four sessions in this introductory module.
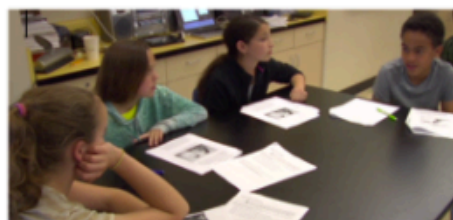
Session Name	Description	Length
Session #1: What is the role of evidence in a scientific argument?	This session introduces the four areas of argumentation that students need extra support in, and then focuses specifically on the role of evidence.	45 minutes
Session #2: How does considering competing claims support students' use of evidence and reasoning?	This session illustrates how engaging students in competing claims supports their use of evidence and reasoning, and also deepens their understanding of the science content.	45 minutes
Session #3: What is the role of reasoning in a scientific argument?	This session focuses on the role of reasoning, and introduces an instructional strategy that can help students incorporate reasoning into their written arguments.	45 minutes
Session #4: How do we support students in interacting with peers during argumentation?	This session highlights the interactive nature of argumentation using an activity in which students analyze data with peers.	45 minutes

5. Using the Learning Modules

Organized by Session

The sessions that make up these modules can also be accessed individually, either by *argumentation element* (e.g. evidence, competing claims) or by *activity* (e.g. card sort, student writing). Each session is 45 minutes long. If you do select sessions here, consider the background of the teachers. The sessions pulled from the Advanced Modules assume some familiarity with the argumentation elements. See this organization below.

Session Name	Argumentation Element	Activity
• What is the role of evidence in a scientific argument?	• Evidence	• Card Sort
• How does considering competing claims support students' use of evidence and reasoning?	• Competing Claims	• Cart Sort
• What is the role of reasoning in a scientific argument?	• Reasoning	• Reasoning Tool, Student Writing

The Argumentation Toolkit

What is the role of evidence in a scientific argument?

Session Goals:

- Teachers will be introduced to four areas of argumentation in which students need extra support: 1) Evidence, 2) Reasoning, 3) Student Interaction and 4) Competing Claims.
- Teachers will develop an understanding of argumentation as a social process in which students build, question and critique claims using evidence and reasoning.
- Teachers will be introduced to a Card Sort as an instructional activity that encourages students to think about what evidence does and does not support a claim.
- Teachers will design a new lesson or revise an existing lesson to integrate argumentation into their science instruction.*
- Teachers will identify areas of argumentation that are challenging for their students.*

*Note: These final two goals are only applicable if the module is implemented as multiple sessions

Agenda:

1. Video: Introduction to module
2. Activity: Mystery card sort 1
3. Video & Discussion: Encouraging talk about evidence
4. Session takeaways

*Extension - Try it with your students!

Materials:

1. Detailed agenda for facilitator
2. Card Sort 1

Presentation View

Scrolling Viewing Option

1. Video: Introduction to module

Watch the video below, which discusses the four areas of argumentation that students need extra support.

02:12   HD

2. Activity: Mystery card sort 1

The task:

1. Work in pairs or small groups to sort cards as supporting, maybe supporting, or not supporting the claim: *The fossil tooth came from a prehistoric mountain lion, which is related to mountain lions that live today.*
2. Make sure to articulate *why* you sort cards as you do.

5 centimeters

Setting up your cards:

Claim: The mountain tooth came from a prehistoric lion.

Supports the claim.   **Might** support the claim.   **Does not** support the claim.
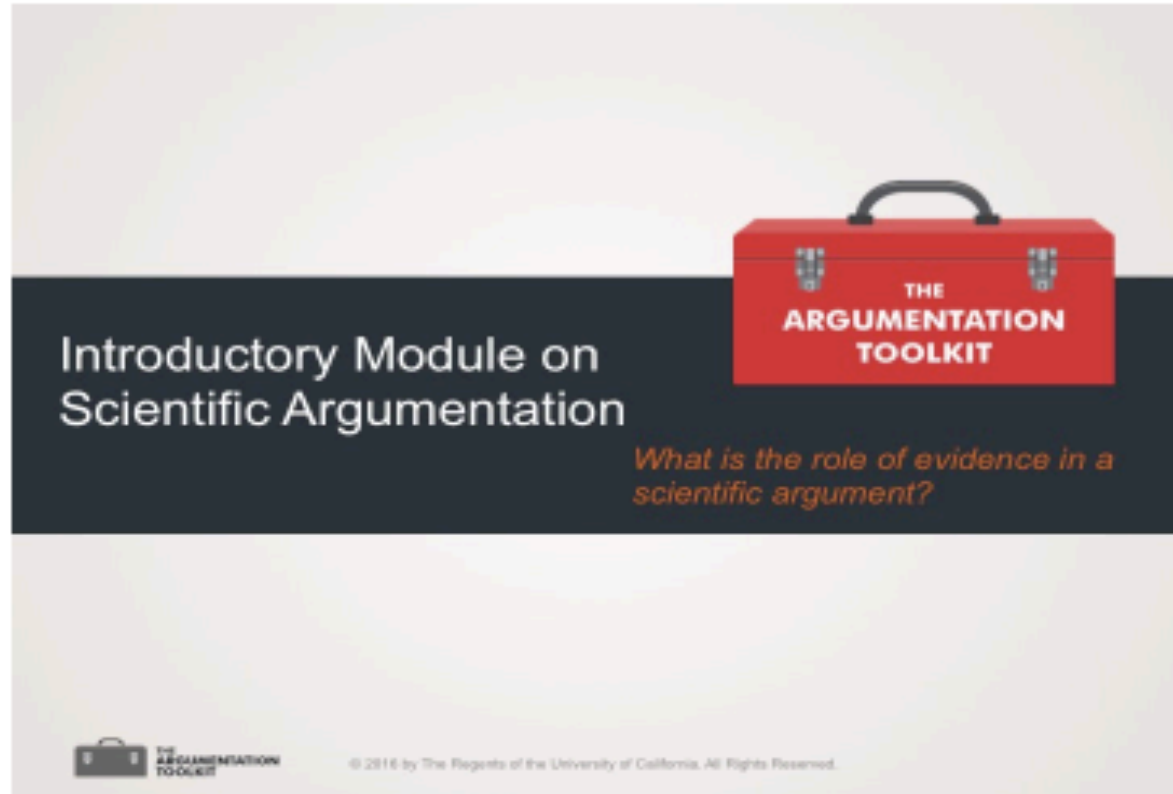
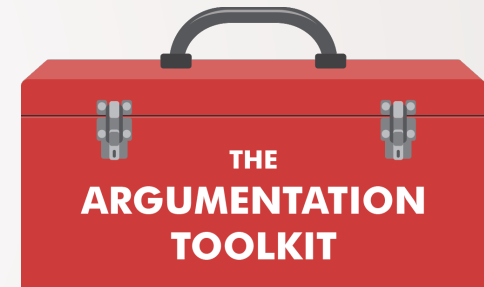# Presentation View
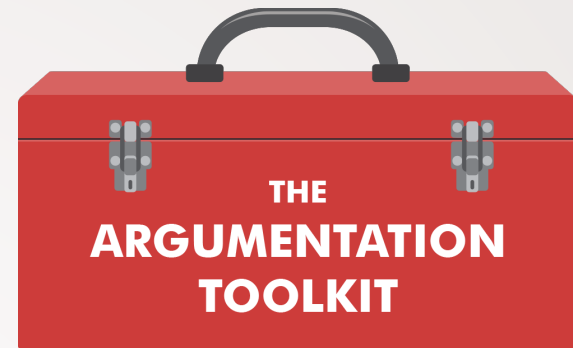
Questions and Contact Information

Questions???

argumentationtoolkit.org

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PARTNERS AND RECOGNITION

Developed in collaboration
with Boston College

Funding provided by
National Science Foundation

NSF DRL-1119584

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the National Science Foundation.

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