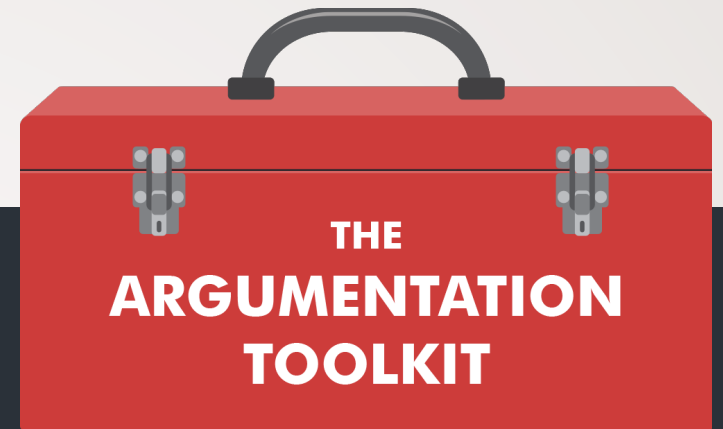


Argumentation Toolkit: Resources for Developing a Classroom Culture for Scientific Argumentation



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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



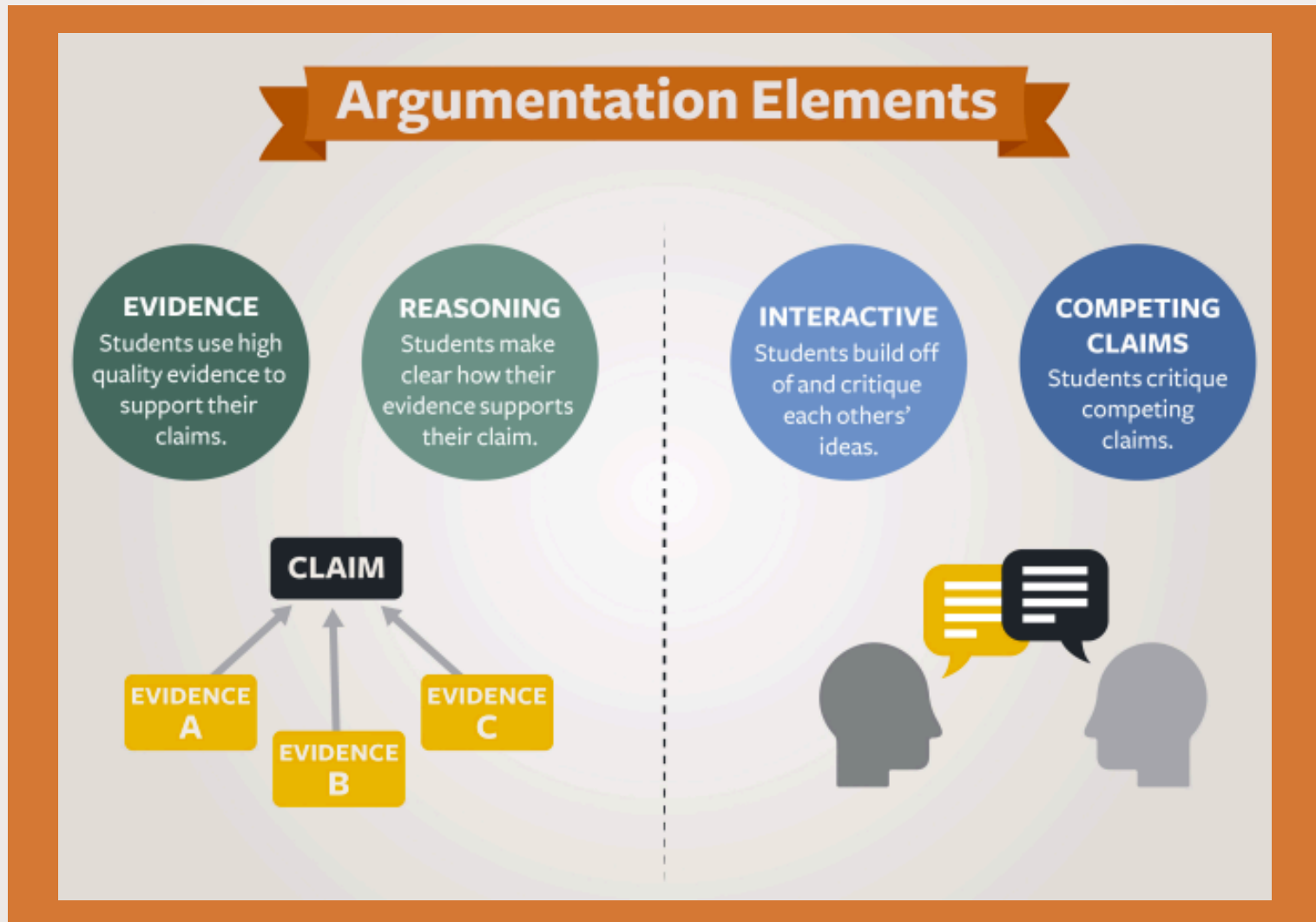
The Learning
Design Group

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



THE
ARGUMENTATION
TOOLKIT

1. Introduction and overview of The Argumentation Toolkit



1. Introduction and overview of The Argumentation Toolkit



1. Introduction and overview of The Argumentation Toolkit

4 Design Features for the Learning Modules:

- Providing images of practice
- Problematizing instruction
- Offering the student perspective
- Encouraging Teacher Reflection

2. Activity: Analyzing data with peers

The task:

1. Examine results from three studies to develop the strongest argument in response to the question – *When a person trains to become an athlete, how does her body change to become better at releasing energy?*
2. Work with others as you engage in this task, making sure to: listen to one another, ask each other questions, build off other's ideas, critique ideas that you do not agree with, and be convincing

Study A		Study B		Study C	
Team	Long Test Score (out of 100)	Team	Long Test Score (out of 100)	Team	Long Test Score (out of 100)
Team A1	85	Team B1	78	Team C1	92
Team A2	72	Team B2	88	Team C2	85
Team A3	90	Team B3	75	Team C3	78
Team A4	88	Team B4	82	Team C4	80
Team A5	75	Team B5	70	Team C5	88
Team A6	82	Team B6	85	Team C6	75
Team A7	78	Team B7	72	Team C7	82
Team A8	80	Team B8	78	Team C8	78
Team A9	85	Team B9	80	Team C9	85
Team A10	82	Team B10	75	Team C10	80
Average	82	Average	78	Average	82

Background Science Content:

- When the human body exercises, cells need more energy.
- The mitochondria in cells need both glucose and oxygen to release energy.
- The body systems work together to deliver glucose and oxygen to the cells in the body.

Discussion about Activity:

- What did you talk about when you engaged in this task?
- How did interacting with others influence the argument you developed?
- What types of supports do you think your students might need to engage in this element of argumentation?

**Extension discussion - Try it with your students!*

Share your experience:

- Share the lesson you developed to focus on reasoning, as well as any student artifacts you may have.

Discussion Questions:

- What went well with the lesson? Why do you think it went well?
- What was challenging with the lesson? Why do you think it was challenging?

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?

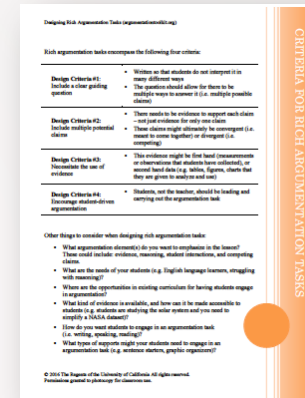
3. Presentation: Criteria for rich argumentation tasks

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:

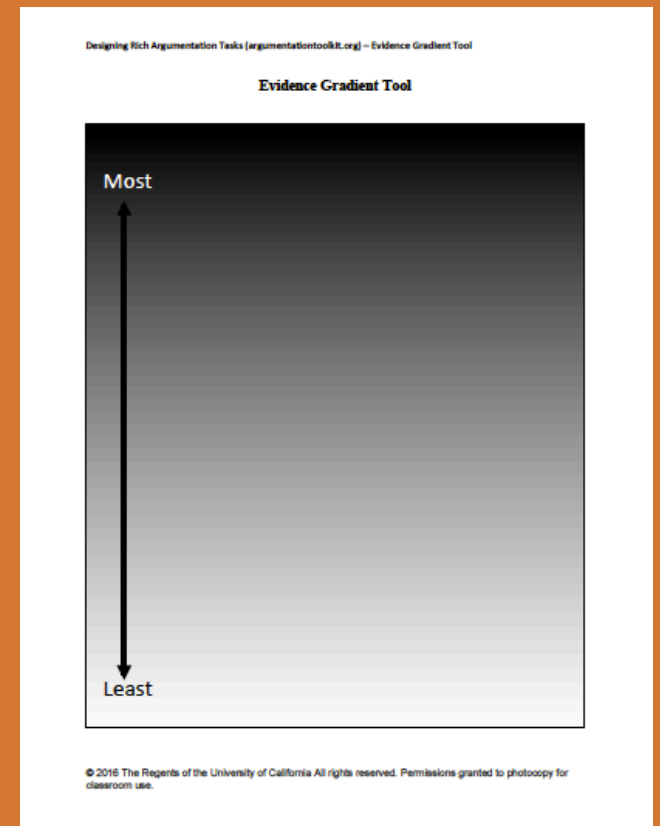
- What are sources you would trust to provide high quality evidence? Why would you trust these sources?
- What are sources you would not trust to provide high quality evidence? Why would you not trust these sources?



4. Activity: Evaluating evidence with the Gradient Tool

The Task (Part 1):

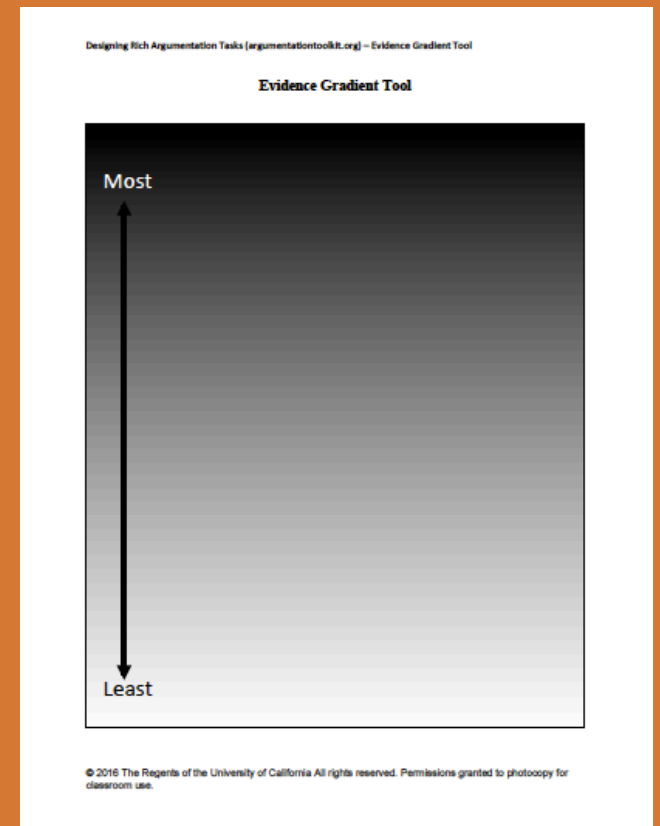
- Use the Evidence Gradient Tool to sort the possible evidence cards according to their source. Place those that are of higher quality at the top of the Gradient Tool, and those that are of lower quality at the bottom
- Make sure you articulate *why* you rank cards as you do
- Once you have completed the task, share your work with another group and discuss any disagreements you may have



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 – Ocean currents impact baby American eels' chances of survival. 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?

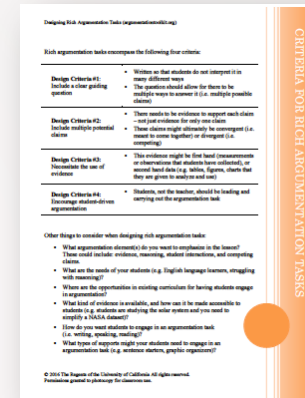
Designing rich argumentation tasks

Key criteria:

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?



5. Using the Learning Modules



5. Using the Learning Modules



The screenshot displays the homepage of 'The Argumentation Toolkit'. The header features a dark blue navigation bar with the title 'The Argumentation Toolkit' in white. Below the title is a horizontal menu with tabs: 'Home' (highlighted in green), 'Intro', 'Argument Elements', 'Resources', 'Teacher Learning', and 'About'. An orange arrow points to the 'Teacher Learning' tab. A dropdown menu is open under 'Teacher Learning', listing four modules: 'Introductory Module' (with a right arrow), 'Advanced - Science Seminar' (with a right arrow), 'Advanced - Designing Rich Tasks' (with a right arrow), and 'Advanced - Evidence and Reasoning' (with a right arrow). The 'Advanced - Evidence and Reasoning' module is further expanded, showing a sub-menu with 'Claim' and 'Evidence' (each with a right arrow). The main content area on the left has a white background with the heading 'Building a Culture of Argumentation' in red. Below this is a paragraph: 'The Argumentation Toolkit is a collection of resources designed to help teachers understand and teach scientific argumentation.' and a green 'Learn More' button. The right side of the main content area features a large illustration with colorful speech bubbles and icons of people sitting at a table. At the bottom of the page, there is a small logo for 'THE ARGUMENTATION TOOLKIT' and a copyright notice.

The Argumentation Toolkit

Home Intro Argument Elements Resources **Teacher Learning** About

Building a Culture of Argumentation

The Argumentation Toolkit is a collection of resources designed to help teachers understand and teach scientific argumentation.

[Learn More](#)

Introductory Module > Session 1

Advanced - Science Seminar > Session 2

Advanced - Designing Rich Tasks > Session 3

Advanced - Evidence and Reasoning > Session 4

Claim

Evidence

ARGUMENTATION TOOLKIT

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5. Using the Learning Modules

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
<ul style="list-style-type: none">Introductory Module on Scientific Argumentation	<ul style="list-style-type: none">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)
<ul style="list-style-type: none">Advanced Module - Science Seminar	<ul style="list-style-type: none">Goal - Introduces the science seminar, an argumentation activity.DCI - Earth science focused on weather (MS-ESS2-5) and climate (MS-ESS2-6)
<ul style="list-style-type: none">Advanced Module - Designing Rich Argumentation Tasks	<ul style="list-style-type: none">Goal - Introduces four criteria and other considerations when designing rich argumentation tasksDCI - Life science focused on growth, development and reproduction of organisms (MS-LS1-5) and fossil record (MS-LS4-1)
<ul style="list-style-type: none">Advanced Module - Evidence and Reasoning	<ul style="list-style-type: none">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).



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.

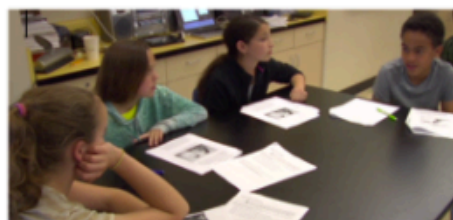
Session Name	Description	Length
Session #1: What is the role of evidence in a scientific argument?	This session introduces the four areas of argumentation that students need extra support in, and then focuses specifically on the role of evidence.	45 minutes
Session #2: How does considering competing 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

- | | | |
|--|--|---|
| <ul style="list-style-type: none">• What is the role of evidence in a scientific argument? | <ul style="list-style-type: none">• Evidence | <ul style="list-style-type: none">• Card Sort |
| <ul style="list-style-type: none">• How does considering competing claims support students' use of evidence and reasoning? | <ul style="list-style-type: none">• Competing Claims | <ul style="list-style-type: none">• Card Sort |
| <ul style="list-style-type: none">• What is the role of reasoning in a scientific argument? | <ul style="list-style-type: none">• Reasoning | <ul style="list-style-type: none">• Reasoning Tool, Student Writing |



The Argumentation Toolkit

[Home](#)[Intro](#)[Argument Elements](#)[Resources](#)[Teacher Learning](#)[About](#)

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.



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.



Setting up your cards:

Claim: The mountain tooth came from a prehistoric lion.

Supports the claim.

Might support the claim.

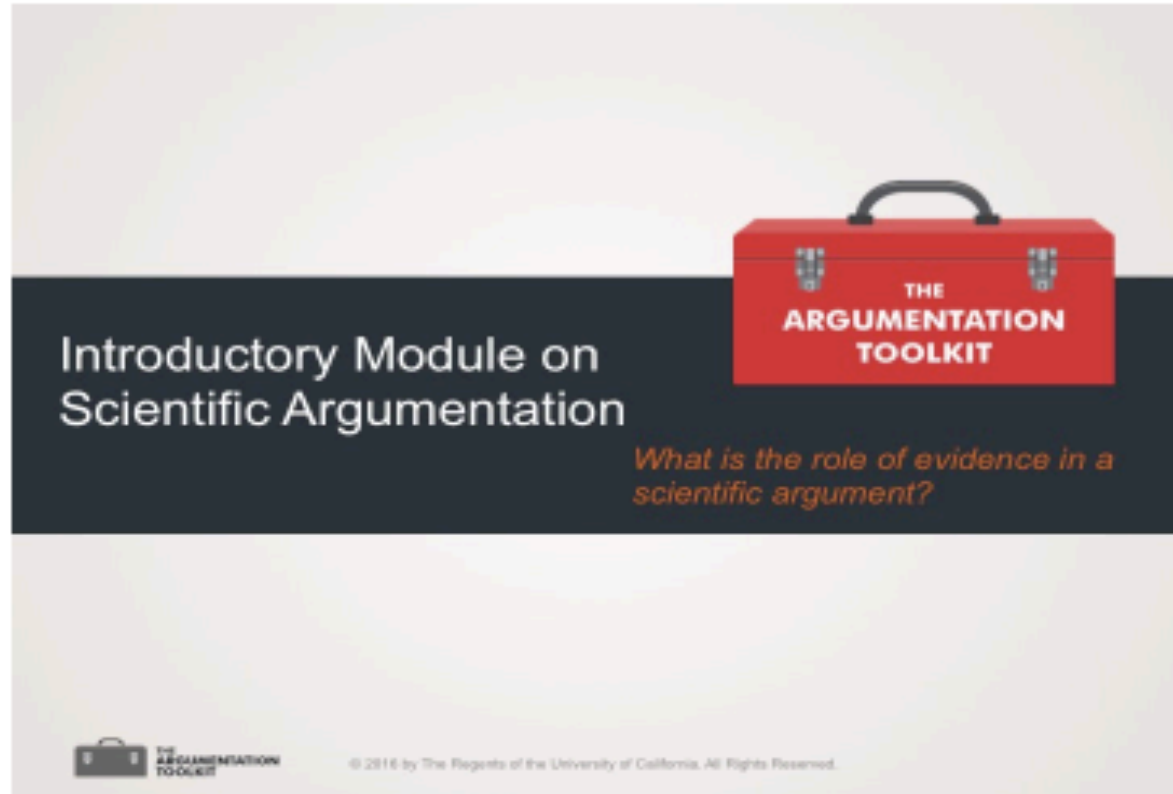
Does not support the claim.



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Presentation View:

Presentation View



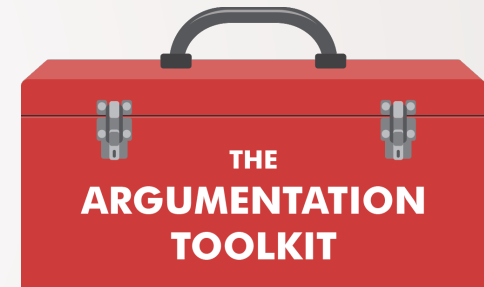
Video 1 - Argumentation Toolkit Overview



Questions and Contact Information

Questions???

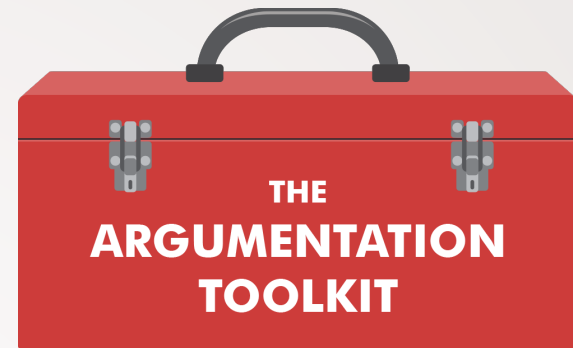
argumentationtoolkit.org



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The Learning Design Group



PARTNERS AND RECOGNITION



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