ILLINOIS STATE BOARD OF EDUCATION

REGIONAL OFFICE OF EDUCATION #47
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SCIENCE EDUCATORS SESSION 6:

Evidence in Action: Supporting Students in Making Science Claims That Stand

Illinois Science Capacity Builders Series

CONTEXT , INTRODUCTIONS, and ROLES:

October – June 2026 Professional Learning

Synchronous virtual sessions, Asynchronous virtual sessions (spring 2026), Face to Face Session (June 2026). All professional learning supported by funds through the Illinois State Board of Education.

IL SCIENCE STEERING COMMITTEE

Meagan Budke, ISBE

Anji Garza, PD & Ed Service Director, ROE 47 (Tech, Chat)

Heather Galbreath, 6th Grade Science Teacher Galesburg, IL

Brian Gibbs, Educator, Bradley School District 61

Sarah Meador, Director of ROE Services, ROE 8

Dawn Novak, Professional Learning Designer, Northwestern University

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Kristin Rademaker, Professional Learning Specialist, NSTA

Misty Richmond, Middle School Science Teacher, CPS

Richard Stokes, University of Illinois - Springfield

Nicole Vick, Science Education Consultant

You! Breakout Participant, Speaker

Purpose & Desired Outcome

Purpose

To deepen your understanding of the Illinois Science Standards, build your capacity to teach science, and support greater student success.

Desired Outcome

By the end of this meeting we will have:

- Experience the science practice of Constructing Arguments from Evidence from a student perspective.
- Gather and analyze evidence from phenomena to develop clear, defensible claims.
- Engage in structured argumentation routines that support justification and reasoning.
- Deepen their understanding of how evidence-based explanations progress across grade levels.
- Identify scaffolds and instructional supports that strengthen students' reasoning and discourse.
- Leave with CER tools, argumentation routines, and classroom-ready strategies to elevate student argumentation.

Participant Guidelines

- Cameras on if possible
- Participate though chat, hands up feature, and breakout sessions
- Resist the temptation to multitask
- Take care of your own needs

Please rename yourself and include your grade level. e.g. 2nd Grade, Anji Garza.

What do we mean by Argumentation from Evidence?

Stop & Jot

What does argumentation from evidence mean to you?

What does this look and/or feel like in the classroom?

What do we mean by Argumentation from Evidence?

Argumentation is a process for reaching agreements about explanations and design solutions.

In science:

- identify strengths and weakness around a line of reasoning
- evidence is formulated from a solid foundation of data
- re-examine own understanding after reviewing other's evidence and feedback
- collaboration with peers to come to consensus to develop the best (working) explanation of a phenomenon

National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas.* The National Academies Press. https://doi.org/10.17226/13165

What do we mean by Argumentation from Evidence?

Argumentation is a process for reaching agreements about explanations and design solutions.

In engineering:

- peer collaboration to select most promising solution
- use systematic methods to compare alternatives including:
  - formulating evidence from testing data;
  - arguing from that evidence to defend a conclusion;
  - critically evaluate other's ideas; and,
  - revise the design to achieve the best solution.

National Research Council. (2012). *A framework for K-12 science education: Practices, crosscutting concepts, and core ideas.* The National Academies Press. https://doi.org/10.17226/13165

What does this look like in a classroom?

Elements of Argumentation

1. Evidence
2. Reasoning
3. Student Interaction
4. Competing Claims

Evidence

This is what students need to support a claim

- Can include data, readings and observations
- Students should learn to evaluate quality of evidence

Reasoning

Uses scientific ideas or principles to make logical connections to show how the evidence supports the claim

- Should include statements to explain why evidence/ science ideas connect to the claim

Student Interactions

Argumentation is meant to be interactive!

- Students should build on, question and critique the ideas of peers
- In order for this to happen, the classroom needs to have a culture of argumentation.
- Teacher can take a step back in leading discussion, but doesn't need to be absent from discussion (check in with groups, take notes)

Competing Claims

Competing claims lead to interaction between students

- Recognizing that evidence can lead to multiple interpretations
- Providing a reason to engage in argumentation
- Moving beyond finding the “right answer”

How do we get there?

Misty Richmond

Poll: Who is the real GOAT 🐐

Why do scientists engage in argumentation?

Rush Holt Addresses Town Hall at Pacific Division 2016 meeting

Science advances because scientists challenge, critique, and refine each other's explanations using evidence. Argumentation is not conflict — it's how scientific knowledge improves.

What caused the dinosaurs to go extinct?

Asteroid impact

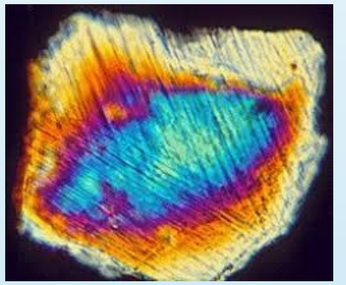
Massive volcanic eruptions

Climate change

Possible Evidence

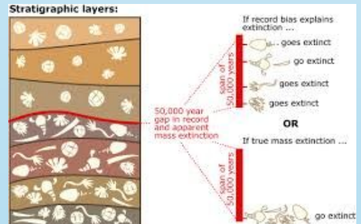
➔ Iridium in rock layers

➔ shocked quartz



➔ the Chicxulub crater

➔ fossil extinction patterns



Students prior experience

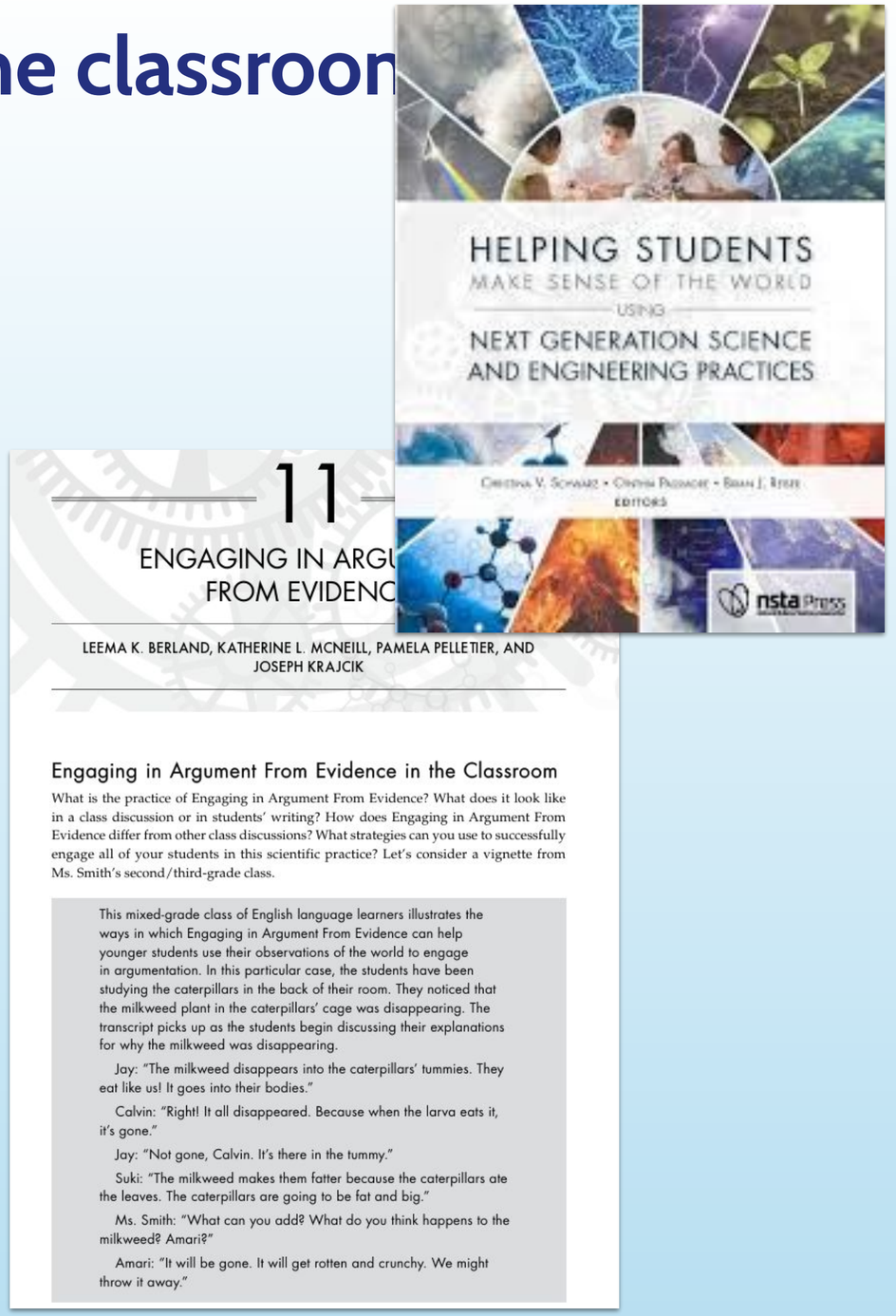
In the chat:

Where do students already argue using evidence?

What does this look like in the classroom

Read the vignette, then discuss with your small group:

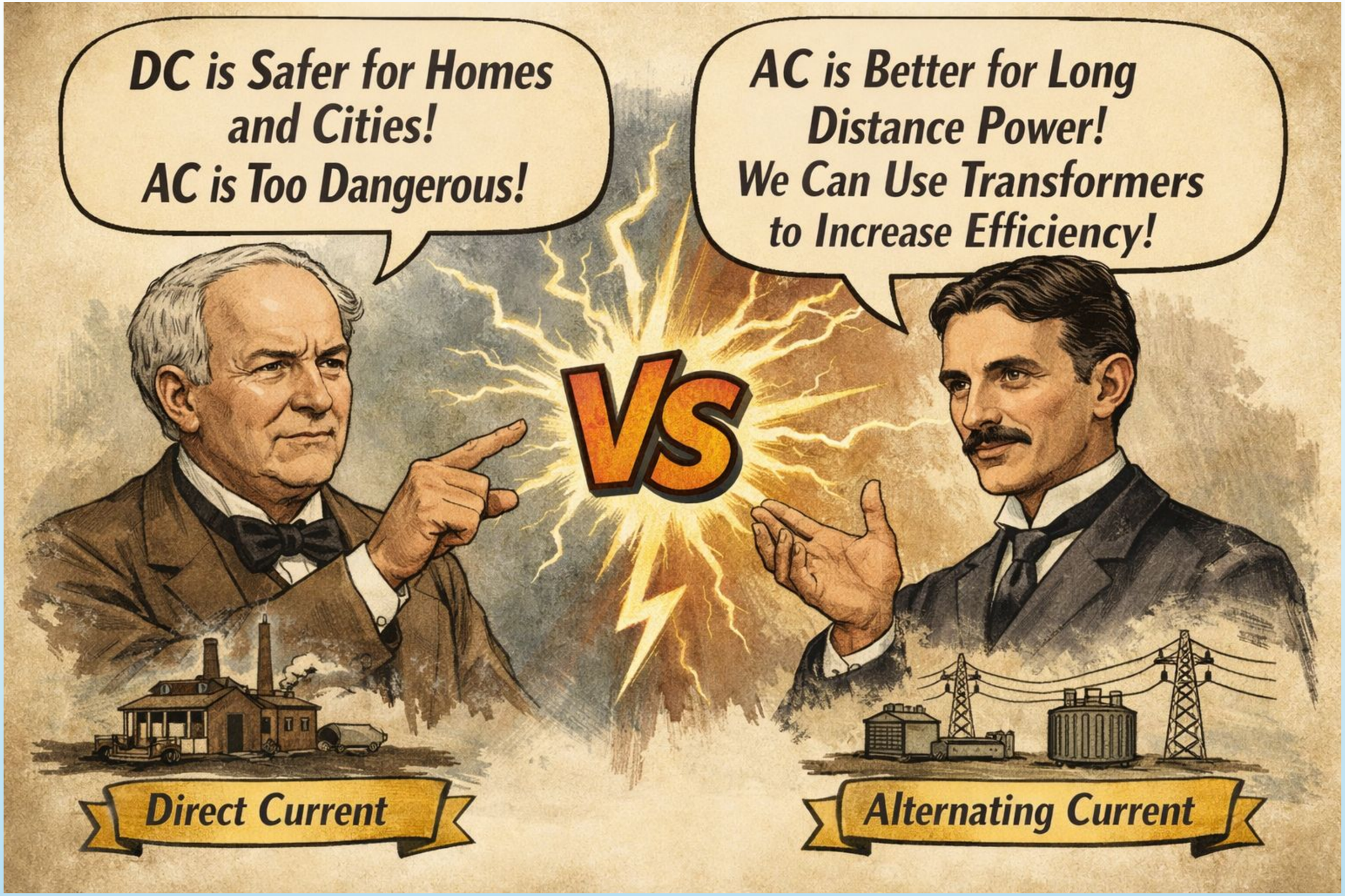
- Where in this discussion do you see students engaging in argument (sharing claims, using evidence, or critiquing ideas) and what makes those moments different from simply sharing ideas?
- How does disagreement between students help the class build a stronger explanation about what is happening to the milkweed?



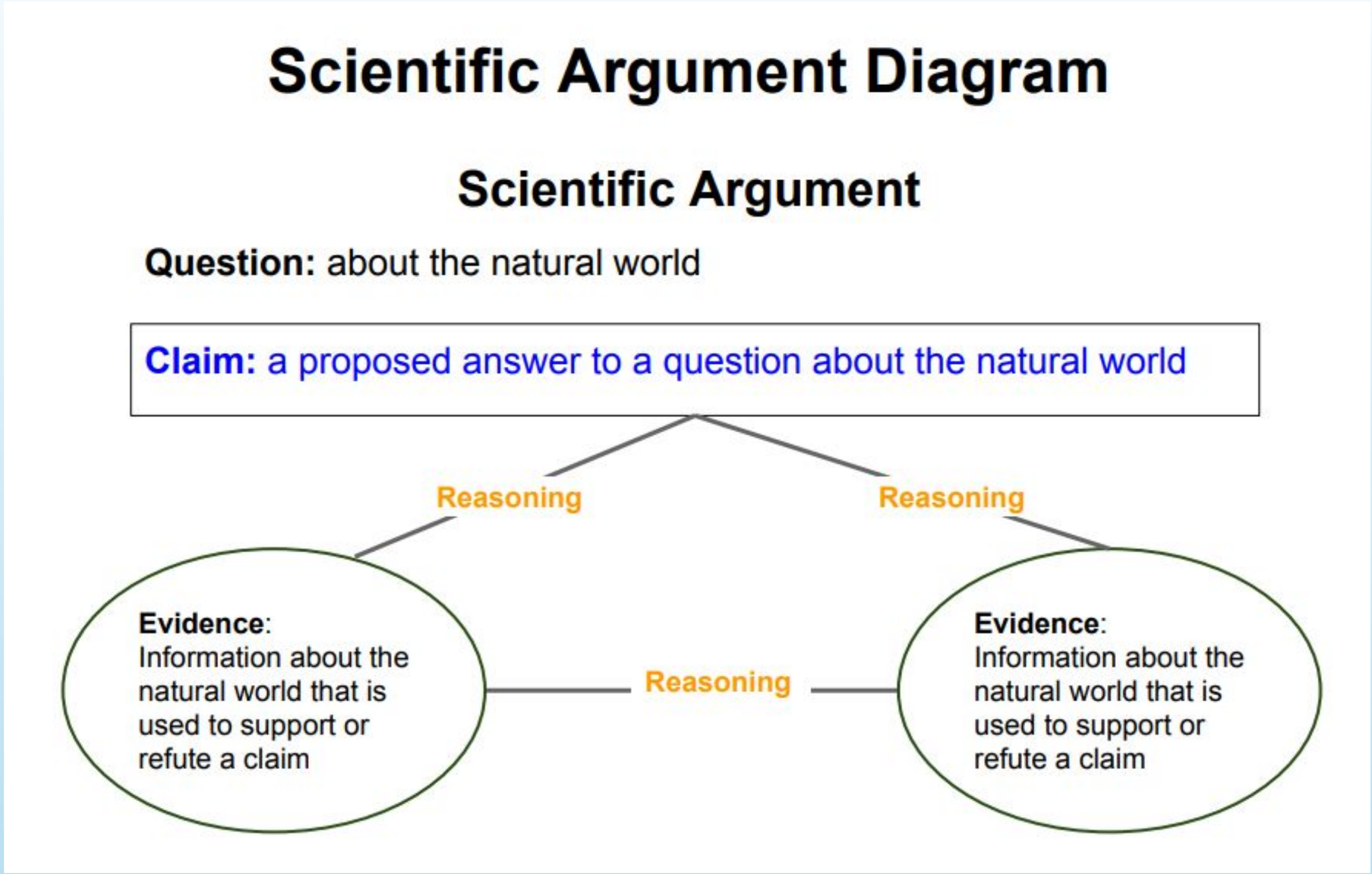
ELA and Science Argumentation

Feature	Argumentation in Science (NGSS)	Argumentation in ELA (Common Core)
Purpose	Explain natural phenomena and develop the best scientific explanation	Persuade an audience or defend a position
Type of Evidence	Data, observations, investigations, models, scientific ideas	Textual evidence, sources, examples, experiences
Argumentation Structure	Claim → Evidence → Reasoning explaining how evidence supports a scientific explanation	Claim/Opinion → Reasons → Evidence/Examples organized to persuade or support a viewpoint
Focus of Reasoning	Cause-and-effect explanations about how the world works	Persuasion and interpretation of ideas
Process	Collaborative discussion, critique of ideas, refining explanations	Constructing and defending an argument for an audience
Goal of Disagreement	Build the strongest explanation based on evidence	Convince others of a position
Introduced in Standards	Begins in Kindergarten through the Science & Engineering Practice: *Engaging in Argument from Evidence*	**Formal argument writing begins in Grade 6**
Language Used in Elementary	Students construct arguments from evidence and evaluate competing explanations	Students write opinions supported by reasons
Development Across Grades	K–5: Identify evidence, make claims, critique explanations → Middle school and beyond: evaluate and refine arguments using multiple sources of evidence	K–5: Opinion writing with reasons → Grade 6+: Claims, evidence, reasoning, and formal argumentative writing

Edison vs. Tesla: War of the Currents



Scaffolds to Support SEP



The Lawrence Hall of Science. (2024). The argumentation toolkit. University of California, Berkeley. https://drive.google.com/file/d/1KaI5hmI_h29NuLFVNup5fuCzM4o84rhP/view

Reasoning Tool

Evidence	This evidence matters because . . .	Therefore, . . .

Argument About Vegetables

Claim: Vegetables are good for you.

Evidence used in argument: Vegetables contain fiber and vitamins, such as Vitamin C.

The Lawrence Hall of Science. (2024). The argumentation toolkit. University of California, Berkeley. https://drive.google.com/file/d/1KaI5hmI_h29NuLFVNup5fuCzM4o84rhP/view

Reasoning Tool: Vegetables

Evidence	This evidence matters because . . .	Therefore, . . .
Vegetables contain Vitamin C.		Vegetables are good for you. 
Vegetables contain fiber.		

The Lawrence Hall of Science. (2024). The argumentation toolkit. University of California, Berkeley. https://drive.google.com/file/d/1KaI5hmI_h29NuLFVNup5fuCzM4o84rhP/view

Reasoning Tool: Vegetables (with reasoning)

Evidence	This evidence matters because . . .	Therefore, . . .
Vegetables contain Vitamin C.	**Eating vegetables and fruits that contain a lot of Vitamin C can help heal wounds and protect against colds and allergies.**	Vegetables are good for you. 
Vegetables contain fiber.	**Eating vegetables that contain fiber can reduce the risk of heart disease, obesity, and type 2 diabetes.**	

The Lawrence Hall of Science. (2024). The argumentation toolkit. University of California, Berkeley. https://drive.google.com/file/d/1KaI5hmI_h29NuLFVNup5fuCzM4o84rhP/view

Comparing Arguments About Vegetables

Argument #1

Vegetables are good for you. They contain fiber and vitamins, such as Vitamin C. You should eat vegetables every day.

Argument #2

Vegetables are good for you. They contain fiber. Scientists have found that fiber can reduce the risk of heart disease, obesity, and type 2 diabetes.

Vegetables also contain important vitamins, such as vitamin C. Vitamin C has been shown to heal wounds and may even help protect us against colds and allergies. Since they have so many health benefits, you should eat vegetables every day.

The Lawrence Hall of Science. (2024). The argumentation toolkit. University of California, Berkeley. https://drive.google.com/file/d/1KaI5hmI_h29NuLFVNup5fuCzM4o84rhP/view

Let's try this together....

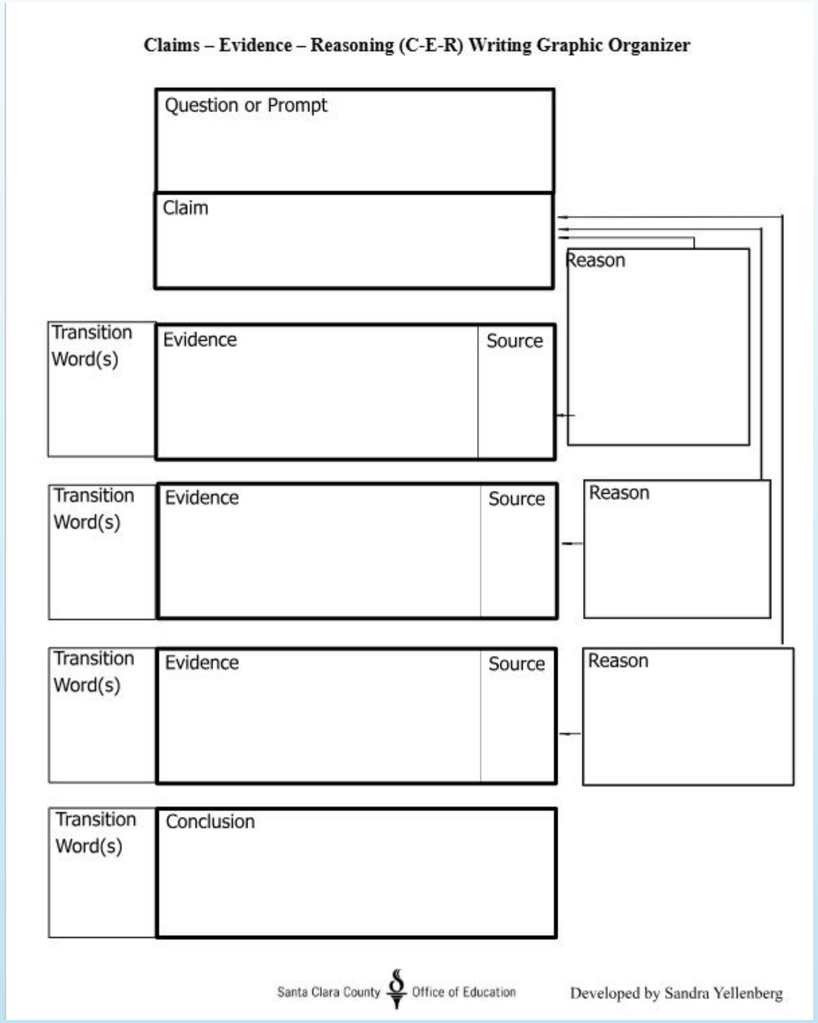
Question: How does light affect the temperature of a closed system?

Average Water Temperature Change vs. Light Measurements (% Incoming Light)

	Condition	ΔT (Change in Temp.)	Transmitted	Reflected
Light	Clear	+1 °C	203%	17%
	Foil	+2 °C	4.2%	27.8%
	Black	+3 °C	2%	10.7%
	White	+2 °C	2.4%	17.6%
Dark	Clear	0	0	0
	Foil	0	0	0
	Black	0	0	0
	White	0	0	0

Evidence	**This evidence matters because…**	**Therefore,…**
All the cups in the light increased in temperature, all cups in dark did not change	without the light there is no energy added to the system	without the light we would not have a temperature increase.
Black cup only transmitted 2% of light and absorbed most of the light	this matters because it shows more energy stays in system it will increase temp	light absorb by the system will cause a temperature increase.

More Tools to Help Support Scientific Arguments



Claims – Evidence – Reasoning (C-E-R) Writing Graphic Organizer

Question or Prompt

Claim

Reason

Transition Word(s)	Evidence	Source
Transition Word(s)	Evidence	Source
Transition Word(s)	Evidence	Source

Reason

Reason

Transition Word(s) — Conclusion

Santa Clara County Office of Education — Developed by Sandra Yellenberg

Transition Words (http://www.smart-words.org/transition-words.html)

Agreement / Addition / Similarity

The transition words like ***also, in addition, and, likewise***, add information, reinforce ideas, and express agreement with preceding material.

in the first place	in the light of	moreover	also
not only ... but also	not to mention	as well as	then
as a matter of fact	to say nothing of	together with	equally
in like manner	equally important	of course	identically
in addition	by the same token	likewise	uniquely
coupled with	again	comparatively	like
in the same way	to	correspondingly	furthermore
first, second, third	and	additionally	similarly

Cause / Condition / Purpose

These transitional phrases present specific conditions or intentions.

in the event that	with this in mind	unless	in case
granted (that)	in the hope that	when	provided that
as / so long as	to the end that	whenever	given that
on (the) condition (that)	in order to	since	only / even if
for the purpose of	seeing / being that	while	so that
with this intention	in view of	because of	so as to
while	If ... then	as	owing to
	due to	since	inasmuch as

Effect / Consequence / Result

Some of these transition words (***thus, then, accordingly, consequently, therefore, henceforth***) are words that are used to show that ***after*** a particular time there was a consequence or an effect.

as a result	then	consequently	accordingly
under those circumstances	hence	therefore	henceforth
in that case	for	because the	thereupon
	thus	for this reason	forthwith

Examples / Support / Emphasis

These transitional devices (like ***especially***) are used to introduce examples as support, to indicate importance or as an illustration so that an idea is cued to the reader.

for one thing	that is to say	on the positive / negative side	truly
as an illustration	with attention to	with this in mind	indeed
in this case	by all means	notably	certainly
for this reason	important to realize	including	surely
to put it another way	another key point	like	markedly
frequently	first thing to remember	to be sure	especially
significantly	most compelling evidence	namely	specifically
in fact	must be remembered	to demonstrate	expressively
in general	point often overlooked	to emphasize	surprisingly
in particular	to point out	to repeat	for example
in detail		to clarify	for instance
such as		to explain	in other words
chiefly			to put it differently

Conclusion / Summary / Restatement

These transition words and phrases conclude, summarize and/orrestate ideas, or a indicate a final general statement. Also some words (like ***therefore***) from the Effect / Consequence category can be used to summarize.

as can be seen	as shown above	in a word	in summary
generally speaking	in the long run	for the most part	in conclusion
in the final analysis	given these points	after all	in short
all things considered	as has been noted	in fact	in brief
altogether	on balance	to summarize	in essence
in any event	overall	usually	to sum up
	ordinarily	by and large	on the whole
	all in all		in either case

What do we mean by Argumentation from Evidence?

Reflection

Look back at your responses to the **Stop & Jot**

How have your ideas changed? Or not changed?

How are you feeling about supporting students in Argumentation from Evidence?

Next Steps

- Follow up email from Anji Garza, includes slides, agenda, and video recording
- Encourage your teachers to attend the educator sessions each month.
- Join us for the next session!

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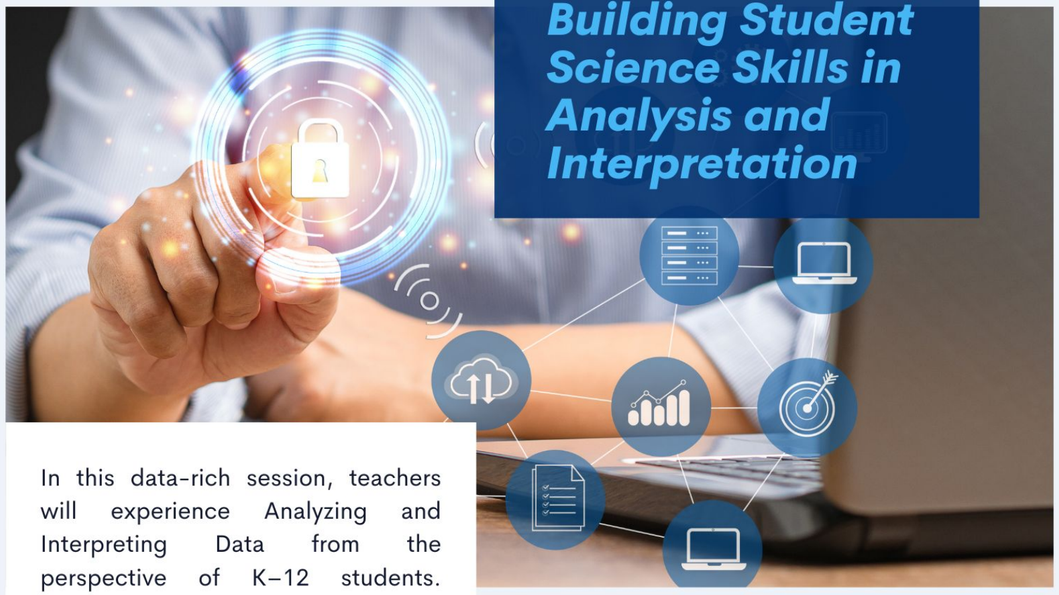
Making Meaning from Data:

Building Student Science Skills in Analysis and Interpretation



In this data-rich session, teachers will experience Analyzing and Interpreting Data from the perspective of K–12 students. Participants will work with multiple forms of data, identify patterns, construct visual representations, and make evidence-based interpretations to explain phenomena. By engaging in the practice as learners, teachers will better understand the developmental progression of data skills and what scaffolds help students make meaning from information. Educators will leave with data routines, graphic organizers, and ready-to-use tools that support student success in data sensemaking.

Monday, April 20, 2026
4:00 - 5:30 p.m.
Zoom

Register Now

Scan QR for more info

This session is offered free of charge,
made possible by funding from the Illinois State Board of Education.

Asynchronous Learning

REIMAGINING SCIENCE INSTRUCTION THROUGH NGSS IN PRACTICE

NGSS in Practice is an **8-week asynchronous professional learning** experience hosted in **Google Classroom**, designed to deepen educators' understanding of three-dimensional science teaching and learning. Participants engage in flexible weekly learning (approximately 2 hours per week) using evidence-based resources, classroom examples, and guided reflection—applying new learning directly to their own instructional materials.

In addition to asynchronous coursework, participants are invited to join f**our optional live Zoom sessions scheduled throughout the course**. These sessions provide space for networking and collaborative dialogue around participant learning, special topics connected to NGSS, and practical implementation of NGSS instructional and assessment practices. Live sessions are designed to extend learning, support sensemaking, and foster connection across grade levels and contexts.

Across the course, educators explore NGSS-aligned curriculum design, instructional supports, and assessment practices while collaborating with peers to strengthen coherence, equity, and student engagement in science instruction. Participants may earn up to **13 PDHs** upon completion.

This session supported by funds from the Illinois State Board of Education.

SCAN QR CODE

ILLINOIS STATE BOARD OF EDUCATION

MARCH 16 - MAY 8, 2026
GOOGLE CLASSROOM

Meeting Evaluation

PLUS

DELTA

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THANK YOU!