



STAC

**SCIENCE & TECHNOLOGY
ADVANCEMENT CENTER**

Using AI to Strengthen Scientific Questioning and Phenomenon-Based Sensemaking

NSTA AI in Education Pathway

April 2026

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About Us

The ***Science & Technology Advancement Center (STAC)***, is a nonprofit organization that works with states, districts, and companies to design, develop and implement high quality science programs. We focus on integrating new and emerging technologies in classroom settings to support 3-dimensional learning.

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Questions Drive Investigations

Strong questions:

- Focus attention on key variables
- Open pathways for investigation
- Reveal student thinking

Weak questions:

- Close down inquiry
- Lead to quick answers, not reasoning
- Doesn't allow the space for productive struggle to occur



What AI Can Do

AI as a Question Generator

Strengths:

- Volume and variety
- Rapid iteration

Limitations:

- Often generic
- May miss key variables
- Can produce uninvestigable questions

We do this

- Generate initial questions about a phenomenon
- Sort questions by type (descriptive, causal, investigable)
- Produce *intentionally flawed* questions

Instructional Core Routine

Generate → *Critique* → *Refine*

Generate

Students + AI produce questions

Critique

Which questions:

Can be investigated?

Focus on cause/effect?

Use observable/measurable variables?

Refine

Improve weak questions

Combine or revise for clarity and depth

Rank questions by usefulness for investigation

THINK

Draft an initial version

CRITIQUE

Identify weaknesses

REFINE

Revise and improve



Classroom Routines & Templates

Question Upgrade

AI generates basic questions

- Students revise to make them:
 - More specific
 - More investigable
 - Mechanism-focused

Find the Flaw

AI generates weak or flawed questions

- Students identify:
 - What's wrong
 - How to fix it

Question Sorting

- Students categorize AI-generated questions:
 - Descriptive vs. causal vs. investigable

Question to Investigation

- Take best question → design data collection approach

Refine the Model





Thank you!

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NSTA Survey Session 11

