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Analyzing and Interpreting Data With AI: Making Sense of Patterns and Anomalies

NSTA AI in Education Pathway
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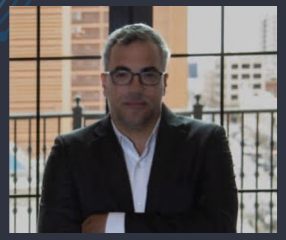
About Us

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.

Chris Lazzaro
Executive Director



Velma Itamura
Operations Director

The Instructional Challenge

In science classrooms, students are often asked to work with tables, graphs, and datasets. Many can identify obvious details, but they may struggle to:

- describe meaningful patterns
- notice anomalies or outliers
- compare datasets effectively
- connect evidence to scientific explanations
- revise an interpretation when new evidence emerges

This session focuses on how AI can help make those thinking moves more visible.

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Role for AI

AI is not there to do the reasoning for students.
AI is there to make reasoning available for critique.

AI can generate:

- a first-pass interpretation of a graph or dataset
- multiple explanations for the same evidence
- comparisons between two datasets
- incomplete analyses
- flawed interpretations that reveal common misconceptions

That creates opportunities for students to examine analytical reasoning instead of just producing a single response.

From Data to Sensemaking

AI can help shift classroom work from simply reading values to making sense of what the data show.

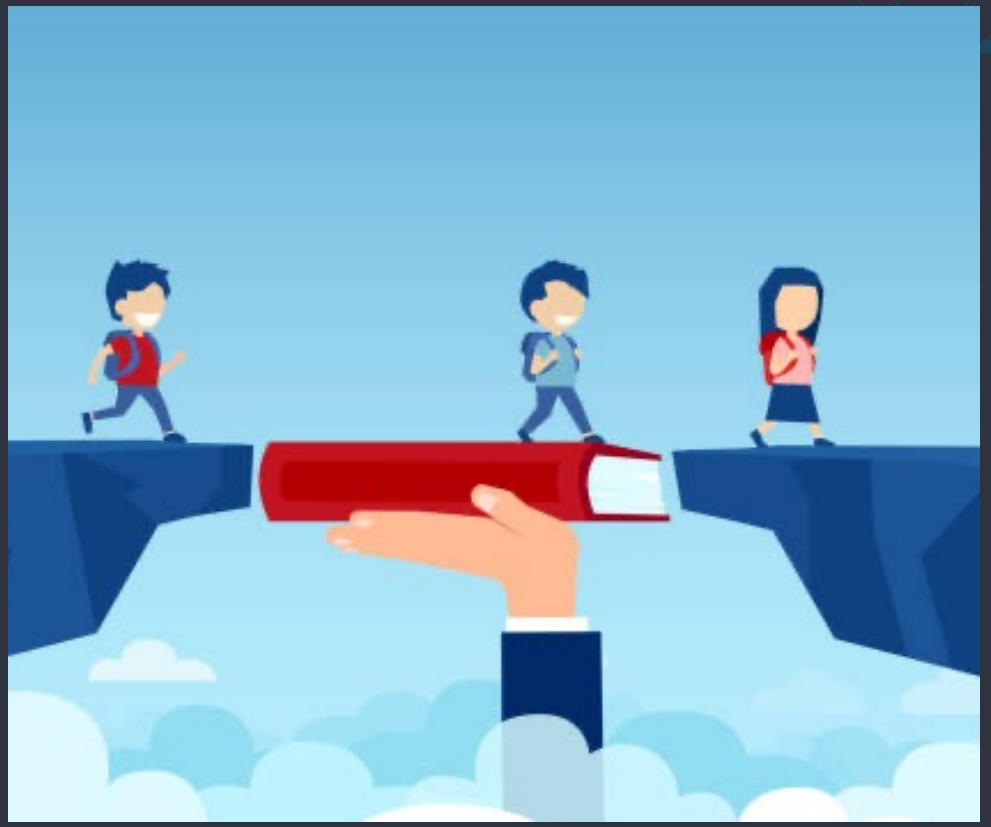
Students can use AI-generated analyses to ask:

- What pattern is being described?
- What evidence supports that claim?
- What did the analysis overlook?
- Is the anomaly meaningful or ignored?
- Are there other plausible explanations?
- How should the interpretation change?

Student Supports

When used purposefully, AI can help students strengthen:

- pattern recognition
- anomaly detection
- evidence-based explanation
- comparison across datasets
- critique of reasoning
- revision of interpretations
- confidence in scientific argumentation



Impact on Student Thinking

Purposeful use of AI can strengthen:

- evidence-based reasoning
- analytical critique
- interpretation of patterns and anomalies
- revision of scientific explanations

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Example

Phenomenon:
After a heavy rainstorm, water in two nearby streams becomes cloudy, but one stream becomes much cloudier than the other.

Time After Rainstorm	Stream A Turbidity (NTU)	Stream B Turbidity (NTU)
Before storm	8	7
1 hour after	45	42
3 hours after	88	79
6 hours after	120	82
12 hours after	95	110
24 hours after	40	28
48 hours after	12	10

What patterns, differences, and unexpected data points do you notice?

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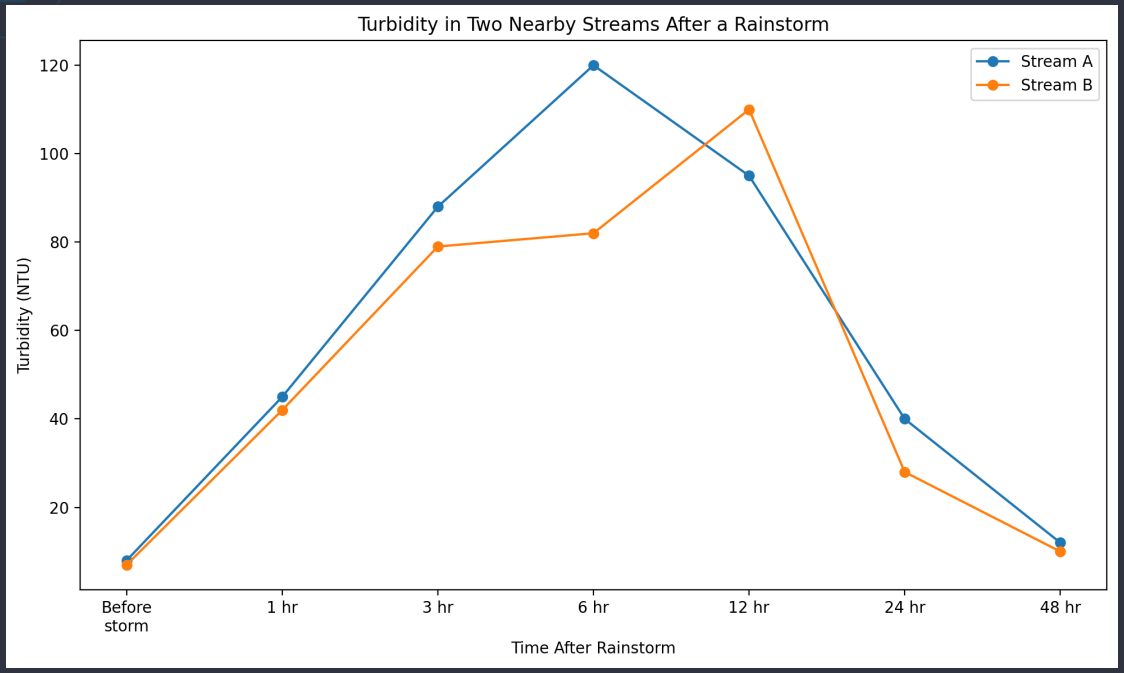
Graph the Data



What patterns do you notice in the data?

What differences do you notice between the two streams?

What data point seems unexpected?

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AI Interpretation

- After the rainstorm, both streams showed increased turbidity as sediment entered the water. Stream A was clearly more affected because it rose faster and peaked higher than Stream B. This means Stream A's watershed is probably more damaged or has less plant cover. The data also show a normal post-storm recovery pattern, with sediment levels dropping steadily after the peak.

AI Interpretation

After the rainstorm, both streams showed increased turbidity as sediment entered the water. Stream A was clearly more affected because it rose faster and peaked higher than Stream B. This means Stream A's watershed is probably more damaged or has less plant cover. The data also show a normal post-storm recovery pattern, with sediment levels dropping steadily after the peak.

- What claim is supported by the data?
- What claim goes beyond what the data show?
- What pattern is real?
- What anomaly needs explanation?
- What did the AI overlook or oversimplify?

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Critique AI Output

After the rainstorm, both streams showed increased turbidity as sediment entered the water. Stream A was clearly more affected because it rose faster and peaked higher than Stream B. This means Stream A's watershed is probably more damaged or has less plant cover. The data also show a normal post-storm recovery pattern, with sediment levels dropping steadily after the peak.

Supported by the data

Needs Revisioning

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Ways to Make Thinking Visible

Annotate the interpretation
or
Comparison Chart

Then, Revise Interpretation

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Annotate the Interpretation

Directions

- Circle claims supported by the data
- Underline claims that overreach the evidence
- Star a pattern that seems real
- Box an anomaly the AI ignored
- Add a note explaining what should be revised

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Comparison Chart

Part of AI Interpretation	Supported by Data?	Evidence from Data	Revise / Question

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Annotate the Interpretation and Comparison Chart

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Thank you!

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NSTA Survey Session 8

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