AI Literacy in Science

Purpose

This STAC handout positions AI literacy in science as a tool-agnostic, disciplinary thinking competency grounded in evidence, reasoning, and the Science and Engineering Practices. It emphasizes intentional AI use, protection of productive struggle, and a shift from product-based tasks to process-based evidence of student thinking.

Key ideas

1. AI literacy in science is about evidence, reasoning, and judgment.
2. Students need a basic understanding of how AI works so they can use it critically and intentionally.
3. The Science and Engineering Practices provide the strongest foundation for AI literacy in science.
4. Science classrooms should protect productive struggle and make student thinking visible.
5. Strong tasks shift from polished products to process-based evidence of reasoning.

STAC definition

AI literacy in science is the ability to use scientific knowledge, evidence, and reasoning to evaluate, critique, and refine information generated by AI. It is a disciplinary thinking competency, not a technical skill.

The thinking is tool agnostic. Students should learn to question, verify, critique, and revise information across tools and contexts so they are prepared for science learning, future work, and informed participation in society.

AI can do	AI cannot do reliably
Generate plausible language, summarize information, suggest patterns, and offer draft ideas or models.	Determine whether a claim is supported by evidence, apply scientific ideas coherently, or replace student sensemaking.

What students need

- A basic understanding that AI generates likely responses from patterns in data, not human-like understanding
- Practice evaluating AI outputs instead of accepting them automatically
- Opportunities to use scientific evidence to accept, revise, reject, or defend claims
- Tasks that keep the important thinking with students

Protect productive struggle

Science learning depends on students wrestling with ideas, interpreting evidence, revising explanations, and working through uncertainty. AI should not lessen the cognitive workload. It should be used intentionally so students still do the thinking that builds durable understanding.

Shift from product to process

In an AI-rich classroom, a polished final answer is no longer enough evidence of learning. Strong science instruction and assessment focus on process: what students noticed, what questions they raised, what evidence they used, what they revised, and how they justified their decisions.

Science & Engineering Practices as the foundation

- Ask questions and define problems
- Develop and use models
- Plan and carry out investigations
- Analyze and interpret data
- Use mathematics and computational thinking
- Construct explanations and design solutions
- Engage in argument from evidence
- Obtain, evaluate, and communicate information

These practices make student thinking visible and keep AI literacy anchored in scientific sensemaking rather than answer-getting.

What this means for instruction and assessment

- Use AI as an imperfect contributor, not an authority.
- Design tasks where evidence matters more than wording.
- Require visible reasoning through annotation, comparison, revision, discussion, or defense.
- Score reasoning, critique, and revision, not just polished fluency.
- Keep the central sensemaking with students.

Quick look-fors

- Students must use evidence and science ideas to judge AI-generated claims.
- The task collects visible traces of student thinking.
- AI supports the work without replacing the reasoning.

Guiding principle

The goal is not to ban AI from science classrooms. The goal is to use AI in ways that strengthen scientific sensemaking, protect productive struggle, and help students become scientifically literate, critical thinkers, and well-informed global citizens.