AI Friction Labs

SAN DOMENICO SCHOOL · SENIOR BIOLOGY · SPRING 2026

When the Bot Doesn't Give You the Answer

How a private school in Northern California used AI simulations to surface something teachers rarely get to see: what students actually do when no one feeds them the answer.

150	102	+39	3.5
Sessions analyzed	Student feedback responses	Avg point gain, Bot 2 → Bot 1	Avg helpfulness (out of 5)

THE SETUP

Mary Churchill teaches senior biology at San Domenico, a private school in San Anselmo, California. Her students were working on real, place-based fire ecology projects, pulling French broom on campus, studying goat grazing, designing fire-risk assessments of school buildings, making educational videos for younger students, all grounded in the Marin landscape they live in.

In early May 2026 she deployed two AI simulations built by AI Friction Labs, timed to the unit's final stretch. The first- **Sandra Reyes**, a Marin County Fire Council member challenged students to pitch their project and defend it across three dimensions: ecological impact, economic feasibility, and community reach. The second- **Isabel Torres**, a UC Berkeley PhD candidate in fire ecology. They drilled students on the mechanisms behind whatever concept they chose, asking "why" until they ran out of answers.

Mary didn't call it AI. She told her students it was "a simulation created specifically for our class, to teach you how to use these tools responsibly." They figured it out within a few exchanges. By then, they were already in it.

HOW IT WORKED

Mary scaffolded the deployment in three stages: five minutes from memory only; then lab notebooks; then permission to do secondary research, "like looking it up in a book." That structure mattered. The students who dove into secondary research earned the highest scores. The ones who waited for a question they could answer from memory plateaued in the middle range. The ones who gave up after three exchanges and typed one-word responses scored low and confirmed something Mary already knew about them.

> *"I thought it really matched their level of perseverance and persistence. The kids who aren't afraid to keep digging deeper — I was like, oh, they are going to eat this up. And the ones who just want me to feed them the answer — they really struggled."*
>
> **— Mary Churchill, Biology Teacher**

The sequence also mattered. Students did Sandra's pitch first, then Isabel's drill. Most failed Sandra's pitch, not dramatically, but meaningfully. She is hard to satisfy: she pressed them on costs they hadn't thought through, demographics they'd never considered, and mechanisms they'd named but not explained. Most walked away with a specific, uncomfortable understanding of what "not enough" looks like. Then they sat down with Isabel. And something shifted.

WHAT IT PRODUCED IN STUDENTS

Across 42 students who completed both simulations, the average score on Isabel's drill was **39 points higher** than on Sandra's pitch. 35 of the 42 improved, a large effect that held across project types, blocks, and baseline preparation levels.

The transcripts tell more than the scores. Students who opened with a surface label — "fire is good for biodiversity," "broom is flammable" — were pushed, turn by turn, into mechanism. **Student A** (93/100) traced a line from "fire clears dead brush" through combustion chemistry, soil-aggregate breakdown, pore-space destruction, root-respiration failure, and erosion. He started with four words and ended with cellular biology. That depth showed up in feedback too: 44% of the 102 students who completed the evaluation said the simulation pushed them toward mechanistic thinking, understanding *how*, not just *what*.

WHAT STUDENTS SAID WORKED

"I started with 'thick bark,' but then had to explain how it insulates the cambium — even how a char layer forms. This helped me actually understand it."

Student A · Block A · Bot 95/100

"It forced the idea from the ecological to liability and public acceptance. It showed that ecology exists within political and social systems."

Student B · Block A · Bot 100/100 (both)

WHAT STUDENTS FOUND HARD

"It was very repetitive, and kept asking about the same specific things that weren't the point of the thing."

Student C · Block A · Bot 91/100

"I didn't know the answers to most of the questions... the bot taught me more."

Student D · Block B · Bot 55/100

WHAT MARY SAID

Mary reviewed the transcripts of each of her students following their interactions. She noted how the bot required a meaningful level of subject matter expertise in order to succeed, but beyond that, she appreciated the life skills and habits the experience promoted:

> *"I could visibly see their habits. And they get frustrated when they're not good at something. So the ones who stopped were like, nope, I don't like it — because they just want the answer. That was the feature that blew me away the most."*
>
> **— Mary Churchill**

She had already mapped out next year: four units, each with three practice sessions and one summative. A pre-assessment to find gaps, a formative check in the middle, a summative at the end. A peer-comparison activity where students with different scores read each other's transcripts together and a built-in reflection prompt for when students hit their knowledge floor: "What's one thing that's going to stick that you didn't know before?"

She also named the phrase that changed how we think about the product. Not soft skills. Not persistence. **Habits of scholarship**, curiosity, the willingness to go deeper, the ability to sit with a hard question rather than reach for the answer.

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