

Part A: Current Practice Inventory

Rate your current implementation (1-5 scale 1= poor implementation, 5= excellent implementation)

- How often do students write in your STEM classes? (4) Science/Engineering- daily, math 3+ times per week
- How explicitly do you teach STEM-specific writing formats? (2) We explicitly teach students who to share data/results and how to write a statement explaining the results. We model for students how to explain their mathematical thinking. We require students to write at the conclusion of each engineering lab. I can't say we've spent enough time teaching the how.
- How do you assess writing in STEM contexts? (2) In science/engineering, we primarily assess the structure and process, does the student have all the required elements? In math, we rarely grade their writing- its more formative.
- What types of writing do your students engage in? (3) quick writes, lists, brain dumps about topics/concepts, Informational Essays, Sequences in an experiment, Communicate what worked and what didn't and why in engineering labs. Content paragraphs to display understanding of content vocabulary.

Part B: STEM Writing Beliefs

Respond to these prompts:

1. Who should be responsible for teaching writing in STEM classes? I believe that what makes STEM different from S-T-E-M is the interdependence and overlap. A student's understanding of a math concept will support their learning in the science room. Similarly, a student's knowledge of science concepts will support reading/writing about those concepts in language arts. EVERY teacher is a reading teacher. EVERY teacher is a writing teacher.
2. What makes STEM writing different from other types of writing? STEM writing often contains more technical vocabulary. Additionally, there are specific forms common in science classrooms. Additionally, in math, I might use a science/technology concept to support the learning of my math standard. In science, I might use math, technology, or social studies topics to support the learning of my science standard. In a traditional writing setting (language Arts Class) the focus is not on the content- but rather the teacher uses the content to teach the reading and writing.
3. What challenges do your students face with STEM writing? Many students struggle with the domain specific vocabulary as well as the topic specific vocabulary. Also, some students do not know how to change their voice by using different writing conventions to reflect the purpose and audience.
4. How might writing enhance STEM learning? I think it was last week when we read about writing to learn. Sometimes the synthesis of learning doesn't come UNTIL students have

written about it. The act of writing (writing conclusions, taking notes, etc) helps to solidify information.

Part C: Goal Setting

Identify one specific goal for improving writing instruction in your STEM teaching.

As the literacy coach on our campus, I often confer with teachers about student literacy progress/needs. In writing, we are very quick to scaffold with stems and templates. I would love to see teachers pull back on the length of time they use those stems. I believe this is most likely to be accomplished if we increase the amount of time we ask students to talk to us and to each other about their thinking, findings, wonderings. If students have expressed orally their thoughts on a topic, perhaps they will be more ready to try it in writing.

Ambitious Science Teaching Exploration

Ambitious teacher- works with student's ideas over time.

- **Learning is oriented around complex and puzzling phenomena;**
- **Student's ideas and experiences are treated as resources for learning**
- **Teachers provide varied opportunities to reason through talk**
 - **Variety of discourse moves: wait time, revoicing, pressing, turn and talk, probing**
- **Thinking is made visible (so they can learn from each other)**
- **Student construct, revise models and explanations**
 - **How has your thinking changed?**
- **Specialized tools support talk and writing**
 - **Sentence frames**
 - **Claim-evidence-reasoning tool**
 - **Student created posters for adding on to one another's ideas**
- **Activities build toward cumulative understandings**
 - **How does the work we've done today help us see the bigger picture?**
 - **A summary table- representation of collective thinking**
- **Everyone is helped to participate**
 - **Teacher monitors who isn't participating and why, what do they need?**

The Four Core Practices:

- **Planning for engagement with big ideas**- used when designing units of instruction
 - Unpacking curriculum and standards around the topic you are teaching
 - Find 6 core ideas from the STANDARDS that are most connected to your topic (write on post its, place on board)
 - Find 4-6 big ideas from the CURRICULUM that are most connected to the topic
 - Choose the 2-3 from either that have the greatest explanatory power (levers for learning) and place in center
 - Identifying an anchoring phenomenon and its explanation
 - Networking work teacher is helping
 - Must write the explanation uses observable and unobservable
 - Organizing a sequence of learning experiences for students
 - Take each science idea in explanation identify at least one investigation, reading, activity for students
 - Arrange the experiences in an order that would be helpful. Consider prioritizing early- middle- later
- **Eliciting student thinking**-
 - Getting students to share what they know about the topic (activates prior knowledge)
 - Select which ideas to make part of a public record
 - After lesson do quick assessment
- **Supporting changes in students' thinking**



- Introduce ideas to reason with (interactive direct instruction)
- Engage students with an activity that generates observations or data (use the ideas above to reason with)

NOTE: Not introducing new ideas to be confirmed by the activity

Best practice is to support students in designing investigations where they collect and analyze the data.

Modeling and asking questions are key

- Use new knowledge to revise models. Would be used 2-3 times over the course of the unit.

➔ **GOAL:** Help all students elaborate on and revise their thinking about a natural phenomenon (need investigations, infusion of new science ideas, and opportunities to talk about their experiences)

→ Goal: Involve all students in scientific practices- develop investigations and questions

- **Pressing students for evidence-based explanations**

Near end of unit- student should be coming up with their explanations for the phenomenon

Select one claim and support it with evidence (Argumentation)

Pull everything together

*teacher may see misconceptions and re-teach OR teacher may ask students to apply their models to different phenomena

→ **GOAL:** Help all student learn to use evidence to support scientific claims

→ **GOAL:** All students to be able to draw upon multiple investigations

Frame the activity for students (summarize what we've done)

Possible Scaffold:

- Think about one claim/ statement you can make about why _____.
- Then give evidence
- Then give reasoning for how this evidence supports the claim

(Give students a tool to write CER, get feedback, revise it)

** Big key here is giving strong and specific feedback in a timely manner.

Justice-Centered Teaching:

- Questioning past/present injustices and envisioning a more inclusive and equitable future
- Impacts personal, classroom, and systemic levels in an attempt to elevate the voices and knowledge systems of previously marginalized peoples (Black, Brown, Indigenous, and People of the Global Majority)

Three Guiding Questions:

1. How is science Done?

- Previously Eurocentric knowledge systems and practices have been elevated- "science gets done by a few elite people in a narrow formulaic way"
- Justice oriented approach- Integrating diverse questions, voices, approaches, and resources of historically marginalized people to construct an inclusive classroom.
We must Shift perceptions of how science has traditionally been done by helping student see themselves as active participants.

2. What counts as science?

Science is often taught as neutral and disconnected from culture or politics. A justice-oriented approach connects students with real phenomena in their lives, cultures, and communities.

We must ensure students understand how their communities are affected by science.

3. Who gets to do science?

Everybody CAN do science, but not everyone GETS to do science.

We must dismantle barriers that continue to gatekeep participation in science and build a more inclusive science learning community.

Part B: Video Analysis

I watched the getting started video as well as the overview video for each of the practices.

Core Practice	Example from video
Planning	<p>Students who listed big ideas from relevant standards, then big ideas from curriculum, then chose the most impactful few and build the unit around those experiences.</p> <p>The teacher modeled showing students the engaging phenomena of the collapsing tanker.</p> <p>Teachers created a list of experiences that would provide students the learning base they would need to reason through the problem. Then the experienced were prioritized as beginning/middle/end of unit depending on where they would place them.</p>
Eliciting	<p>During this part we saw students writing their knowledge on sticky notes or on chart paper and adding it to a collective bank of known information</p>
Supporting	<p>This was the part where the teachers were balancing giving students experiences to anchor their learning, and providing instruction in scientific ideas. This is where students engaged in several iterations of their investigations.</p>
Pressing	<p>This step is the key to the power of this teaching framework. This is the part where students start synthesizing everything they learned in instruction, in reading, and through their investigations and coming up with their explanations for the phenomenon. In the eliciting phase teachers were taking everything they said but in this part, they are constantly pushing students to go deeper or refine an idea.</p>

- Notice how student talk and thinking are prioritized- [the college professor continues to encourage his students over and over to respond to student idea by pushing them deeper. It's student led- but still very teacher guided \(by questioning\)](#)
- Observe scaffolding strategies for diverse learners

Students were partnered, there were response stems, in one case the teacher changed the way the data was recorded in order to help students see the correlation better.