

How do I support students so that they will all be more successful at constructing evidence-based explanations?

STRUCTURE



Pre-thinking & Pre-writing



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Setting students up for success

To help students successfully construct evidence-based explanations, it is imperative that you provide support and time for formulating ideas BEFORE you ask students to formally talk or write about their final explanations in front of “high-stakes” audiences such as you and the whole class. Supporting students and setting them up for success occurs as an ongoing process beginning 5 to 7 days before students are expected to “perform” on a big task or in front of a “high-stakes” audience. The following steps have helped me ensure that students have the ideas, skills, language, and confidence necessary for success in my science classes. Everything I’ve included here came from 10 years of collaboration with numerous specialists at schools where I’ve worked. When you have a student with special needs or ELL students, I recommend talking about specific strategies that you can try in your classroom. No strategy will work like magic, but over time you will find ways to support learning for every student.

Step 1: Structured Rehearsal Time to Pre-Think and Pre-Write

[This usually lasts for 2-3 days about a week before I expect students to have a polished version of their explanations to share publicly].

STRUCTURED PRE-THINKING AND PRE-WRITING:

Students need LOTS of structure, scaffolding, and time to think about their ideas and to write/draw their ideas in small pieces.

- Prompt students to write/draw their explanation in narrative form like a storyboard. Students should be telling/showing their ideas about the beginning, middle, and end of the phenomenon. For example:

Beginning:	Middle:	End:

WRITING SCAFFOLDS:

Use writing scaffolds to support students’ writing in the bottom row of their storyboard. I provide a mixture of generic writing scaffolds that students can use in any explanation for any science idea and specific writing scaffolds that are only useful in the context of one particular assignment. For example:

1. Sentence starters – help students by giving them a running start for some sentences.
 - EXAMPLES: “The rollerblader starts his gliding motion by ...” “One reason this happens is because ...” “This made me think that ...”

2. Science idea banks – help students by prompting specific science ideas for a particular explanation.
 - EXAMPLES: “In your explanation, be sure to use these ideas – push, drag, normal force, friction force, ...”
3. Sentence transition phrases – helps students by providing connecting words/phrases characteristic of academic writing.
 - EXAMPLES: “In addition, ...” “therefore ...” “but another possibility is ...” “because ...”
4. Science concept cards – helps students utilize science terminology while writing.
 - EXAMPLES: Students build a collection of cards with terms, drawings, and student-generated definitions. Students are free to use these cards whenever they are working on tasks in class or on homework assignments. A “Word Wall” can serve a similar function.

STRATEGIC PARTNERSHIPS:

This pre-thinking/pre-writing task can be done individually or in pairs where the partners have been strategically selected to support the specific needs of certain students. The goal when planning strategic thinking/writing partnerships is to distribute the cognitive load across two people without totally removing the cognitive load from either student. It takes time to build a culture where two students have learned how to be good partners. As students develop throughout the year, this scaffolding can be reduced and eventually removed.

- Consider pairing two same-language ELLs where one student has developed slightly more advanced English language skills so that the students could switch back and forth between languages. Consider allowing ELL students to communicate in a language other than English and work on translating into English later. However, I would not want students to be excluded from using English or excluded from hearing academic English (students need to use and hear academic English in order to learn academic English). Use these pairings sparingly – and reduce this practice as students progress throughout the year.
- Consider pairing certain special needs students with patient and helpful students who could serve as sounding boards, writing tutors, or reminders to stay focused. However, remember that there is a lot to consider here:
 - Students won’t learn to develop literacy skills (like writing) if they are never allowed to write so I wouldn’t have a student serve as a scribe for another student with learning disabilities unless an IEP specifically directed me to do so.
 - I would have a student serve as a scribe for a student with a physical disability (like when I had a student with cerebral palsy who was unable to write or draw for himself).



Step 2: Rehearsing Evidence without adding more Writing

[This usually takes one more day.]

Once you have a student-generated artifact representing students’ explanatory models, you can ask them “How do you know that this part works this way?” and see if students can connect the “parts” of their story to some specific experiences. Students can add these connections to experience and evidence by placing a Post-It note with a short phrase on their storyboard. When working with students who have typically struggled in school, it is important to pay attention to your tone of voice and social cues when asking a question like “How do you know?” Students can interpret this as a challenge or as a put-down which can cause them to shut down or become defensive. Instead, explain to students that you want them to figure out how they learned about parts of their explanation and then pose your question.

Step 3: More Rehearsal & Time to Re-Think and Re-Write

[This usually takes one more day.]

After each student has worked out his/her ideas, then students should be ready to communicate with a partner or very small group. However, it's probably not safe to try to have vulnerable students try to communicate in front of the whole group yet, so don't skip this step. Pair-sharing or very small group sharing time allows students to do two things: 1) to rehearse their own ideas and language with a small audience, and 2) to grab ideas and language from their peers as well. You should build in some time for students to add to their storyboards, to delete or change their ideas after hearing from peers.

Step 4: The Big Performance – Talking in Front of the Whole Class & the Teacher

Now students might be ready to engage in the official dialogue as outlined in the steps of Discourse Tool #3. If you have done the prep work described here, students will have already formulated and rehearsed their ideas, gathered their thoughts, and tried out some language. When they are now asked to say things out loud (to you or to the whole group) it's not about trying to think on their feet or speak off of the top of their head, it's about telling a story that has been rehearsed a little bit over the previous days of class time. Timeframes for all of these steps will condense a bit as students become more proficient and more comfortable over the year.

Step 5: The Final Product – Constructing a Polished Version of an Evidence-Based Explanation

After all of this, you could ask students to polish up their work from the previous week and write/draw a final draft of their evidence-based explanation.

I often work with colleagues from literacy/language classes to develop sentence-writing, paragraph-writing, and essay-writing support that is consistent across students' subject areas. Many schools use a writing model (such as the Jane Shaeffer model, or sentence-combining model) to assist students when writing paragraphs and essays.



Don't expect Nobel-Prize-winning theories, just look for students' abilities to take some pre-existing partial understandings to the next level and to begin to develop further in their use of ideas and language.