



Task-Tool-Talk



A Framework for Rigorous STEM
Education



Introductions

Introduce yourself to your table

- Where do you teach
- What grade level(s)/subject(s)
- Favorite tradition at your school

Introductions

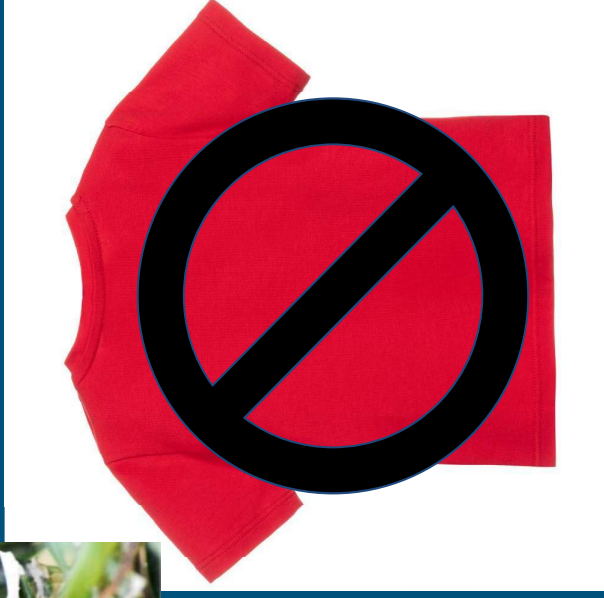


Audrey Moorhouse

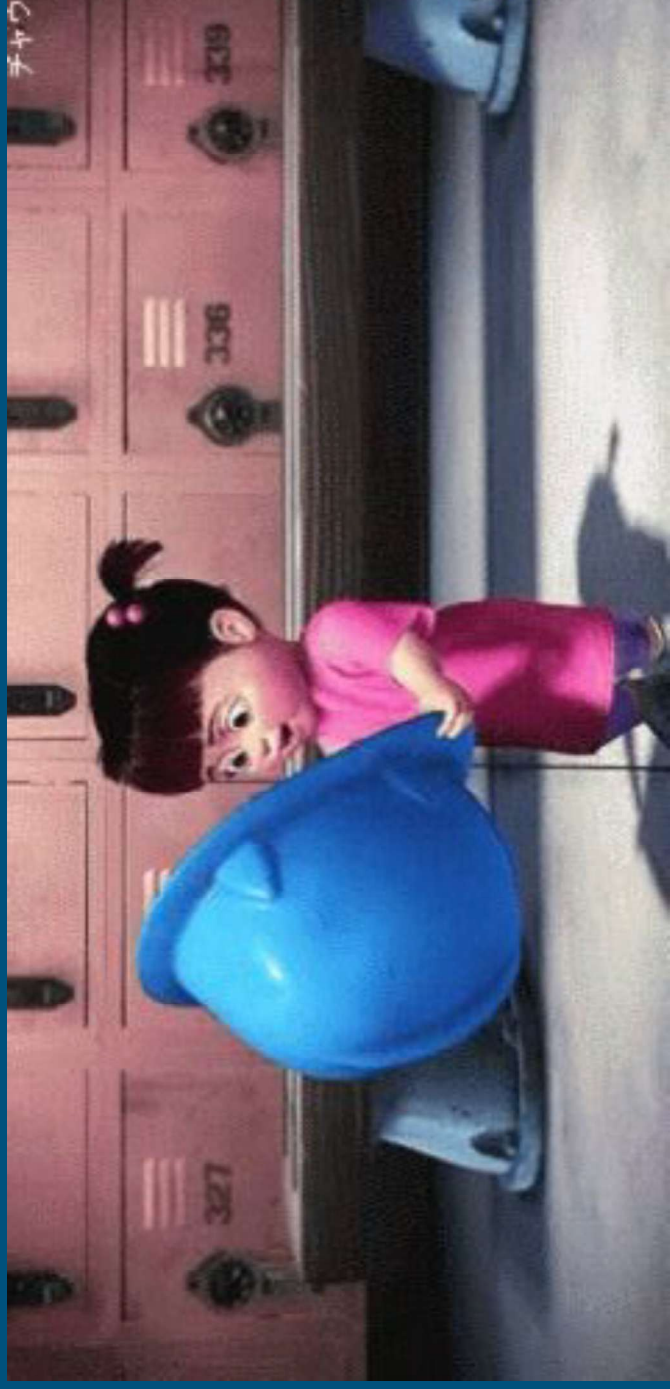


Natalie Hartung

Group Norms



Put on Your Student Hat





Develop a Model

We're trying to figure out what happened with this tanker and what made it implode! You will be put into groups to discuss. Then, you will submit a model (before-during-after) of what you think is going on.

5 Minutes to Collaborate



Share with a neighboring group



Whole Group Sharing

Teacher Hat Time!



What is Task - Tool - Talk?

Task-Tool-Talk is a framework for lessons that make rigorous STEM education accessible to all students

- Builds access in the design
- Provides rigor (high cognitive demand) for all students
- “How do we keep the thinking hard, but the entry points wide?”

Why It's Effective

- Simple enough to plan quickly
- Aligns well with NGSS-style instruction
- It helps diagnose why a lesson didn't work or what would make it more impactful:
 - Was the task too low-level?
 - Were tools doing too much? Were there not enough tools?
 - Was there no meaningful talk?

Task

Definition:

A meaningful, observable real-world anchor that creates a genuine need to explain, requires students to construct explanations or solutions through multiple possible lines of reasoning, and offers opportunities to act on that understanding.



Hallmarks of a Good Task

- **Phenomenon** (What is happening?)
- **Sensemaking** (Why is it happening?)
- **Application** (What students are doing and what is the mental load they are carrying?)
- **Multiple perspectives** (All students are able to enter the sensemaking space)
- **Agency** (What kinds of decisions, predictions, or design choices are students making?)

Remember

- The mental load carried by students is key.
- Science content (the students' explanation) has to be structurally necessary for students to complete the task.
- Multiple perspectives allow all students to enter the sensemaking space, but this doesn't mean that all ideas are equally correct.

Task: Traditional Tasks vs Using a TTT Framework

Traditional Task	Task in a TTT Framework
Students solve 20 proportional reasoning problems about recipes	Three groups propose different ways to scale a recipe for a large event. Students analyze the methods, determine whether each is valid, and argue which approach is the most efficient (phenomenon and multiple perspectives)
Students read about a severe storm before completing a worksheet on air masses	Students analyze weather data to decide whether public officials should cancel a community event or leave it as scheduled and they justify their recommendation using evidence from weather maps and forecasts (application and agency)

Task: Traditional Tasks vs Using a TTT Framework

Traditional Task	Task in a TTT Framework
A lab where students test different materials for cleaning dirty water and then record results, but never explain why anything happens	A lab where students use their results to decide which material best cleans dirty water, and explain their choice using scientific evidence from the experiment (sensemaking)

Extra resources and ideas - [Wonder of Science, Performance Assessment Resource Bank](#)

Self Check Questions

- Does success in the task require students to construct a mathematical or scientific explanation, not just produce an answer or complete a procedure?
- Do students have to make a prediction, decision, or design/solution choice that is justified using scientific reasoning and evidence?
- Are multiple valid strategies or lines of reasoning possible, requiring students to compare, defend, or refine their thinking?
- Do all students have access to contribute ideas that are then tested, supported, or revised using shared mathematical or scientific criteria (not just opinion)?

Tool

Definition:

Tools are resources that support language, help students make their thinking visible, and strengthen students' reasoning. Tools aren't for delivering ideas, they're for surfacing ideas.

Examples - models, drawings or pictures, manipulatives, graphic organizers (example), data sets.



Tool: Traditional Tasks vs Using a TTT Framework

Traditional Tools	Tools in a TTT Framework
A geometry formula sheet students copy without understanding	Geoboards students use to construct shapes, test ideas, and explain relationships among area, perimeter, and symmetry
A demonstration of magnetism that students observe	Magnets and various objects students test directly to sort materials and explain patterns of attraction and repulsion

Tool: Traditional Tasks vs Using a TTT Framework

Traditional Tools	Tools in a TTT Framework
A fancy slide deck with colorful and informative diagrams about how photosynthesis works	Students construct, share, and revise their own models to explain how redwood trees gain so much mass, using evidence from the phenomenon (even imperfect models become tools for discussion and refinement)
Students examine a completed graph or data set and identify trends the teacher points out	The teacher intentionally hides part of the graph or data set, and students predict what comes next, justify their predictions with evidence, then compare their thinking to the complete data and revise their explanations

Task Resources and Ideas

- Data sets! [NYTimes Graphs](#) and [Information is Beautiful](#).
- Consider covering up part of a data set to have students talk about it
- Phenomenon resources - the Wonder of Science
- Graphic organizers from STEM Teaching Tools (The talk website)

Self Check Questions

- Do the tools make student thinking visible so it can be explained, discussed, and revised by others?
- Do the tools support students in using language to reason through ideas, not just complete a task faster?
- Are students actively using the tools to explore relationships, patterns, or cause-and-effect rather than passively observing or copying?

Talk

Definition:

The things students say that drive learning forward.

- Doesn't always mean long whole-class discussions
- The goal is not a greater quantity of talk, it's about greater quality of talk



Talk: Traditional Tasks vs Using a TTT Framework

Traditional Tools	Tools in a TTT Framework
The teacher asks a question, calls on one student, evaluates the answer, and moves on.	Students first think independently, discuss with a partner, then share and critique multiple ideas before the class reaches consensus.
The teacher immediately corrects an incorrect answer.	The teacher asks, "Who agrees? Who disagrees? What evidence supports your thinking?" before addressing the misconception.

Talk: Traditional Tasks vs Using a TTT Framework

Traditional Tools	Tools in a TTT Framework
Students ask the teacher whether their answer is correct.	Students explain their reasoning to classmates, ask questions of one another, and use evidence to determine whether an explanation is convincing.
The teacher does most of the talking during the lesson.	The teacher listens, probes, and presses for evidence to support students carrying the mental burden of learning.

Remember

- Talk depends on the task and the tools. Low mental load means low participation
- If you're struggling with getting students to talk about academic stuff in your class, look at the culture around talk

REMEMBER
ONLY YOU
ARE RESPONSIBLE
FOR SETTING UP
SUCCESSFUL TALK

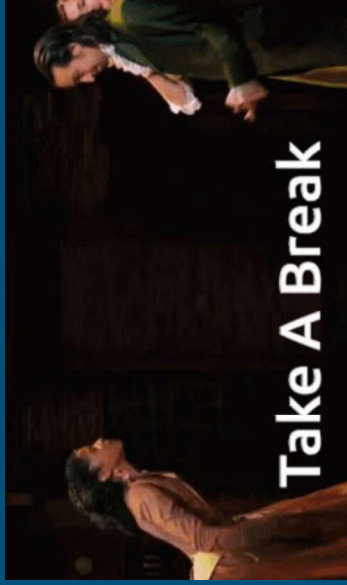


Self Check Questions

- How does the culture of my classroom support or detract from students contributing to the shared learning?
- Are students given opportunities to work out their ideas verbally before committing to an answer?
- Are all students speaking out loud at least one time during the lesson or class period? If they aren't sharing in front of a whole group, are they at least sharing with a peer?
- Did I give the students something meaningful and sufficiently unclear to talk about? Do the students have to provide or choose between multiple perspectives, or make a decision together about what to do?

Break

20 Minutes



Starting again at 2:10

When we come back we'll have
some open discussion then work
time



Welcome Back!

Here's how we'll spend the last
bit of time together

Open Discussion about TTT
Work Time
End of Session Surveys



Discussion/Questions

What has resonated with you so far?

Reflecting on your own teaching, what part of TTT feels like your biggest strength? Area of growth?

Where do you see potential barriers to utilizing the TTT approach?

What are some lingering questions you have?

Work Time - 35 Minutes(ish)

- Use this time to apply the Task-Tool-Talk framework into one of your units or lessons
- Feel free to collaborate with peers
- Explore the Resources
- We're here to help!

Surveys

Natalie and Audrey's Survey - Please use your phone!

