Carbon TIME Classroom Discourse Routine

The ***Carbon TIME* classroom discourse routine** is an intentional sequence of private and public talk and writing surrounding each Process Tool. The routine establishes consistent time and places for students to think and write individually, to share and edit ideas with a partner or small group, and for the class to listen and comment together.

The classroom discourse routine serves several purposes.

1. It provides necessary opportunities for students to understand and clarify *their own* thinking and questions, which is requisite for conceptual learning.
2. The routine allows *the classroom community and the teacher* to know about and understand differing and similar ideas, and for the teacher to make responsive instructional decisions.
3. Also, consistently elevating and returning to student ideas is important in providing students with *agency* in the classroom – in supporting their ownership, motivation, and curiosity in *figuring it out*.

Steps in the *Carbon TIME* classroom discourse routine, during the lesson when the Process Tool is used

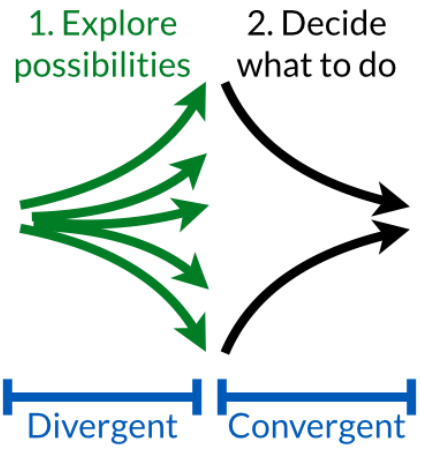
1. Introduction: Discussion is aimed at establishing the purpose for completing the Tool and for activating students' prior knowledge; sometimes students need help to realize they do, actually, have ideas. In later Tools, the introduction also involves going back to ideas from earlier Tools and discussions.
2. Private writing: Students use the Process Tool to write their ideas, conclusions, and explanations individually.
3. Sharing ideas: Students share and compare ideas using think-pair-share, small group, or classroom elicitation strategies.
4. Consensus-seeking discussion accompanied by public writing: Public writing refers to a class-level documentation of ideas (PPT slides, sticky notes on posters, digital image of white board). The nature of the consensus seeking is *different* for the different tools.
    - Expressing Ideas & Predictions Tools: Class comes to consensus about:
        - Similarities and differences among students' ideas
        - Important issues and points of disagreement
        - Questions about the system
    - Evidence-Based Arguments Tool: Class comes to consensus about:
        - Relevant patterns in data
        - Warranted conclusions
        - Unanswered questions – especially answers to the Three Questions that *cannot* be determined by looking at patterns in the investigation data
    - Explanations Tool (and follow-up explanation activities in the last lesson): Class comes to consensus about:
        - Coherent explanations that answer the Three Questions while following the rules (middle column of the Three Questions) in ways that are consistent with evidence (last column)

Divergent and Convergent: Discourse Routines & the Instructional Model

One way we think about the *Carbon TIME* Discourse Routine is how, for each Process Tool, it contains both divergent and convergent thinking and discussions. As outlined above, there is a routine around each Tool that begins with divergent thinking (students share and discuss diverse ideas) and leads to convergent thinking (students come to consensus), though the details of what diverges and converges differ across the Tools. The image in Figure 1 represents this idea of divergence and convergence in discussions.

We view the *Carbon TIME* Instructional Model as a series of discourse routines, each around a separate Process Tool, each beginning with the exploration of differing ideas, and each ending with consensus around some. This shift from divergent to convergent is also reflected across the unit as a whole, with the uncovering of varied student ideas at the beginning of the unit, converging as students construct scientific explanations for processes toward the end of lesson 3 and in lessons 4 and 5 (see Figure 2). Supporting both divergent and convergent discourse represents instruction that is both **responsive** (eliciting, valuing, and clarifying students' diverse ideas) and **rigorous** (using science practices to help students develop the capacity to construct accurate, canonically-aligned, model-based scientific explanations).

Figure 1. Divergent and convergent discussion in *Carbon TIME* classroom discourse



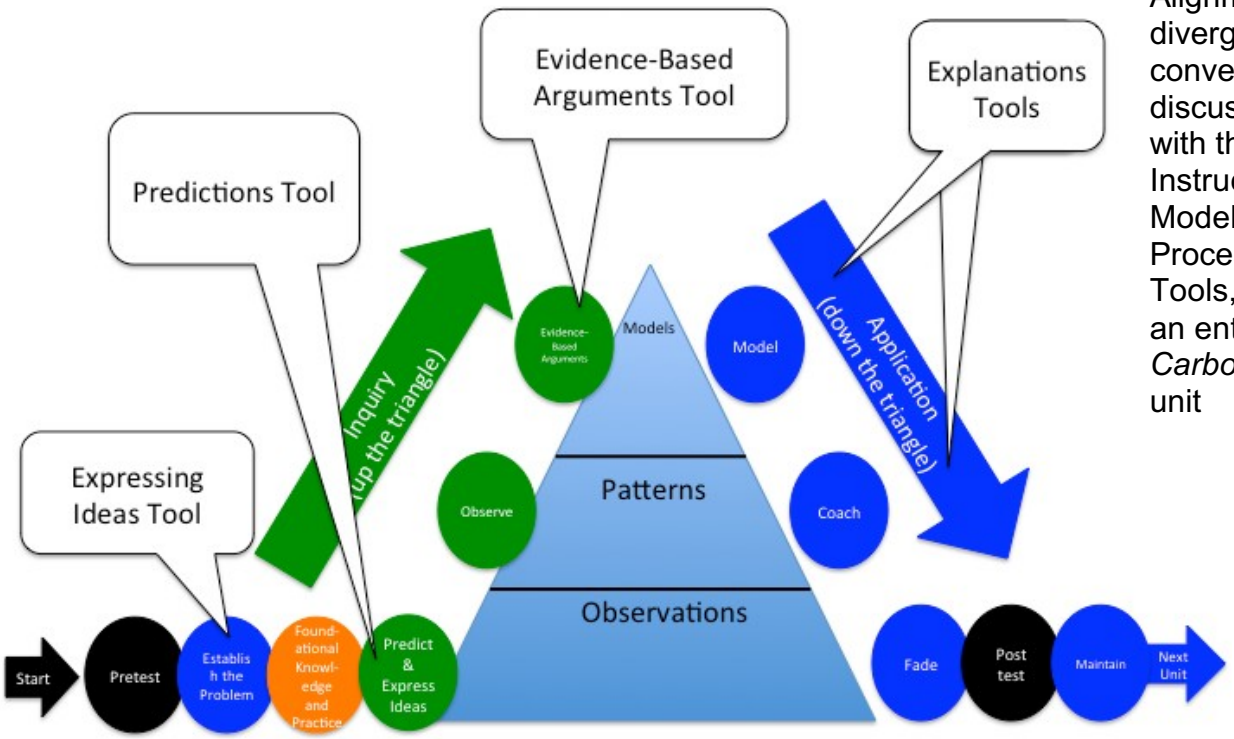


Figure 2. Alignment of divergent and convergent discussions with the Instructional Model and Process Tools, across an entire *Carbon TIME* unit

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