

# Using a Driving Question Board Educator Resource

By Wendy Johnson, Kentwood Public Schools

The defining feature of NGSS-aligned instruction is that students are engaged in figuring out phenomena. There are two main reasons for this. First is that figuring out phenomena engages students' natural curiosity about the world and mirrors the work of professional scientists by integrating the practices of science, crosscutting concepts and disciplinary core ideas. Second, figuring out phenomena motivates student learning by using their own ideas and questions to drive classroom activities. Instruction centered on figuring out phenomena prompts dramatic changes in classroom discourse because, "the focus of learning shifts from learning about a topic to figuring out why or how something happens" (Achieve, 2016).

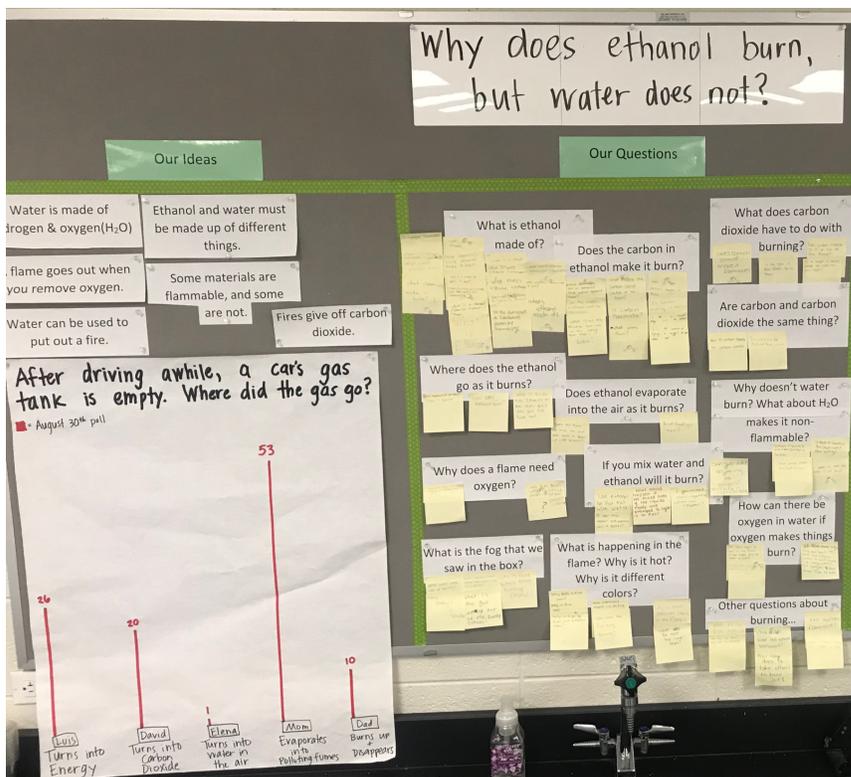
Each *Carbon TIME* unit begins with an anchoring phenomenon that is used to drive student learning. For example, the *Systems & Scale* Unit uses burning ethanol to engage students in figuring out the process of combustion. Many curricula end with students constructing a consensus explanation (their final model) for the anchoring phenomenon. However, *Carbon TIME* is unique in that students take their explanation a step further and learn how it applies to a broader class of phenomena. For example, in the *Systems and Scale* Unit students apply what they learned about ethanol burning to other examples such as methane, gasoline, and wood. In doing so they see that the process of combustion is similar for all organic materials. By the end of the unit students have developed a broad and powerful explanation that addresses why organic materials burn while inorganic materials do not.

The *Carbon TIME* discourse routine scaffolds students in sharing, comparing and revising their ideas throughout a unit. A **driving question board** makes this process visible in the classroom. It helps to keep the anchoring phenomenon central during class discussions and provides a concrete way to connect activities back to students' ideas and questions. There are many different ways to create and organize a driving question board in the classroom. Some teachers prefer to have a separate board for each hour. Personally, I find it difficult to manage many different boards. Also, I like to combine ideas and questions across class periods so that students in different periods benefit from the insights shared in other classes. Therefore, I have one driving question board that includes ideas and questions from all of my class periods.

I use a large cork board in my classroom for the driving question board. At the top of the board I write the driving question about the anchoring phenomenon for the unit. Below the question the board is divided into three sections: Our Ideas, Our Questions, and What We Figured Out. The ideas and questions columns represent students' work as questioners and investigators. On the first days of a unit students write their most salient ideas and questions about the anchoring phenomenon on sticky notes. I then organize the ideas and questions from all the classes into key themes and create larger headings so that they can be read from across the room. Throughout the unit we also add new ideas and questions as they arise.

Driving question for the unit		
Our Ideas	Our Questions	What We Figured Out

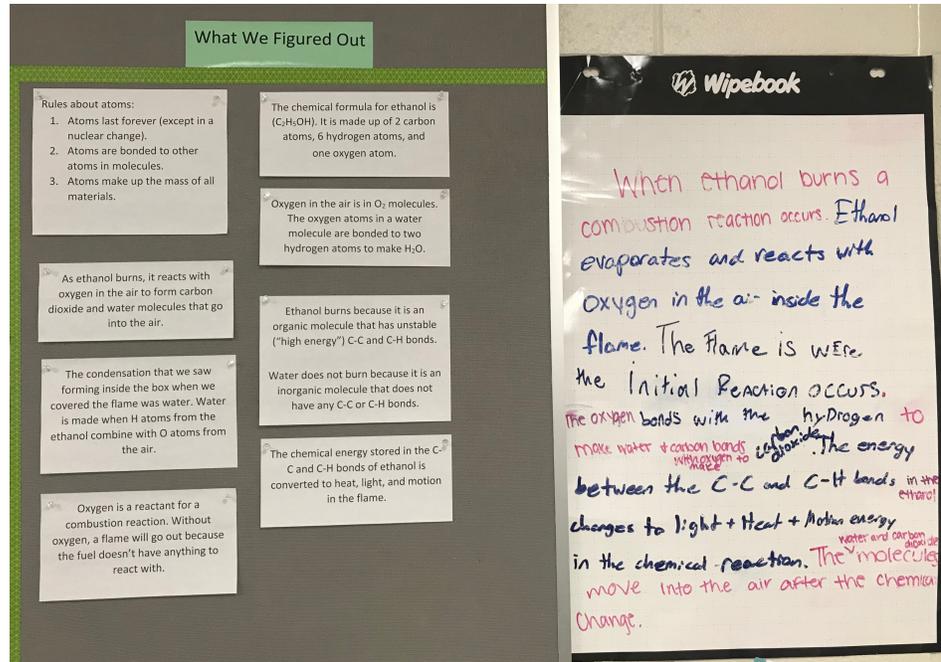
The first two columns of the board represent students' own ideas and questions generated by the activities surrounding the Expressing Ideas Tool, Big Idea Probe, Predictions Tool, and Evidence-Based Arguments Tool. Thus, the ideas will not all be scientifically "correct," and many will be vague and imprecise. At first it can feel very uncomfortable for teachers to post these naïve ideas on the wall. However, if we include only correct ideas or only logical and clearly articulated ideas, we inadvertently send the message that we are looking for correct answers and not what students really think. I often have to remind students that the goal is to understand our own thinking and to generate useful questions that can help to guide our learning.



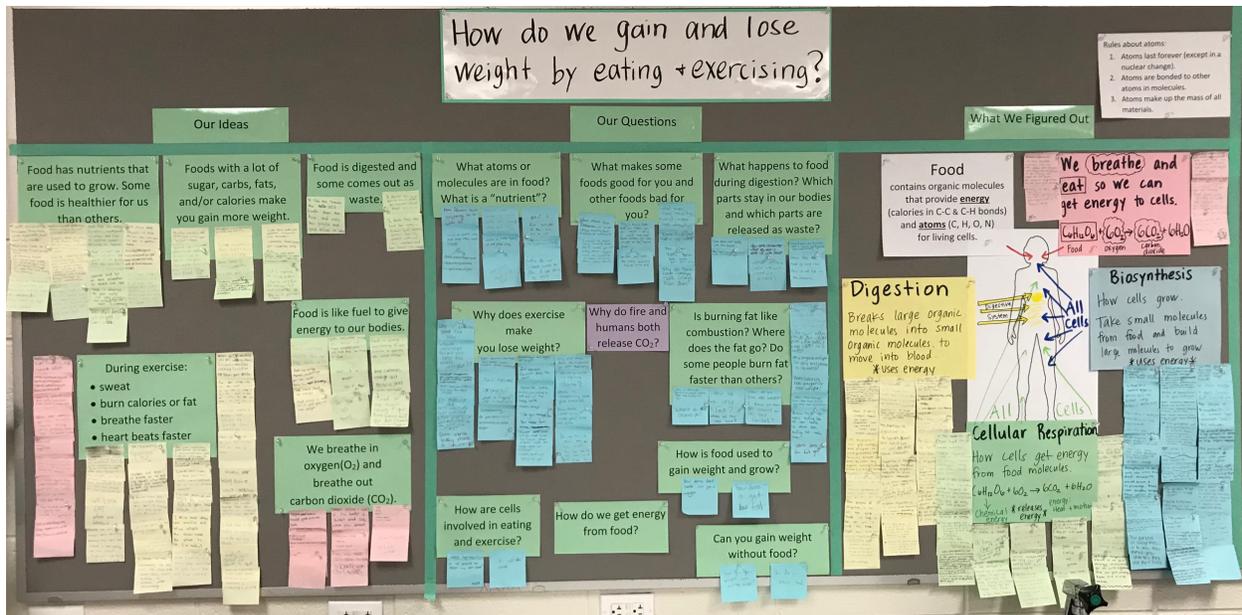
Organizing students' questions into themes also allows me to "massage" their ideas and questions in a productive way, while validating their thinking. For example, one student may write on a sticky note, "ethanol has different chemicals than water" and another may write, "ethanol and water have different stuff in them." I summarized ideas like these on the board with the statement, "Ethanol and water must be made of different things." Sometimes students will also share ideas or questions during our discussion that they do not feel confident enough about to write on sticky notes. When I organize the ideas on the board, I can make sure that these are included as well. I often also include a representation of students' response to a Big Idea Probe in the "Our Ideas" column. This reaffirms that I value divergent thinking. I explain that by the end of the unit we should see much more agreement in our answers to the Big Idea Probe and we should be able to use evidence to support or reject our initial ideas and answer our questions.

As we answer students' questions throughout the unit, we add conclusions in the "What We Figured Out" column. This column represents students work as explainers. The statements are generated through the activities surrounding the Explanation Tools, the Matter Tracing Tool, and the Learning Tracking Tool. Sometimes I post students' responses to exit ticket questions, while other times I just summarize what we have figured out as a class. I will often post a few examples of students' final models or written explanations in this column of the board (or next to it) as well.

Although each unit follows this same basic pattern, how I collect and organize the ideas looks a bit different in each unit. Sometimes each student contributes sticky notes (so there are many), while other times I have each group write their most important ideas and questions to add to the board (so there are fewer). Occasionally I use different colored sticky notes to help us stay organized.



For example, during the *Animals* unit I had students write ideas about food on yellow sticky notes, ideas about breathing and exercise on pink sticky notes, and questions on blue sticky notes. Throughout the unit I had students write their conclusions about each process (digestion, cellular respiration, and biosynthesis) on different colored sticky notes. Other times I don't use sticky notes at all and just take pictures of the whiteboard after a class discussion to summarize and categorize the ideas on the driving question board. The important thing is that students see their ideas and questions represented on the board and understand how it is helping them to figure out phenomena. Below is a picture of the driving question board at the end of the *Animals* unit.



I have found the driving question board to be tremendously helpful in shifting from learning about science to figuring out phenomena. The board continually reminds me to make connections between activities that I naturally make in my head more explicit for students. It also reminds me to use their ideas and questions to drive the unit. I feel like it has definitely helped me to be more responsive to my students' thinking. Using a driving question board also creates buy-in and gives ownership to the students for their learning. Finally, I think the driving question board illuminates important aspects of science practices such as the importance of asking questions and how ideas are revised over time to develop explanations.

**References:**

Achieve, Inc. (September, 2016). Using Phenomena in NGSS-Designed Lessons and Units. <http://nextgenscience.org/sites/default/files/Using%20Phenomena%20in%20NGSS.pdf>