Student Drivers -
Driving question boards empower students to figure out what they really need to know and how they will get there.

I noticed...
Why did...
I Wonder...
What if...
How often does...
You can find more storylines and the storyline tools at:
http://www.nextgenstorylines.org

You can find lots of examples of work in our classrooms on Twitter:
Holly Hereau @hhhereau (hollyhereau.weebly.com)
Wayne Wright @wewright1234
The Driving Question Board
Not about how it looks but how it is used!
Driving Questions vs. Parking lots

What is the difference?
Students are DRIVING their learning using their own Questions

“We figure out the science ideas.”

“We figure out where we are going each step.”

“We put the pieces of the science ideas together over time.”
Let’s do a Driving Question Board!

What would a (well behaved) 5th grade version of you notice and wonder about the following phenomena?
Why do dead things disappear over time?
Predictions

- DRAW
- What will this look like in 2 weeks?
- What will this look like in 2 months?
Examples of Student Predictions

Q1. Draw and label your predictions of what you think the raccoon and the surrounding area will look like over time.

**What will happen to the raccoon?**

1. The raccoon looks like that because other raccoons and animals killed the raccoon.
2. The raccoon bones are growing because the other animals were eating the raccoon and had open raccoon skin.
3. The raccoon is gone and there are nothing but the bones because the skin have decomposed.

**Raccoon after 2 days**

**Raccoon after 2 weeks (36 days)**

**Raccoon after 2 months (72 days)**

**Raccoon bones**

**Raccoon after 2 days**

**Raccoon after 2 weeks (36 days)**

**Raccoon after 2 months (72 days)**

**Raccoon bones**
Examples of Student Predictions

My all time favorite prediction!

What will cause it to look this way? Just go hit it.

What will cause it to look this way? The sloth is being eaten by FIDS.
What do we Notice/ Wonder?

https://www.youtube.com/watch?v=E93rNE5F-LE
Driving Question Board
Why did this dead thing disappear?

Day 1

Day 9

Day 5
Driving Question Board in Lynda’s Class

Why do dead things disappear over time?
Examples of Questions

- What are those insects doing on the carcass? Where did they come from?
- What happens to all the parts of the badger like the inside muscles and organs, fur, and bones?
- Do some parts of the badger go into the soil? Does some get washed away? Does it get eaten etc.?
- Is this the same thing that happens to leaves, or fruit or wood when it rots?
- How do new plants grow from parts of plants that seem like they are dead?
SEP: Asking Questions/ Defining Problems

1. It isn’t just about students writing any questions

1. All questions are not necessary/helpful to help us figure out the phenomena (DCI).

we need to purposefully scaffold our DQB to make sure students give meaningful questions that will help us figure out our phenomena (DCI)
Effective DQB are beneficial to both teachers and students because...

**Teacher’s Perspective**

By the end of grade 5, matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means (e.g., by weighing or by its effects on other objects). For example, a model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon; the effects of air on larger particles or objects (e.g., leaves in wind, dust suspended in air); and the appearance of visible scale water droplets in condensation, fog, and, by extension, also in clouds or the contrails of a jet. The amount (weight) of matter is conserved when it changes form, even in transitions in which it seems to vanish (e.g., sugar in solution, evaporation in a closed container). Measurements of a variety of properties (e.g., hardness, reflectivity) can be used to identify particular materials.

**Students’ Perspective**

We have a lot of questions about where dead things go and we need to figure this out.
Effective DQB are beneficial to both teachers and students because...

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**Students’ Perspective**

We have a lot of questions about where dead things go and we need to figure this out!

**An effective DQB meets the goal from both perspectives**
Having the END in Mind!
What do you want students to produce?
How Do We Make Sure Our DQB is Effective?

1. Timing - when your DQB happens...
2. Framing your DQB...
3. Student Engagement with the DQB
1. Timing is Everything....

You need to be purposeful about when you do your DQB within your instructional sequence to make sure your students ask questions that lead to the DCI’s.
Initial Questions (too Specific) → Driving Questions (General) → Anchoring Phenomena Routine

1) Questions on Bacteria + Antibiotics
   - Is this Bacteria found?
   - Is it found more in some places than others?
   - How do antibiotics work?
   - Why not give them all at once?
   - Are there other ways to kill Bacteria?
   - Why not give the strongest Antibiotics first?
   - Once infected how long before you feel sick?
   - How many people are affected by antibiotics?
   - How many people are killed by Antibiotics?
   - Are there a cure yet?

2) Questions on Bacteria + Antibiotics
   - How do antibiotics work?
   - Why not give them all at once?
   - Are there other ways to kill Bacteria?
   - Why not give the strongest Antibiotics first?
   - Once infected how long before you feel Sick?
   - How many people are affected by antibiotics?
   - How many people are killed by Antibiotics?
   - Are there a cure yet?

3) Bacteria
   - Places?

4) Other
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What will happen to the body of this dead raccoon over time? We have different predictions about what will happen? We have come across other dead animals outdoors. What will happen to the body of dead things over time?
How can we hear so many sounds when the record spins?

1. There is a sound starter.
2. Sound moves through air.
3. Something catches the sound.

We Notice:

- What do we notice?
- How can we explain this? Do our explanations agree?
- Where else does something similar happen?

What questions do we have about sound or about how we hear noises?
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**How did Addie get so sick?**

**We have a lot of different ideas about how the antibiotics stopped working.**

1. Have you ever gotten sick before?
2. How often does antibiotic resistance happen?

**Why don’t antibiotics work like they used to?**
2. Frame the DQB Board.

How you frame the Driving Question Board is important in what types of questions you will get.

“What Questions would we need to ask that answer would help us figure out...”
3. Student Engagement

1. Create the culture that everyone is going to get a question on the board. All student questions and ideas are valued.

2. The facilitator listens and asks clarifying questions to lift the important ideas voiced by students.

2. Scientist circles are important.
High School Example - Junco Evolution
3. Student Engagement

4. Students need to listen to classmate’s questions to see how their questions connect.

5. The class works together to categorize the questions into groups.
3. Student Engagement

6. The DQB motivates students to plan investigations that will attempt to answer these questions:

- **Estimated minimum number of illnesses and deaths caused by antibiotic resistance:**
  - At least 2,049,442 illnesses, 23,000 deaths.

- **Estimated minimum number of illnesses and death due to Klebsiella pneumoniae:**
  - At least 250,000 illnesses, 14,000 deaths.

**Objectives**
- Our goal was to determine the diversity and abundance of Staphylococcus bacteria on different surfaces of a public transportation system in a mid-sized city (Portland, Oregon) and to examine the level of drug resistance in these bacteria.

**Methods**
- We collected 78 samples, 2 cm × 4 cm sections from seven different areas on buses and trains in Portland, USA, taking 10 samples from each area. We isolated a subset of 14 suspended Staphylococcus aureus colonies based on phenotypes, and constructed a phylogeny from 16S rRNA sequences to assist in identification. We used the Kirby-Bauer disk diffusion method to determine resistance levels to six common antibiotics.

**Results**
- We found a range of pathogens: Staphylococcus epidermidis. The mean bacterial colony counts were 87.1 on bus and train floors, 86.1 in clerks' areas, 0.5 in hundreds, 0.6 in seats and armrests at bus stops, 3.6 on the underside of seats, 2.9 on window, and 1.9 on wall per millimeter.
3. Student Engagement

5. The DQB motivates students to plan investigations that will attempt to answer those questions.

What we **figure out** from those **investigations** often lead to new **questions** that motivate students to plan another investigations!
3. Student Engagement

7. We return later back to the board throughout the unit to see how we have answered our questions.
Thank you to:

The incredible teachers and researchers around the country that created and piloted these materials

The Next Generation Science Storylines Team at Northwestern University
You can find more storylines and the storyline tools at:

http://www.nextgenstorylines.org

You can find lots of examples of work in our classrooms on Twitter:
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Wayne Wright @wewright1234