

A Tool For Generating Big Ideas

Before using this tool, please read the Big Idea Primer. As you use this tool, keep in mind that a big idea is a relationship between an important class of natural phenomena and an underlying causal explanation.

The following prompts will help you transform common topics found in textbooks and curricula into big ideas worth teaching. The purpose of this is NOT for you to justify why you have started out with a particular topic. It is to help you *question* the topic's importance, to *learn more* about it, and to *transform it* into an inquiry-worthy idea.

Two important notes: 1. In using this tool you will quickly reach the “edge” of your science knowledge. You should take a break from working on it yourself (after Step 3 is a good time) and start *sharing your ideas and questions* about the subject matter with some colleagues. Once you have explored these ideas collaboratively for awhile you can come back to the tool with new perspectives. 2. This tool is *not linear*. You will likely go back to previous steps to revise what you had recorded there. This is expected and it is a productive way to develop the big idea.

Step 1

Where are you starting?

1.1 What does your curriculum identify as the topic? What is your first impression as to what the big idea should be? Respond to each question in a sentence or two.

Step 2

Digging into the fundamentals of the topic

You will need to deepen your understanding of topics with which you *may think* you are very familiar. We are not talking about details, but rather a thorough understanding of the fundamental processes involved in the topic. You don't need college level textbooks, just use *Wikipedia*, *How Stuff Works*, the *National Digital Library* or other reputable source. Read with the expectation that you'll have to generate a causal explanation (a “why-does-it-happen-this-way” story) for some phenomenon related to your topic.

2.1 Write below what **new facets** of the topic you've learned about and if new relationships between ideas have come to light—**what facts, concepts, connections did you not already understand?** Note: You may have to answer questions in Step 3 of this guide first if you cannot narrow down what it is you are supposed to be learning more about.

Step 2 continued... Digging into the fundamentals of the topic

You should also identify where your topic fits in the Washington State Standards and in the authoritative national document called *Benchmarks for Scientific Literacy*, produced by AAAS (American Association for the Advancement of Science). A “standard” names important things that all kids should know, but it is a label, meaning it’s never stated in a form that helps you think about designing instruction.

2.2 Write below the standards or benchmarks that relate to your topic. State them precisely *verbatim*. If you DON’T find your topic in these two documents, what does that tell you?

Step 3 Moving from topics toward big ideas

In this step you will begin the process of transforming a topic into a big idea. Sometimes topics are represented as *things* (batteries and bulbs, plants, acids and bases, rocks), other times they are *concepts* (density, energy, inheritance, form and function), they may be listed as *processes* (osmosis, homeostasis, phase changes, convection), or the curriculum could frame them as *theories or laws* (Gas Laws, Newton’s Laws, evolution). Regardless of what you are starting with (thing, concept, process, theory), answer the 3 questions below relevant to your starting place. Elaborate—don’t write one or two-word responses.

3.1 What about this process/thing/theory/concept is so important for students to understand beyond knowing definitions and examples? (Don’t say *why* it is important, say what *about it* is important.)

3.2 Does this process/thing/theory/concept have a more fundamental or underlying idea that should really be the target of instruction? This is *most often* the case! For example, energy transfer is what “underlies” the idea of food webs; kinetic molecular motion “underlies” the Gas Laws; and, the idea of unbalanced forces “underlies” simple machines. ALTERNATIVELY: Your topic could be a smaller part of a *larger system of activity* that is really what is important to teach. For example, in earth science the tides should be taught within the larger context of the regular movement of bodies in space and the gravitational effects of these bodies. Explain one of these options that you think pertains to your topic.

3.3 What aspects of this process/thing/theory/concept might be relevant to kids’ lives? Why?

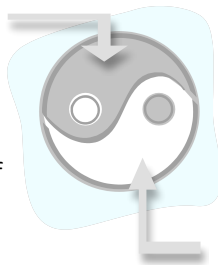
Step 4 Coordinating an important phenomenon with its explanatory model

Now we return to the “big idea” as a relationship between some observable set of events (phenomena) and the underlying causal model for those events. Answer these two sets of questions that help establish a relationship between the two— to create your “big idea.”

The Phenomenon

4.1 From your starting point as a “thing”, “process”, “theme”, or “theory/law”, what is an actual, observable event or set of events that kids can come to a deep understanding of over a period of days?

4.2 How can the phenomena be made “local” or “personal” to students rather than generic? Can earthquakes, for example, be about the Nisqually Earthquake; can food chains be about the decline of the Orca populations in Puget Sound?; can cell division be about wounds healing?



The Explanatory Model

4.3 Now write out the full causal storyline for this phenomenon. Use the abstract or unobservable characters, events, properties to form the explanation. This should be a “gapless” explanation that is just beyond what you think kids at your relevant grade level might be capable of. *In addition* to the written explanation, create on a separate piece of paper a diagrammatic/pictorial representation of the explanation—this is how some students may come to represent the model and understand it best.

4.4 Is there more than one kind of legitimate explanation for the phenomenon you’ve chosen? If so, what is it/are they?

Step 5 What success looks like

In this final step, you should imagine what your kids will be able to do if they are successful in understanding the big idea. In general, students should be able to accomplish the 3 kinds of performances below if they deeply understand your big idea. After each indicator of successful student understanding, respond to the questions about what you anticipate students should be able to do.

5.1 *Students use the big idea to explain a new phenomenon that is different from the one you've used in class—and/or can use the big idea to predict “what if” scenarios or conduct thought experiments. So, what different phenomena or hypothetical situation might you have kids explain to indicate they understand the big idea?*

5.2. *Students can talk about how different kinds of evidence supports the explanatory model when used in particular circumstances. What forms of 1st hand (collected by students) and 2nd hand evidence (collected by others) do you plan to have students work with to develop this explanatory model? Name what unseen event the data will be used as evidence for. Name two different types of evidence, they can be first hand or second hand.*

	Kind of evidence	What kind of unseen event, process will it apply to?
Example 1		
Example 2		

5.3. *Students can see how this model might be connected to other, related models. What other explanations of natural phenomena (other than what you have mentioned previously) can you ask students to connect with this unit's big idea?*

This is the end of the tool, you should now have enough of an understanding of your big idea to prepare you for planning instruction...but keep testing and comparing ideas with your colleagues—professionals are never “done” thinking about science ideas!