**Acceleration Process Document:**

**Accelerating Learning when Designing Units and Lessons**

**for High School Science**

Select lab experiments, readings, discussions, lectures, and other learning activities based on **what students should learn** and explicitly link them together in the unit.

**Work Backward**

To create lessons for your classroom that build on the Kentucky Academic Standards for Science (*Next Generation Science Standards)*, start from the end and work backward. **We suggest beginning the process by bundling particular performance expectations identified in the unit that bridge the expectation with the knowledge and skills students will already have in place at the beginning of instruction.**

First, identify a performance expectation. Then read it thoroughly **to find the competencies that will demonstrate how well students learned the related concepts, practices, and ideas**, then design assessments that give students an opportunity to demonstrate those competencies. Then you can begin to design activities to teach students the concepts and practices in the three dimensions.

**Identifying the Three Dimensions**

Each Kentucky Academic Standard for Science (from the Next Generation Science Standards) is a performance expectation that is an integration of three distinct dimensions; Science and Engineering Practice, Crosscutting Concept, and a Disciplinary Core Idea. The **performance expectations are designed to describe what students should be able to do when instruction is complete**. They are not meant as learning objectives, and should not be treated as instructional strategies. Instead, use them as goals to guide the activities and lessons that you select, giving students learning experiences that will give them confidence in **demonstrating the performance expectations at grade level** for each dimension once it comes time for assessment.

Look at the disciplinary core ideas that correspond with a given performance expectation**. Identify what the students should know coming into your class and combine that information with date from formative assessments to identify at what level your students are entering instruction. In addition, you must clarify what the grade level expectation is for the student after the teaching and learning is complete.** The difference between those is the learning that must occur for the student to be successful.

Brainstorm some phenomena (objects or events that scientists study in the world around them) related to the core ideas for students to investigate. The phenomena should be interesting to students, and explaining the phenomena should require an understanding of the targeted core ideas.

Once you have identified some useful phenomena, think about how students will investigate those phenomena. What will they do in each lesson? Incorporate science and engineering practices. Will students formulate scientific questions to investigate? Will they plan and/or carry out an investigation? Analyze data? Construct explanations or develop models? Engage in arguments or communicate information? Again, you will need to **determine where your students are in their skill development for each practice through previous performance and formative assessments in addition to what level of performance is grade level appropriate for that practice when the teaching and learning is complete.** The difference between those is the learning that must occur for the student to be successful.

Now think about the crosscutting concepts. **Determine where your students are in their ability to use the Crosscutting Concept for making sense of a phenomena or designing a solution. Look at the previous grade level expectations in addition to formative assessment information you have from prior learning with the student in addition to what level of performance is grade level appropriate for that Crosscutting Concept when the teaching and learning is complete.** The difference between where they are starting and your end goal is the learning that must occur for the student to be successful.

**Ask the Right Questions**

Each step in the instructional sequences you design should integrate the three dimensions ([practices](https://ngss.nsta.org/PracticesFull.aspx), [disciplinary core ideas](https://ngss.nsta.org/DisciplinaryCoreIdeasTop.aspx), and [crosscutting concepts](https://ngss.nsta.org/CrosscuttingConceptsFull.aspx)) into a single learning performance. As you develop your lessons, you may want to focus on these questions:

* What are some commonly held student ideas (both troublesome and helpful) about this topic? How could instruction build on them?
* **What prior concepts do students need to learn to understand the core ideas?**
* What representations or media help students make sense of core ideas?
* **What practices could students engage in to explore phenomena and/or representations of this concept?**
* Are there crosscutting concepts that could support learning the core idea?
* What connections to other content areas could be emphasized as students engage in the instructional sequence?
* How do the **crosscutting concepts** in the foundation box support understanding of the associated **disciplinary core idea**?
* How will the crosscutting concepts assist or support in learning the disciplinary core idea or will the process work in reverse? Namely, as the understanding of the disciplinary core ideas develops, will it aid in understanding the broader crosscutting concept?

**References for use:**

* [Book: A Framework for K-12 Science Education](http://www.nsta.org/store/product_detail.aspx?id=10.2505/9780609217422)
* [Book: The NSTA Reader’s Guide to the Next Generation Science Standards](http://www.nsta.org/store/product_detail.aspx?id=10.2505/9781938946066)
* [Book: Translating the NGSS for Classroom Instruction](http://www.nsta.org/store/product_detail.aspx?id=10.2505/9781938946011)
* [Book: The NSTA Reader's Guide to A Framework for K-12 Science Education, Second Edition: Practices, Crosscutting Concepts, and Core Ideas](http://www.nsta.org/store/product_detail.aspx?id=10.2505/9781938946196)