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How to Read a Middle School Science Unit

Purpose of this document: This guide was created to clarify the contents and purpose of each section present in a Middle School Science Unit Guide. Each section contains a short description to support you in your understanding of the material.

Purpose: The Why, What, and How of This Unit

What is this section?

This section explains the unit purpose in three ways:

Essential Question: The Essential Question drives the entire unit, as scholars discover and eventually master the Big Ideas.

Unit Storyline Synopsis: This gives the context in which scholars will explore the Essential Question over the course of the unit.

Why This Unit? This section is meant to provide the following:

- A high-level overview of the content to be covered during the unit
- An explanation of how this unit fits into the broader scope of K–8 Science
- Other reason(s) why this particular content is important

How do I read this section?

Ask yourself: *What excites or interests you about this topic? How can you visualize the Essential Question coming to life in your classroom? How does the storyline enhance the meaning of the Essential Question? Why is this unit important this year in science? Why are these concepts and skills important for scholars in the future?*

What Is the Bottom Line?

What is this section?

If you do nothing else, you must help scholars understand the Big Ideas. You will not have a perfect go at inquiry in your first year of teaching, but the bottom line is that scholars must learn science, and it's your job to ensure the Big Ideas are mastered.

Big Ideas are derived from the **Disciplinary Core Ideas** in the **Next Generation Science Standards**.

- Big Ideas are the most critical scientific understandings that comprise smaller concepts or facts. This section lists the Big Ideas and shows how they are broken down into smaller concepts that scholars must master.
- Each lesson objective relates back to one or more Big Ideas in a narrative form

Science and Engineering Practices (SEPs) and **Crosscutting Concepts** are also derived from the Next Generation Science Standards.

- The science practices describe behaviors that scientists engage in as they investigate, build models, and develop theories about the natural world. The engineering practices are those that engineers use as they design and build models and systems.
- Crosscutting concepts are themes that arise in all areas of science and are meant to further clarify ideas.

How do I read this section?

Read this slowly, read it again, and then decide what content you need to study on an adult level before you move on. Do not move on until you've mastered the content. Then, ensure you can articulate the Big Ideas in your own words without looking to colleagues. Finally, as you study lessons, you will come back to this section often to make connections to Big Ideas.

Safety

What is this section?

This section highlights some of the safety risks you should be aware of while teaching these lessons. These safety suggestions are not meant to take the place of a formal science safety training. Please be sure to follow all safety rules from your district, as well as all local, state, and federal science safety guidelines.

Unit Storyline

What is this section?

The storyline tells you exactly how each lesson fits into the overall arc of the unit and why it belongs in the specific "E" it is placed within.

Our units follow the **BSCS 5E Instructional Model** and are designed to support scholar-led guided inquiry, putting the thinking work on the scholars throughout the unit and allowing content mastery to build over time.

How do I read it?

As you read this section in the unit, start with the orange text first, to read the “story” on its own. Next, go back and read it again with the lesson descriptions in grey to connect the storyline back to what scholars will actually be doing day to day. Finally, read the whole section one more time, and match the Big Ideas to each section, determining what scholars are discovering and/or mastering at each stage.

Engage: Scholars are introduced to the unit’s Essential Question, and should be excited and inspired to find an answer. Scholars will also take time to assess any prior knowledge that could help them on their quest.

Explore: Scholars dive headfirst into hands-on activities, experiments, and research to help them uncover foundational knowledge to support them in answering the Essential Question. By the end of this section, scholars will have a lot of partially formed ideas, new understandings, and more advanced questions.

Explain: This is a time for scholars to draw conclusions that solidify their understanding. Finally, they have answers to their questions and can put all the pieces together. By the end of the Explain lessons, scholars have everything they need to answer the Essential Question and demonstrate mastery of the unit’s Big Ideas.

Elaborate: Scholars’ mastery of the unit’s content/central phenomena are challenged and deepened through new experiences. Scholars will be asked to apply what they have learned in new contexts, testing the strength of their understanding.

Evaluate: Finally, scholars are challenged to independently demonstrate mastery of the unit’s Big Ideas. This can come in many forms â€” a unit test, a debate, a longer lab with lab report, a writing sample, or a combination of these.

Extra Resources

What is this section?

Linked in this section are additional resources that support you in executing the unit. Each unit includes a printable set of Exit Tickets and a scholar Lab Notebook.

Lessons

What is this section?

Lessons follow the storyline, state the lesson objective, and provide teacher best practices through “tips” and questions. But this is not an exhaustive list of moves. Teachers must study and prepare for the reality of the classroom, and no curriculum can provide every question or answer that could arise. These lessons are your guide, not your script.

What is the purpose of each section?

Lesson Objective Each day, this is your end goal and your driving force. Ask yourself: *Where do scholars need to land with their understanding of the Big Idea today? … with the Essential Question? What concepts do they discover partially, wholly, or are they still left wondering about?*

Do Now This is a very quick activity (5 minutes at most) that happens as scholars are entering the room. Do Nows vary in format and are designed to get scholars “into science mode” and thinking.

- Do Nows are designed by teachers in accordance with the **Do Now plan**.

Launch This is a brief introduction to the lesson. The teacher:

- Creates interest and generates curiosity by posing thinking questions, telling an engaging story, performing a demonstration, and/or eliciting responses that unveil scholars' prior knowledge and misconceptions
- Presents the lesson challenge
- Sets expectations for the activity/experiment and shares lesson-specific safety information

Activity/Experiment/Reading

- Scholars study the map showing the approximate locations where Lystrosaurus **fossils** are found.
    - Scholars brainstorm and chart:
        - Prior knowledge about rock layers, fossils, or geography that they think may be relevant
        - Possible explanations for this strange phenomenon
    - Scholars record the hypothesis they think is the strongest/most likely to be true in their lab notebooks.
- As scholars are working, circulate and gather informal data on their prior knowledge and ability to use evidence to support an explanation.

Discourse During the Discourse, scholars talk about their ideas. The teacher:

- Asks questions to guide discussion about findings and results (note that this portion should be brief and should NOT take up the bulk of the discussion time)
- Does NOT preach or lecture
- Shares scholar work, uses the experiment materials, and charts findings
- Challenges and deepens the students' understanding of Big Ideas by asking questions that apply their thinking in new contexts
- Revisits the Essential Question, pressing scholars to apply their new knowledge to continually build upon and refine their answer

Accountability (Lab Notebook) At the end of the lesson, there is a quick informal assessment of the lesson objective that comes in a variety of formats. The two most common are:

Exit Tickets â€" Exit Tickets are aligned to the 5E lesson they are in, meaning Explore Exit Tickets will assess basic understanding, whereas Elaborate Exit Tickets will assess application of ideas. Some Exit Tickets are multiple choice, while others are open response; each has a purpose aligned to the assessment. The teacher must consider whether they will coach specific scholars during the Exit Ticket or test everyone's knowledge without support on a particular day.

Scored classwork â€" Scored classwork often makes more sense than an Exit Ticket when scholars have worked hard to complete a long experiment or simulation, partake in a class-wide debate, or give a presentation.

Unit Vocabulary

What is this section?

Unit guides provide a list of vocabulary terms and definitions that scholars should become familiar with throughout the course of the unit.

Teachers must introduce and support mastery of vocabulary words as they naturally arise during the unit. Look for **boldface** vocabulary words, which signal the first time a word should be formally defined during whole-class discussion. (Some vocabulary is italicized. These are words that teachers should use and may need to define for scholars, but scholars are not expected to know them or be able to use them without support by the end of the unit.)

Drilling vocabulary on a regular basis or ruining the joy of discovery by introducing vocabulary words before they are meant to be used goes against our vision.

How to Introduce Scientific Vocabulary Discovery â€” Scholars should organically discover vocabulary words as they explore concepts and determine how to explain their new knowledge.

Making Connections â€” Scholars should constantly be thinking of connections between scientific vocabulary and their own knowledge. Vocabulary should be clearly visible and broken down by teachers to ensure full understanding by all scholars.

Teacher Press â€” Teachers must press scholars daily to use previously discussed scientific vocabulary accurately and precisely in their discourse and in their writing.

Building Habits â€” Studying vocabulary must be incorporated as a joyful classroom routine that can create long-lasting at-home habits to reinforce mastery.