Supporting Educators in Improving Practice Through Instructional Materials

Can curriculum and instructional materials be developed to not only support students in building knowledge and skills, but also support educators in honing their practice? Educative curriculum materials help teachers acquire new content and pedagogical knowledge, typically through embedded notes, annotations, and models of practice. The presence of educative features in a curriculum has been shown to improve teachers’ instructional planning and curriculum implementation as well as student learning.

For example, teachers using highly educative mathematics curriculum materials are more likely to identify the big ideas in a curricular program while planning collaboratively and are more likely to maintain cognitive demand and elicit student thinking during a lesson (Stein and Kaufman 2010). Research also suggests that teachers who use educative curriculum materials show increases in pedagogical content knowledge and use a greater number of strategies to support student learning (Schuchardt et al. 2017).

In 2005, researchers Elizabeth A. Davis and Joseph S. Kracik—who was also a Next Generation Science Standards writing team leader—offered five design principles to help guide the development of educative curriculum materials, stating that educative resources should do the following:

- Support teachers’ learning of subject matter.
- Help teachers anticipate what learners might say or do in response to activities.
- Help teachers consider how to relate units throughout the year.
- Make curriculum developers’ pedagogical judgments visible.
- Promote a teacher’s capacity to make pedagogical adaptations for learners.

All Great Minds® curricula were intentionally and uniquely designed to contain educative elements because we believe in empowering teachers to not only deliver a high-quality curriculum, but also to effectively adapt it to meet the unique needs of the students in their classroom. Unlike a scripted curriculum where content is provided to educators with little to no guidance or rationale, our educative curricula help teachers improve their practice while enabling all students to achieve greatness.

Defining Educative Curriculum Materials

In 1996, Ball and Cohen introduced the concept of educative curriculum materials in their seminal paper, which suggested that curriculum resources themselves had the potential to support not only students’ learning but teachers’ learning as well. This idea differentiated educative curriculum materials from those that mainly focus on instruction without developing teachers’ own content and pedagogical knowledge.
Five Educative Features Embedded in PhD Science®

The PhD Science® Teacher Edition is one of the core resources that teachers use to plan for and deliver instruction. Crafted by our team of teacher-writers, the Teacher Edition includes five educative features that support teachers’ own learning and help them achieve flexible, high-quality science instruction for all students.

1 **Module Overviews.** Each module’s Teacher Edition begins with an overview that contains an introduction to the anchor phenomenon and a description of how students make sense of that complex phenomenon over the course of the module. The overview also provides the module scope and sequence and crucial insights into the standards students interact with. Finally, each overview contains key terms, information about the preparation of materials, safety considerations, and additional reading for teachers.

2 **Lesson Preparation.** Each module contains 25 to 30 lessons organized into concepts that help students make sense of an anchor phenomenon. All lesson sets for a given concept have a Prepare section that includes the following information to help teachers get ready for instruction:

- A brief introduction to the lesson set and its three-dimensional learning, including how the lesson material connects to previous and upcoming content.

- A clear picture of intended objectives, learning outcomes, and Performance Expectation(s) to be addressed through the lessons.

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**Module Overview**

**Essential Question**

How can we prevent a storm from becoming a disaster?

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**Module Map**

<table>
<thead>
<tr>
<th>Anchor Phenomenon: 1900 Galveston Hurricane</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Concept 1: Weather Conditions</strong></td>
</tr>
<tr>
<td>Phenomenon: How do we describe weather?</td>
</tr>
<tr>
<td>Performance Question: What happened in Galveston, Texas in 1900?</td>
</tr>
</tbody>
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**Lesson Preparation**

**Concept 5: Weather Conditions**

Phenomenon Question: How do we describe weather?

Performance Question: What happened in Galveston, Texas in 1900?

**Prepare**

Lesson 1 through 3 build on prior knowledge from Kindergarten about severe weather so students learn more about severe storms. In Lesson 5, students study photographs of Galveston, Texas, before and after the 1900 hurricane and describe the damage. Through this lesson, teachers involve students in understanding what caused the destruction in Galveston in 1900. In Lesson 6, students build a driving question based on their observations and questions from previous lessons. The questions that students develop help guide their learning throughout the rest of the module.

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**Student Learning**

**Knowledge Statement**

Weather hazards pose a threat to life and property.

**Objectives**

- Lesson 1: Observe photographs of Galveston, Texas, before and after the 1900 hurricane and describe the damage.
- Lesson 2: Develop a class anchor model to explain what happened in Galveston, Texas, during the 1900 hurricane.
- Lesson 3: Ask questions about how a hurricane can cause a disaster such as the disaster in Galveston, Texas.

**Standards Addressed**

3-ESS2-1 Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season. (Developing)

3-ESS3-1 Make a claim about the merits of a design solution that reduces the impacts of a weather-related hazard. (Developing)

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“Dig into it. Know that it will be hard at first for kids with no background in how to draw models. Don’t expect perfection. Don’t use it as a script, but make it your own so that it works for you and your kids.”

—Meg Johnson, Teacher, Lincoln Parish Schools

“The work [with PhD Science] allows elementary teachers, who usually aren’t trained as subject matter specialists, to learn alongside their students.”

—Melissa Parfait, Curriculum Specialist, St. Charles Parish Public Schools
Margin Notes. Each lesson also contains embedded instructional supports and sidebar notes with additional information for teachers. These notes help teachers deepen their knowledge of science content, pedagogy, and the progression of student learning.

- **Teacher Notes** communicate information that helps with lesson implementation. For example, they may enhance scientific understanding, explain pedagogical choices, give background information, or help teachers identify common misconceptions.

- **Spotlights on Three-Dimensional Integration** explain how a lesson activity develops specific Science and Engineering Practices, Disciplinary Core Ideas, and/or Crosscutting Concepts.

- **Content Area Connections** signal opportunities for students to practice grade-appropriate skills from other subject areas and allow teachers to confidently integrate and reinforce science instruction with English language arts (ELA), mathematics, and more. These notes provide cross-curricular connections, instructional strategies, or additional activities that align with standards for ELA and math as well as connections to history and art.

- **Check for Understanding** and **Conceptual Checkpoints** provide examples of evidence teachers should look for to gauge student learning as well as instructional next steps to support all students in reaching proficiency.

- **Differentiation Suggestions** offer in-the-moment examples of how teachers may customize instruction to support students of various backgrounds and abilities.

- **English Language Development Notes** build teachers’ capacity to support English language development. These notes provide strategies that benefit multilingual learners, such as explicit introduction to new terms and Spanish cognates when applicable. They also provide targeted scaffolds for key moments that can benefit students of all backgrounds.

- **Extension Activities** provide additional learning opportunities related to the lesson topic that extend beyond the time allotted for the lesson.
One of the great strengths of PhD Science is its educative nature and its usefulness as point-of-use professional development with these embedded supports. Of course, PhD Science professional learning is available in many forms, including professional development sessions, coaching, implementation services, and a variety of digital resources. Providing teachers with ongoing, curriculum-based professional learning is key to unlocking the potential of high-quality instructional materials.
Works Cited


