

Alignment of Scientific Method Module to the Next Generation Science Standards

The Next Generation Science Standards (NGSS) were published in April 2013. They consist of statements that convey the performance expectations for students. Each performance expectation is a single statement that is built from three parts: science and engineering practices (Practices), disciplinary core ideas (DCI) and crosscutting concepts.

Since the Scientific Method Module was created prior to the release of these standards one would expect that it aligns most readily to the individual statements that articulate the practices or crosscutting concepts. The background material, reading, and the slides from the module address the aspects of the NGSS shown in Table 1.

TABLE 1. ALIGNED PRACTICES, DISCIPLINARY CORE IDEAS, AND CROSSCUTTING CONCEPTS		
<i>PRACTICE</i>	<i>DCI</i>	<i>CROSSCUTTING CONCEPT</i>
<p><i>MS. Asking Questions and Defining Problems: Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles.</i></p>	<p>None found</p>	<p><i>MS. Cause and effect. Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation.</i></p>
<p><i>Where is this Practice found in the lesson plan?</i></p> <p>The teacher Background Information includes students asking questions about observations, and developing a hypothesis.</p>	<p><i>Where is this DCI found in the lesson plan?</i></p> <p>As this lesson centers on inquiry skills rather than disciplinary knowledge, there are no DCI's found aligned.</p>	<p><i>Where is this Crosscutting Concept found in the lesson plan?</i></p> <p>This is implied in the Learning Activity, as students use a "fortune telling" fish and determine why the fish reacts in certain ways.</p>

TABLE 1. ALIGNED PRACTICES, DISCIPLINARY CORE IDEAS, AND CROSSCUTTING CONCEPTS

<i>How well is this Practice aligned?</i>	<i>How well is this DCI aligned?</i>	<i>How well is this Cross Cutting Concept aligned?</i>
Weak alignment. Students are not required in the activity to ask questions, and they are not given guidance on how to generate a hypothesis.	NA	Weak alignment, as students are not explicitly helped to understand this concept, and are not assessed on their understanding.

Alignment of Scientific Method Module to the Common Core State Standards for English Language Arts/Literacy and Mathematics

The Common Core State Standards (CCSS) were published in June 2010. They articulate student skills for English language arts/literacy and mathematics. The content of the module addresses the concepts and skills shown in Table 3.

For English language arts/literacy, the CCSS is organized around College and Career Anchor Standards (CCR) that articulate the over-arching skills that students need to be prepared for college and career. There are grade level versions of each Anchor Standard, as well as versions for science and social studies classrooms (literacy standards). Alignments in Table 3 were made to the Anchor Standards, unless a more specific version of the standard was a closer fit to the skills in the module.

Table 3. Aligned Common Core Standards for English Language Arts & Literacy

<i>STANDARD</i>
RST.11–12.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.
<i>Where is this standard found in the module?</i>
The background information includes 5 steps for the scientific method that students must understand and put to use. Students apply the steps of the scientific method, as well as steps for the specific procedure of testing hypothesis regarding a Fortune Telling Fish.

Table 3. Aligned Common Core Standards for English Language Arts & Literacy
<p><i>How well is this standard aligned?</i></p> <p>Partial alignment. Applying the scientific method to a specific question about the fish toy requires students to follow a procedure when carrying out an experiment. Understanding the recursive nature of the scientific method and scientific investigations is a major objective for this lesson.</p> <p>Although students must analyze the results, they may not be based on explanations in a text.</p>
<p>STANDARD</p> <p>CCR.SL.1 Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.</p>
<p><i>Where is this standard found in the module?</i></p> <p>Discussion questions are provided.</p>
<p><i>How well is this standard aligned?</i></p> <p>Weak alignment. The ability to discuss the results of experimentation with peers is prerequisite to this module. Although discussion questions are given, there is no prescribed format or specific expectations for class discussion.</p>
<p>STANDARD</p> <p>WHST.2: Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p>
<p><i>Where is this standard found in the module?</i></p> <p>Students record their observations during step 7 of the procedure, and they write a short summary of the experiment during step 8 of the procedure. Instructions for the activity state to, "Remind older students that proper documentation is critical, and have them record their observations."</p>
<p><i>How well is this standard aligned?</i></p> <p>Weak alignment. Students must be able to record and summarize their observations, but these skills are prerequisite, as they are not the target of instruction or assessment.</p>

For mathematics, Table 4 shows alignments to standards found in the 8th through 12th grade levels.

TABLE 4. ALIGNED COMMON CORE STANDARDS FOR MATHEMATICS
<i>None Found</i>

SAMPLE