C2 Collaborative's DECONSTRUCTION OF STANDARDS *for* CLASSROOM IMPACT Guide

for use with

NEXT GENERATION SCIENCE STANDARDS*

Your Time-Saving Curriculum-Building Resource

Grade 4

C2 Collaborative, Inc.
Supporting Today's Educators, Shaping Tomorrow's Leaders

800.318.4555 | www.C2Ready.org

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C2 Collaborative, Inc.
1s660 Midwest Road, Suite 310
Oakbrook Terrace, IL 60181
(800) 318-4555
www.C2Ready.org

GRADE 4

Deconstruction of Standards for Classroom Impact Guide for use with *Next Generation Science Standards**

C2 Collaborative, Inc. is pleased to offer this grade-level tool for all educators to utilize as they move from the knowledge of the *Next Generation Science Standards** to application of these standards in the classroom.

C2 Collaborative's Deconstruction of Standards for Classroom Impact Guide for use with Next Generation Science Standards* is an instructional tool intended to help educators develop curriculum, lessons, unit plans, assessments, and tasks to support effective science teaching and learning. This practical, content-rich resource is not intended only for those who have adopted the *Next Generation Science Standards**; indeed it can be used as a resource for how to move from standard language to standard practice in science. The standard deconstruction is a process by which the learning expectations are unpacked into more manageable pieces that can then be taught in a manner that builds conceptual understanding and task complexity while considering prior knowledge.

We hope that this resource will be of value as a teaching and learning tool and to facilitate discussion with your colleagues as you work toward preparing students to be global citizens capable of solving complex and challenging problems, so many of which will be rooted in science.

Overview

*C2 Collaborative's Deconstruction of Standards for Classroom Impact Guide for use with Next Generation Science Standards** are organized around each grade level and/or discipline as indicated in the table below.

BOOKS FOR ELEMENTARY GRADES (COVERS ALL DCIs)	
Kindergarten	Grade 3
Grade 1	Grade 4
Grade 2	Grade 5
BOOKS FOR MIDDLE SCHOOL (GRADES 6-8)	**BOOKS FOR HIGH SCHOOL (GRADES 9-12)**
Physical Sciences	Physical Sciences
Life Sciences	Life Sciences
Earth and Space Sciences	Earth and Space Sciences
Engineering, Technology, and Application of Sciences	Engineering, Technology, and Application of Sciences

Understanding the Organization
Grades kindergarten to fifth are composed of sections based on the disciplinary core ideas (DCI) of Physical Science, Life Science, Earth and Space Science, and Engineering, Technology, and Applications of Science. Grades sixth to eighth and ninth to twelfth are grouped as grade bands and each book is dedicated to one of the disciplinary core ideas.

Elementary: Kindergarten to Fifth Grades
Each component of the disciplinary core ideas has a title page (e.g., K-PS2 Motion and Stability: Forces and Interactions). Next there is a two-page spread that should be viewed together as the information on both pages is connected.

The pages on the left include the following sections: **Understanding the Performance Expectation, Planning Instruction,** and **Instructional Leadership.**

Understanding the Performance Expectation:
The **Performance Expectation** (PE) and **Clarification Statement** are taken directly from the NGSS document (see Appendix). The **Big Idea** provides educators with an overall context for learning the component idea while the **Critical Vocabulary** (both academic and discipline specific) is aligned to the **Performance Expectation**.

Planning Instruction:
Materials & Equipment, Instructional Strategies, and a suggested **Graphic Organizer** have been identified as they relate to the PE. These examples can be used during instruction or as a model to adapt based on the needs of your students.

Instructional Leadership:
Teachers, coaches, principals, and other administrators can use the **"Look For"** as an indicator of learning when visiting classes. This indicator can also help teachers select a work product to monitor student learning.

The pages on the right include the following sections: **Understanding the Instructional Targets** and **Learning Targets.**

Understanding the Instructional Targets:
The **Essential Question(s)** sparks thinking and promotes student and teacher engagement with the concepts. Knowing the **Depth of Knowledge Level** of the **Performance Expectation** will help in the development of appropriately aligned tasks for the student. A sample **Highest Level Assessment Item** is provided as a model that can be adapted or adopted. The **Assessment Boundary** is taken directly from the *Next Generation Science Standards** document (see Appendix) and it specifies the limits of assessments, in particular large scale assessments.

Learning Targets:
In the **Students Should Be Able To** section, the Performance Expectation is deconstructed into three progressive learning targets of Know, Think, and Do, and specific **Examples** are provided for each learning target where appropriate. This will help educators see how conceptual knowledge builds based on the outcomes of the Performance Expectation.

WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER

4-PS4

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GRADE 4

WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER

UNDERSTANDING THE PERFORMANCE EXPECTATION	
PERFORMANCE EXPECTATION	**4-PS4-2** Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.
BIG IDEA	Energy moves through matter and space in waves.
CRITICAL VOCABULARY	lens, convex, concave, reflection, light source, angles, function
CLARIFICATION STATEMENT	n/a

PLANNING INSTRUCTION		
INSTRUCTIONAL STRATEGIES	**DIRECT INSTRUCTION**	**INDEPENDENT STUDY**
	Present lens types, how the eye functions, and how to write informational essays.	Provide opportunities for students to do research on lenses to increase their ability to access, organize, and present information.
MATERIALS & EQUIPMENT	drawing materials, informational texts, online media resources, writing materials, science journals	
GRAPHIC ORGANIZER	Venn diagram comparing and contrasting two types of lenses	

INSTRUCTIONAL LEADERSHIP	
"LOOK FOR"	diagrams with correct explanations of how we see objects; completed informational essay

4-PS4

UNDERSTANDING THE INSTRUCTIONAL TARGETS

PERFORMANCE EXPECTATION	**4-PS4-2**		
	Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen.		
ESSENTIAL QUESTION(S)	• What happens when light is reflected from objects?		
DEPTH OF KNOWLEDGE	**Level**		**Highest Level Assessment Item**
	2	Skills & Concepts	Demonstrate an understanding of reflection and how the lens of the eye works by using diagrams and informational essays.
ASSESSMENT BOUNDARY	Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.		

LEARNING TARGETS

	Know	**Think**	**Do**
STUDENTS SHOULD BE ABLE TO:	Describe different types of lenses.	Explain why we are not able to see objects in total darkness.	Create a model that demonstrates that we see objects as a result of light reflecting from those objects.
EXAMPLES	List the two types of lenses and examples of where each type of lens is used.	Read informational texts and access videos online that explain how the eye works to see objects. Write an informational essay that is informative and interesting and explains why we cannot see objects in complete darkness.	Draw diagrams of an eye, a mirror, and a light source (e.g., flashlight). Use arrows on each diagram to show how we see objects with that particular device. Each diagram should have the mirror at different angles and demonstrate that the angle of the mirror affects the angle of reflection.

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WAVES AND THEIR APPLICATIONS IN TECHNOLOGIES FOR INFORMATION TRANSFER

UNDERSTANDING THE PERFORMANCE EXPECTATION

PERFORMANCE EXPECTATION	**4-PS4-3**
	Generate and compare multiple solutions that use patterns to transfer information.*
BIG IDEA	Energy moves through matter and space in waves.
CRITICAL VOCABULARY	sound, patterns, code, vibrations
CLARIFICATION STATEMENT	Examples of solutions could include drums sending coded information through sound waves, using a grid of 1's and 0's representing black and white to send information about a picture, and using Morse code to send text.

PLANNING INSTRUCTION

INSTRUCTIONAL STRATEGIES	**INDIRECT INSTRUCTION**
	Support problem solving where students analyze a problem and propose a solution.
MATERIALS & EQUIPMENT	paper, pencils, craft sticks, writing materials, science journals
GRAPHIC ORGANIZER	Morse code translations chart

INSTRUCTIONAL LEADERSHIP

"LOOK FOR"	indications that students are able to understand the messages that are sent by other students

**Integrates traditional science content with engineering.*

4-PS4

UNDERSTANDING THE INSTRUCTIONAL TARGETS

PERFORMANCE EXPECTATION	**4-PS4-3**		
	Generate and compare multiple solutions that use patterns to transfer information.*		
ESSENTIAL QUESTION(S)	• How has technology advanced communication?		
DEPTH OF KNOWLEDGE	**Level**		**Highest Level Assessment Item**
	2	Skills & Concepts	Create and share a pattern of sounds for sending coded messages.
ASSESSMENT BOUNDARY	n/a		

LEARNING TARGETS

STUDENTS SHOULD BE ABLE TO:	**Know**	**Think**	**Do**
	Reproduce basic Morse code patterns to send a message.	List common objects that make sound. Determine which part of the object is vibrating to produce the sound.	Discuss and devise solutions for how information could be sent using patterns.
EXAMPLES	Read about Morse code and the symbols that represent letters. Work with a partner to exchange short messages.	Team with a partner to go on a "sound scavenger hunt" using pictures from magazines and newspapers to create a collage of objects that make sound. Highlight the part of the object that produces the sound.	Research how early man and other civilizations sent messages over long distances using drums. Devise a code to be used to send short messages and invent a way to write the code down so that it can be remembered. Practice with a partner.

**Integrates traditional science content with engineering.*

EARTH'S SYSTEMS

4-ESS2

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UNDERSTANDING THE PERFORMANCE EXPECTATION

PERFORMANCE EXPECTATION	**4-ESS2-1** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
BIG IDEA	Earth's surface is built up and worn down by natural processes.
CRITICAL VOCABULARY	erosion, chemical, acid rain, deposition, geology, sediment, landforms, weathering, glacier, freezing, thawing, cooling, heating, water flow
CLARIFICATION STATEMENT	Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.

PLANNING INSTRUCTION

INSTRUCTIONAL STRATEGIES	**DIRECT INSTRUCTION**	**INDEPENDENT STUDY**
	Explain weathering.	Allow students to construct models.
MATERIALS & EQUIPMENT	magazines, newsprint, flyers and posters obtained from United States Geologic Society (USGS), tray, soil, sand, water, measuring tool, data chart, science journals	
GRAPHIC ORGANIZER	cause/effect chart	

INSTRUCTIONAL LEADERSHIP

"LOOK FOR"	credible model showing erosion and deposition; data accompanying model

4-ESS2

UNDERSTANDING THE INSTRUCTIONAL TARGETS

PERFORMANCE EXPECTATION	**4-ESS2-1**		
	Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.		
ESSENTIAL QUESTION(S)	• How does physical weathering change Earth's surface over time?		
DEPTH OF KNOWLEDGE	**Level**		**Highest Level Assessment Item**
	2	Skills & Concepts	Record data from model of erosion with three to four trials representing the change in the slope and deposition.
ASSESSMENT BOUNDARY	Assessment is limited to a single form of weathering or erosion.		

LEARNING TARGETS

	Know	**Think**	**Do**
STUDENTS SHOULD BE ABLE TO:	n/a	Observe and identify the effects of weathering and the rate of erosion.	Measure the effects of weathering or the rate of erosion.
EXAMPLES	n/a	Create posters showing different places and objects that have been affected by erosion and the type of erosion that caused it.	Construct a model of a hill or slope using sand and/or soil. Use a spray bottle of water to represent precipitation. Measure the height and width of the slope before and after a "rainfall." Repeat several times graphing the results of erosion.