



dinodoom



Dino Doom

High School Common Core State Standards Alignment Document



WHAT STUDENTS DO: Explore the extinction event at the KPg boundary.

Students will explore sites around the world searching for clues to the mass extinction event that occurred 66 mya. They will collect evidence from each site to tell a piece of the KPg story. Finally, students will combine all of the evidence to explain how natural events impact life on Earth.

| NRC FRAMEWORK/NGSS CORE & COMPONENT QUESTIONS | INSTRUCTIONAL OBJECTIVES (IO) |
|--|--|
| <p>HOW AND WHY DO ORGANISMS INTERACT WITH THEIR ENVIRONMENT AND WHAT ARE THE EFFECTS OF THESE INTERACTIONS?</p> <p><i>NGSS Core Question: LS2: Ecosystems: Interactions, Energy, and Dynamics</i></p> <p>How do organisms interact with the living and nonliving environments to obtain matter and energy?</p> <p><i>NGSS LS2.A: Interdependent Relationships in Ecosystems</i></p> <p>What happens to ecosystems when the environment changes?</p> <p><i>NGSS LS2.C: Ecosystem Dynamics, Functioning, and Resilience</i></p> | <p><i>Students will be able to</i></p> <p>IO1: Construct an explanation, using empirical and observational data from the rock record, for the impact of a natural event on the carrying capacities of an ecosystem and the natural selection that results from limited resources.</p> |

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HOW CAN THERE BE SO MANY SIMILARITIES AMONG ORGANISMS YET SO MANY DIFFERENT KINDS OF PLANTS, ANIMALS, AND MICROORGANISMS?

NGSS Core Question: LS4: Biological Evolution: Unity and Diversity

**How does the environment influence populations of
organisms over multiple generations?**

NGSS LS4.C: Adaptation

HOW AND WHY IS EARTH CONSTANTLY CHANGING?

NGSS Core Question: ESS2: Earth Systems

How do Earth's major systems interact?

NGSS ESS2.A: Earth Materials and Systems

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1.0 About This Activity

How Students Learn: Science in the Classroom (Donovan & Bransford, 2005) advocates the use of a research-based instructional model for improving students' grasp of central science concepts. Based on conceptual-change theory in science education, the 5E Instructional Model (BSCS, 2006) includes five steps for teaching and learning: Engage, Explore, Explain, Elaborate, and Evaluate. The Engage stage is used like a traditional warm-up to pique student curiosity, interest, and other motivation-related behaviors and to assess students' prior knowledge. The Explore step allows students to deepen their understanding and challenges existing preconceptions and misconceptions, offering alternative explanations that help them form new schemata. In Explain, students communicate what they have learned, illustrating initial conceptual change. The Elaborate phase gives students the opportunity to apply their newfound knowledge to novel situations and supports the reinforcement of new schemata or its transfer. Finally, the Evaluate stage serves as a time for students' own formative assessment, as well as for educators' diagnosis of areas of confusion and differentiation of further instruction. The 5E stages can be cyclical and iterative.

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2.0 Instructional Objectives, Learning Outcomes, Standards, & Rubrics

Instructional objectives and learning outcomes are aligned with

- Achieve Inc.'s, *Next Generation Science Standards (NGSS)*
- National Research Council's, *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas*
- National Governors Association Center for Best Practices (NGA Center) and Council of Chief State School Officers (CCSSO)'s, *Common Core State Standards for English Language Arts & Literacy in History/Social Studies, Science, and Technical Subjects*

The following chart provides details on alignment among the core and component NGSS questions, instructional objectives, learning outcomes, and educational standards.

- Your **instructional objectives (IO)** for this lesson align with the Common Core State Standards.
- You will know that you have achieved these instructional objectives if students demonstrate the related **learning outcomes (LO)**, also aligned with the Common Core State Standards.
- You will know the level to which your students have achieved the learning outcomes by using the suggested **rubrics**.

Quick View of Standards Alignment:

This alignment document provides full details of the way in which instructional objectives, learning outcomes, 5E activity procedures, and rubric assessments were derived through, and align with the Common Core State Standards. For convenience, a quick view follows:

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HOW AND WHY DO ORGANISMS INTERACT WITH THEIR ENVIRONMENT AND WHAT ARE THE EFFECTS OF THESE INTERACTIONS?

NRC Core Question: LS2: Ecosystems: Interactions, Energy, and Dynamics

How do organisms interact with the living and nonliving environments to obtain matter and energy?

NRC LS2.A: Interdependent Relationships in Ecosystems

What happens to ecosystems when the environment changes?

NRC LS2.C: Ecosystem Dynamics, Functioning, and Resilience

HOW CAN THERE BE SO MANY SIMILARITIES AMONG ORGANISMS YET SO MANY DIFFERENT KINDS OF PLANTS, ANIMALS, AND MICROORGANISMS?

NRC Core Question: LS4: Biological Evolution: Unity and Diversity

How does the environment influence populations of organisms over multiple generations?

NRC LS4.C: Adaptation

HOW AND WHY IS EARTH CONSTANTLY CHANGING?

NRC Core Question: ESS2: Earth Systems

How do Earth's major systems interact?

NRC ESS2.A: Earth Materials and Systems

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| Instructional Objective <i>Students will be able to</i> | Learning Outcomes <i>Students will demonstrate the measurable abilities</i> | Standards <i>Students will address</i> |
|--|--|---|
| IO1: Construct an explanation, using empirical and observational data from the rock record, for the impact of a natural event on the carrying capacities of an ecosystem and the natural selection that results from limited resources. | LO1a: Investigate the patterns in fossil data over time that aid in the discovery of significant events in Earth's history. LO1b: Investigate the global patterns in chemical composition data over time that aid in the discovery of significant events in Earth's history. LO1c: Determine the size of the impact crater, using the global patterns of iridium in the rock record, to search for the location of the impact potentially responsible for changes to the environment. LO1d: Investigate the global patterns of living organisms, before and after the KPg boundary, to identify the significant changes to life on Earth. | WRITING STANDARDS FOR LITERACY IN SCIENCE AND TECHNICAL SUBJECTS: <ul style="list-style-type: none"> Text Types and Purposes CCSS.ELA-LITERACY.WHST.9-10.2 CCSS.ELA-LITERACY.WHST.11-12.2 |

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4.0 Evaluation/Assessment

Use the (*N*) *Dino Doom Alignment Rubric* as a formative and summative assessment, allowing students to improve their work and learn from mistakes during class. The rubric evaluates the activities using the Common Core State Standards.

5.0 References

- Achieve, Inc. (2013). *Next generation science standards*. Achieve, Inc. on behalf of the twenty-six states and partners that collaborated on the NGSS.
- Bybee, R., Taylor, J., Gardner, A., Van Scotter, P., Carson Powell, J., Westbrook, A., Landes, N. (2006) *The BSCS 5E instructional model: origins, effectiveness, and applications*. Colorado Springs: BSCS.
- Donovan, S. & Bransford, J. D. (2005). *How Students Learn: History, Mathematics, and Science in the Classroom*. Washington, DC: The National Academies Press.
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(M) Teacher Resource. Dino Doom Common Core State Standards Alignment

You will know the level to which your students have achieved the **Learning Outcomes**, and thus the **Instructional Objective(s)**, by using the suggested **Rubrics** below.

|  Common Core State Standards | | |
|--|--|--|
| Instructional Objective | Writing Standards for Literacy in Science and Technical Subjects (9-10) | Writing Standards for Literacy in Science and Technical Subjects (11-12) |
| IO1: Construct an explanation, using empirical and observational data from the rock record, for the impact of a natural event on the carrying capacities of an ecosystem and the natural selection that results from limited resources. | <p>Text Types and Purposes: CCSS.ELA-LITERACY.WHST.9-10.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <ul style="list-style-type: none"> a. Introduce a topic and organize ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among ideas and concepts. d. Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers. e. Establish and maintain a formal style and objective tone while attending to the norms and conventions | <p>Text Types and Purposes: CCSS.ELA-LITERACY.WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <ul style="list-style-type: none"> a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic. c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of |

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| | | |
|--|---|---|
| | <p>of the discipline in which they are writing.</p> <p>f. Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).</p> | <p>likely readers.</p> <p>a. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic).</p> |
|--|---|---|

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(N) Teacher Resource. Dino Doom Common Core State Standards Alignment Rubric

Related Rubrics for the Assessment of the Instructional Objective Associated with the Above Standard(s):



Common Core State Standards

| | Expert | Proficient | Intermediate | Beginner |
|-------------------------------|--|---|--|---|
| CCSS.ELA.LITERACY.WHST.9-12.2 | <p>Introduces topic clearly, provides a general observation and focus, and groups related information logically; Develops the topic with facts, definitions, concrete details, or other examples related to the topic; Links ideas using words, phrases, and clauses; Use domain-specific vocabulary to explain the topic; Provides a concluding statement related to the explanation.</p> | <p>Introduces topic clearly, provides a general observation, or groups related information logically; Develops the topic with concrete details, or other examples related to the topic; Links ideas using words or phrases; Uses domain specific vocabulary to explain the topic; Provides a concluding statement related to the explanation.</p> | <p>Introduces topic, provides a general observation; Develops the topic with details, or other examples related to the topic; Links ideas using words or phrases; Uses domain specific vocabulary to explain the topic; May or may not provide a concluding statement.</p> | <p>Introduces topic; Develops the topic with details, or other examples, potentially unrelated; Uses specific vocabulary to explain the topic; May or may not provide a concluding statement.</p> |