

Don't Box Me In

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Grade Level 9th – 12th Grade

Course Biology, Environmental Science

What is in a phenomenon-driven three-dimensional (3D) instructional set? These science resources use phenomena to facilitate engaging and meaningful learning, instruction, and formative assessment. Each resource set contains a guiding document and three other types of documents: an Instructional Task (IT), a corresponding formative Assessment Task (AT), and a corresponding Pattern Analysis of Student Thinking (PAST). These resources are not intended to be a complete lesson plan. Three-dimensional learning is not limited to one specific type of lesson format and is compatible with most lesson plan models. The IT proposes two or more possible phenomena that could be used to drive an instructional sequence addressing a specific OAS-S standard. It also provides suggestions for engaging students with the phenomena through meaningful learning experiences in three dimensions. The AT focuses on a phenomenon-associated scenario. It contains one or more tasks designed to give students opportunities to show their thinking and provide evidence-based explanations about the disciplinary core ideas (DCIs) using crosscutting concepts and scientific practices for that standard. The PAST document is directly associated with the AT. It describes the intended purpose of each part of the AT and includes relevant student response themes to help teachers identify patterns of student thinking. It also provides guidance and insight into how to interpret student responses and possible instructional moves for facilitating student understanding of a specific DCI concept. Individual teachers can use the PAST as a tool to construct a rubric for the AT.

Performance Expectation (PE)

Biology: HS-LS2-6

Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

Environmental Science: HS-LS2-7

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

Disciplinary Core Ideas (DCI)

Ecosystem Dynamics, Functioning, and Resilience

A complex set of interactions within an ecosystem can keep the ecosystem's numbers and types of organisms relatively constant over long periods of time under stable conditions.

If a modest biological or physical disturbance occurs to an ecosystem, that ecosystem may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem.

Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability.

Anthropogenic changes (induced by human activity) in the environment can disrupt an ecosystem and threaten the survival of some species.

Biodiversity and Humans (secondary to HS-LS2-7)

Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction).

Humans depend on the living world for the resources and other benefits provided by biodiversity, but human activity also has adverse effects on biodiversity.

Thus, sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth.

Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value.

Developing Possible Solutions

When evaluating solutions, it is important to take into account a range of constraints including cost, safety, reliability, and aesthetics and to consider social, cultural, and environmental impacts.

Resource Attachments

Phenomenon-Based Instructional Task

- Guide to using a Phenomenon Driven Three Dimensional Instructional Set 3-6-19—Don't Box Me In.pdf
- HS LS2 6 IT Ecosystem Dynamics Functioning and Resilience Mountain Fork River Data—Don't Box Me In.pdf
- HS LS2 6 IT Ecosystem Dynamics Functioning and Resilience—Don't Box Me In.pdf

Formative Assessment Task

- HS LS2 6 AT Ecosystem Dynamics Functioning and Resilience Niangua Darter 1—Don't Box Me In.pdf

Pattern Analysis of Student Thinking (PAST)

- HS LS2 6 PAST Ecosystem Dynamics Functioning and Resilience Niangua Darter—Don't Box Me In.pdf