

Carbon TIME Professional Development Module 1

Professional Development Module 1 provides a vision of science teaching and learning and background information relevant to all *Carbon TIME* units. The table below illustrates how Module 1 contributes to each of the four [Carbon TIME Professional Development Course of Study](#) Goals.

Professional Development Module 1 Goals

Carbon TIME Professional Development Course of Study Goals				
	Goal 1: Understanding Three-Dimensional Learning and Carbon TIME Curriculum	Goal 2: Preparing to Teach Carbon TIME Units	Goal 3: Learning from Classroom Experiences and Student Work	Goal 4: Creating and Sustaining Supportive Professional Communities
Module 1	Establishes a vision for students' three-dimensional engagement with phenomena.	Establishes a foundational understanding of tools and practices designed to assess and scaffold students' three-dimensional engagement.	[Intentionally empty.]	Provides an opportunity for participants to develop a shared vision of three-dimensional teaching and learning.

Module 1 Introduction and Overview

This module focuses on the first stage in teachers' cognitive apprenticeship experience: establishing the problem.

- Teachers discuss the importance and the challenges of *Carbon TIME*'s goals for student learning—environmental science literacy (including three-dimensional proficiency and preparation for future learning).
- They discuss the implications for classroom teaching—the importance of scaffolding and assessing students' three-dimensional engagement with phenomena.
- They are introduced to the resources on the *Carbon TIME* website and the essential features of *Carbon TIME* units—the Instructional Model and discourse routine.
- They see an overview of the PD Course of Study and its cognitive apprenticeship model.

Activities for Establishing the Problem

There are multiple ways to engage teachers in establishing the problem. Here, we provide a few recommendations for the kinds of activities and engagement that we have found support teachers in identifying and discussing the importance and challenges of *Carbon TIME*'s goals for environmental science literacy and three-dimensional engagement with natural phenomena.

At the beginning:

- Watch the *Carbon TIME Overview* video (*Environmental Science for All* video), from the [Carbon TIME homepage](#).
- Introduce a Driving Question for the Professional Development Course of Study: *How do I support my students in three-dimensional engagement with natural phenomena, in order for them to achieve environmental science literacy?*
- Gather and discuss teachers' ideas and questions about the PD Course of Study's Driving Question.
 - See any *Carbon TIME* unit's Activity 1.2 (Expressing Ideas & Questions) for a step-by-step guide; though written for teachers' engagement of students, these steps are identical for adults' to express, share, and publically discuss initial ideas and questions.

- The [Using a Driving Question Board Educator Resource](#) provides support for developing and using a Driving Question with learners.
- Other possible discussion questions: *How well-situated are we to meet new goals and overcome challenges?*

Early in the Professional Development Course of Study

- Watch the *Teachers and students share about their experiences with Carbon TIME* video, from the [Carbon TIME homepage](#) and revisit the PD Course of Study's Driving Question.
 - Additional possible discussion questions after tis video: *What did you notice about ways of engaging with phenomena? Assessing and scaffolding learning? Student roles and discourse? Unit sequence?*
- Watch the *Carbon TIME research: Understanding how students learn and effects of Carbon TIME on student learning* video, from the [Carbon TIME homepage](#) and revisit the PD Course of Study's Driving Question.
- Use locally-available data to identify and explore students' challenges in reaching three-dimensional performance goals.
 - If possible, providing current (or "last year's") students with assessment items from *Carbon TIME*'s overall posttest (or any *Carbon TIME* unit posttest) – available through the [Carbon TIME Assessment site](#) – can help teachers identify ways in which *Carbon TIME* and NGSS goals for student outcomes are different from current local assessments and instruction.
 - This data may be from school-, district-, or state-level assessments, though the majority of these are not (yet) assessing three-dimensional (NGSS-aligned) performances.

Throughout the entire Professional Development Course of Study

- Regularly revisit the PD Course of Study's Driving Question: *How do I support my students in three-dimensional engagement with natural phenomena, in order for them to achieve environmental science literacy?*
 - Have teachers review and update their ideas and questions.
 - See the [Using a Driving Question Board Educator Resource](#) for support.

Activities for Teachers' Foundational Knowledge about NGSS and Carbon TIME

Teachers may have a range of knowledge about the three-dimensional student performance expectations in the *Next Generation Science Standards* and your related state and local guiding documents. Here, we provide a few recommendations for the kinds of activities and engagement that may help provide teachers with an understanding of shifts in student expectations and classroom instruction.

- Use the [PD Module 1 PowerPoint](#) (with notes), making connections between the NGSS and *Carbon TIME*.
- Watch the [Carbon TIME Infomercial](#) (~30-minute video) introducing *Carbon TIME*, available through Michigan State University's CREATE for STEM Institute.
- Read the [Three-Dimensional Learning in Carbon TIME](#) Educator Resource
- Other (free and paid) suggestions:
 - Use resources on the [Next Generation Science Standards website](#).
 - Use resources from the [STEM Teaching Tools website](#).
 - Review the [National Resource Council's \(NRC\) Framework for K-12 Science Education](#) (2012).
 - Use (paid) resources from the National Science Teaching Association (NSTA) Press:
 - [Helping Students Make Sense of the World Using Next Generation Science and Engineering Practices](#) (2017), especially Chapter 1 (Moving Beyond "Knowing

About” Science to Making Sense of the World) and Chapter 4 (The Role of Practices in Scientific Literacy).

- [Disciplinary Core Ideas: Reshaping Teaching and Learning](#) (2016), especially Chapter 7 (Core Idea LS2; Ecosystems: Interactions, Energy, and Dynamics).
- [Crosscutting Concepts: Strengthening Science & Engineering Learning](#) (2021), especially Chapter 8 (Energy and Matter: Flows, Cycles, and Conservation).

Activities for Teachers’ Foundational Knowledge about Carbon TIME website and unit design

These activities are designed to support teachers in locating and using resources in the *Carbon TIME* website, including unit-level resources, password-protected assessment resources, and general resources about *Carbon TIME* unit design.

- Explore the [Carbon TIME website](#).
 - The [Units](#) tab takes teachers to each of the six units and its unit materials – except for assessments and answer keys – are located.
 - The [Assessment Links](#) is a password-protected site. Teachers will need to register with a username and password to gain access to the unit pre/post assessments, overall tests and item pools, and unit assessing and grading documents.
 - The [Carbon TIME Library](#) takes teachers to a variety of unit, cross-unit, and educator-facing tools.
- [Professional Development Module 3](#) includes a section on Preparing to Teach Other *Carbon TIME* Units, which outlines, in detail, unit resources and their organization on the website. [Professional Development Module 2](#) provides similar information, in the context of the *Systems and Scale* unit.
- Read the [Carbon TIME Unit Synopses](#) for an overview of all six *Carbon TIME* units.
- Read the [Carbon TIME Instructional Model](#) for information on overall unit design.
- Read the [Carbon TIME Discourse Routine](#) for information on organization of individual activities.