

GLENCOE

EARTH SCIENCE

GEOLOGY, THE ENVIRONMENT & THE UNIVERSE



Ease the Transition to Next Generation Science.

Whether your district has already adopted Next Generation Science Standards (NGSS) or is considering adopting them or any other new standards, *Earth Science: Geology, the Environment and the Universe* ensures a seamless transition.

The increased pace of change in education in the last few years has created seismic shifts in the delivery and consumption of educational materials. Students want to connect what they learn in the classroom to what they see happening in the real world – today!

We deliver to you the most effective, innovative, and inspiring high school earth science curriculum that meets both NGSS and local science standards. Whether you’re looking for a hybrid digital-print or a digital-first program, McGraw-Hill Education is your trusted advisor.

With *Earth Science: Geology, the Environment, and the Universe* you are equipped to:

- Meet science standards **Performance Expectations** (PEs).
- Integrate **Science and Engineering Practices** into your science classroom.
- Apply the **Disciplinary Core Ideas** (DCIs).
- Correlate your lessons to **NGSS**.

Earth Science: Geology, the Environment, and the Universe Leveraging technology to drive personalized student success while engaging and motivating students with hands-on, project-based activities and real-world applications.

McGraw-Hill Education: Our tools, platforms, and services are focused on serving the needs of educators and learners through our purposeful technology, proven differentiated pedagogy, and unmatched professional development.

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*Next Generation Science Standards is a registered trademark of Achieve. Neither Achieve nor the lead states and partners that developed the Next Generation Science Standards was involved in the production of, and does not endorse, this product.



When you combine
the **science of learning**
with the **art of teaching**,
there's no limit to what
students can achieve.





RAMP UP THE ENGAGEMENT...

To create memorable learning experiences.

To meet you wherever you are on the digital spectrum, *Earth Science: Geology, the Environment, and the Universe* interactive learning and teaching resources are easy-to-use, whether you're a technology novice, digital native, or somewhere in the middle.



ConnectED is your digital teaching platform making it easy and convenient to customize lessons, review assignments, and communicate with students.

Plan, Teach, and Assess with *ConnectED*.

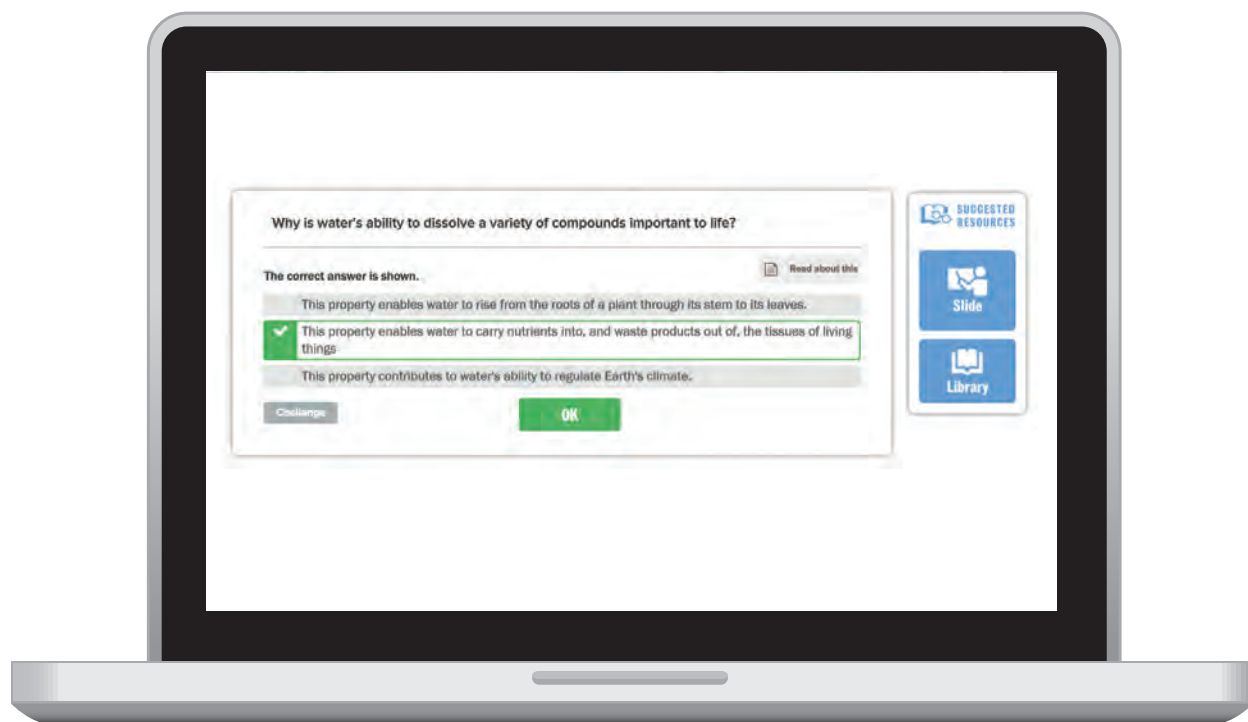
Increase Knowledge Retention with LEARNSMART®.

The *LearnSmart*® adaptive learning engine with *SmartBook*® gives every student a unique learning path and every teacher the power to reach all students in class.

SmartBook is an eBook whose text is fully integrated with *LearnSmart* technology. As a student reads, this technology determines precisely which learning objectives he/she understands and which ones he/she struggles with, highlighting the most critical content for the student to read next.

Learning Resources close knowledge gaps by immediately clarifying the concepts the student finds most challenging.

The personalized study resources your students need today to master state assessment tomorrow



Pinpoint knowledge gaps for individual students and across classes.

Empower students to personalize their learning experiences with optimal learning paths so they spend more time on what they don't know with *LearnSmart*.

- Practice of basic Earth science concepts to improve recall and application before moving on
- Additional exposure and increased practice to master new concepts
- Presentation of concepts individual students struggle to master



TIME SAVING TECHNOLOGY...

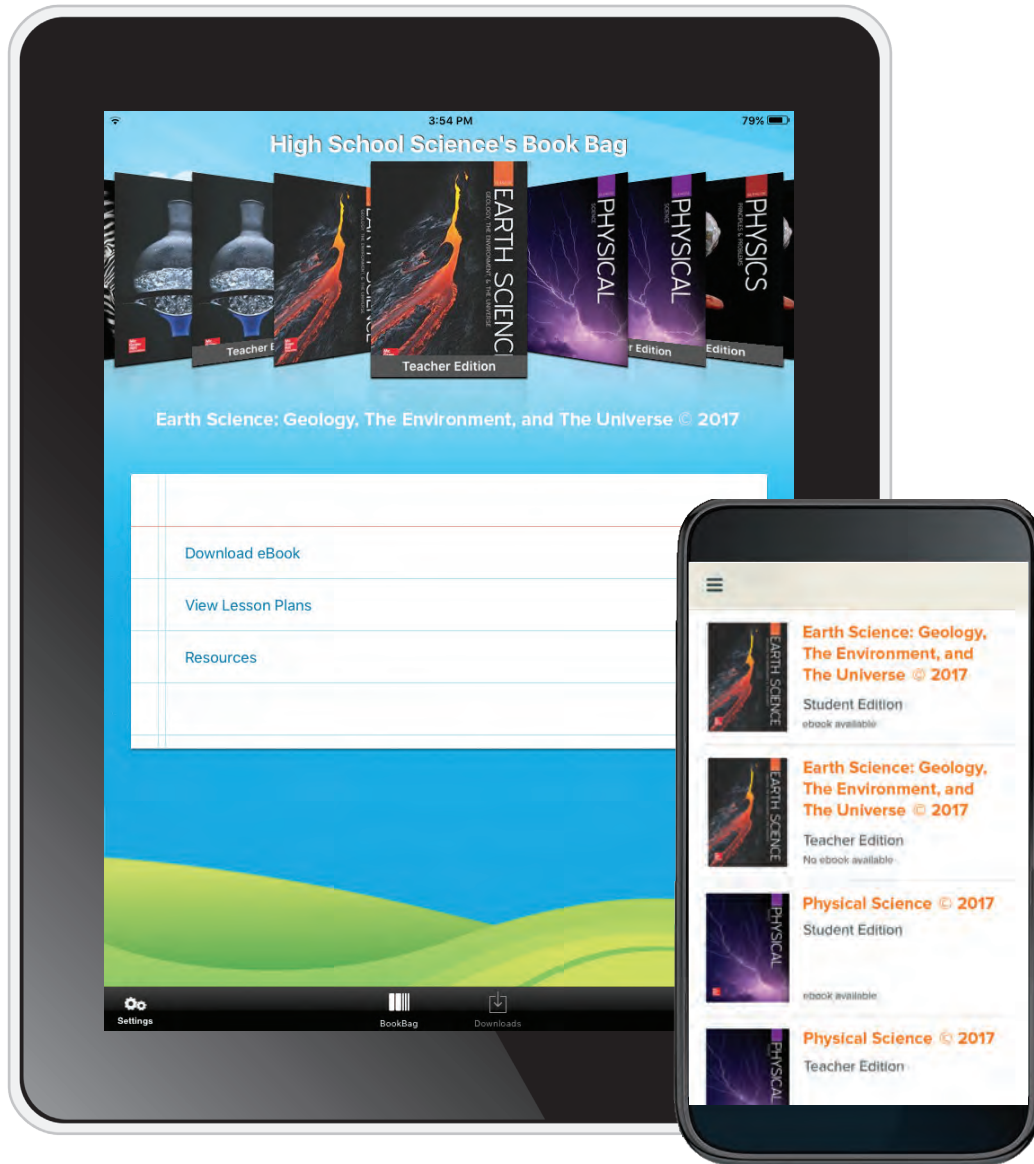
To optimize your productivity

Give your students the resources they need on the go! The *student eBook* helps students turn Earth science in the real world into learning moments by giving students access to their program materials and resources anytime and anywhere.

Empower students to learn from earth science as-it-happens with the *student eBook* which learners can access anytime and anywhere using the Open eBook icon.

Plan and Prepare On-The-Go

The *ConnectED Mobile App* gives access to your Earth Science program including *student eBook*, planning tools, reference materials, and other program resources. *ConnectED Mobile* is available on select Chromebook, iOS, and Android™ devices.



Use the ConnectED Mobile App to:

- Access all the courses available to you in ConnectED.
- Download *student eBook* for use offline, whenever you need it.
- Review lesson plans from the Plan & Present tab from the *ConnectED Teacher Center* dashboard.
- Manage the content you download to the app.
- Retrieve a comprehensive list of resources from the Resource tab from the *ConnectED Teacher Center* dashboard.

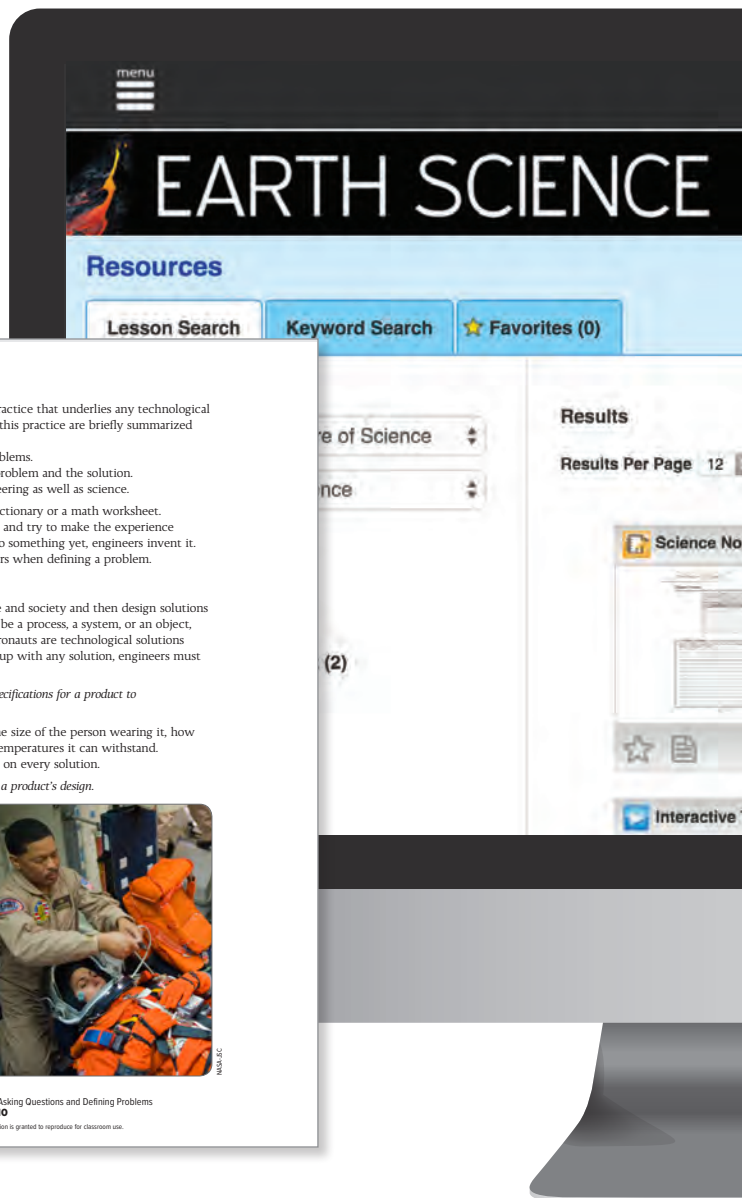
Real-World Connections

Be confident helping students achieve more! Use the *Science and Engineering Practices Handbook* to introduce the skills to students and support their scientific investigations and engineering projects.

As a reference book, the *Science and Engineering Practices Handbook* provides students with background information, definitions, examples, and Quick Practice activities to stimulate and reinforce learning.

The *Science and Engineering Practices Handbook* is an easy-to-use reference for all eight practices.

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information



Defining Problems

Defining problems is an engineering practice that underlies any technological solution. The different components of this practice are briefly summarized below.

1. Engineers design solutions to problems.
2. Problem statements outline the problem and the solution.
3. Asking questions is part of engineering as well as science.

Defining problems doesn't involve a dictionary or a math worksheet. Engineers study how people do things and try to make the experience better. If people don't have a way to do something yet, engineers invent it. Engineers have to consider many factors when defining a problem.

Seeking a Solution

Engineers identify problems for people and society and then design solutions to those problems. The solution could be a process, a system, or an object, such as a tool. Space suits worn by astronauts are technological solutions designed by engineers. When coming up with any solution, engineers must consider many criteria.

Criteria are requirements or specifications for a product to be successful.

Criteria for a space suit may include the size of the person wearing it, how easy it is to move around in, and the temperatures it can withstand. Engineers also have certain constraints on every solution.

Constraints are limitations on a product's design.

For example, some materials may not be durable enough or may be too expensive to use. Major constraints include time, energy, space, and the availability of tools and materials. Other important constraints are the number of people working on the project, how much money is available for the project, and what information about the project exists.



Space suits have many criteria for safety and functionality.

Find the Practices Handbook in your teacher resources.

Integrated Student Resources

Written to meet each Next Generation Science Standard (NGSS) performance expectation, **Applying Practices Worksheets** and **Project-Based Learning Activities** (PBLs) challenge your students to solve real problems in the real world. These sheets are editable, downloadable, accessible online, and designed to meet specific performance expectations.

Student resources, learning activities, and worksheets are embedded for point-of-use access. Students can use these dynamic resources immediately to practice new concepts.

Students practice earth science in action with these learning tools.

- **Applying Practices** and **Project-Based Learning Activities** that integrate traditional science content with science and engineering practices
- Design-your-own labs
- Guided Laboratory Investigations
- Modeling activities
- Research and communicate projects

Name _____ Date _____ Class _____

APPLYING PRACTICES **Evaluating Impacts of Environmental Change on Populations**

The Isthmus of Panama

Introduction
Anthropogenic is a term used to describe human influences on nature. Anthropogenic and natural changes to the physical environment, such as deforestation or application of fertilizers, contribute to the expansion of some species, the emergence of new distinct species, and the decline - and sometimes the extinction - of some species. Panama has experienced both natural and anthropogenic changes during its existence (the age of Panama is currently a hot topic of debate among scientists).
The formation of the Isthmus of Panama created a bridge between North America and South America - and a wall between the Pacific and Atlantic oceans. This made the migration of land plants and animals between the continents possible, but separated populations of marine organisms that once swam in the same waters.
The year 2014 AD celebrated the centennial birthday of the Panama Canal, a waterway constructed to help ships travel more efficiently between the Atlantic and Pacific Oceans. The canal cuts through the Isthmus of Panama, allowing ships to avoid the dangerous and lengthy trip around the southern tip of South America. The constructed canal also connected the Rio Chagres and Rio Grande rivers of Panama, providing an opportunity for once-isolated fish communities to come to come together and share the space as invasive species.

Task
Your task is to research how the natural formation of the Isthmus of Panama and the anthropogenic construction of the Panama Canal changed the local environments, and what impacts these changes had on populations of organisms. Take detailed notes on examples of (1) increasing population size of a species, (2) speciation or (3) extinction events.
Once you have finished your research, you will engage in a Socratic Seminar as a form of an interactive presentation to evaluate the claims and evidence presented by your peers regarding the argument that natural and anthropogenic environmental changes can cause changes in populations of species.

Process
Use your resources to answer the following questions.
1. Would the separation caused by land formation lead to changes in a population's gene pool over time? Make a claim and back it up with evidence regarding a specific species.

Applying Practices • Evaluating Impacts of Environmental Change on Populations
1
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Find Applying Practice Worksheets in your teacher resources and teacher blades. Also accessible at point-of-use in student resources.

Science in Action

Earth Science: Geology, the Environment, and the Universe offers you diverse lab opportunities to deepen your students' understanding of science by experiencing it and experimenting with Earth science first-hand!

Use these lab activities included in every chapter to bring science to life for your students.

- Launch Labs
- MiniLabs
- Problem Solving Labs
- GeoLabs
- Lab Manual
- Exploring Environmental Problems

[Chapter 1]

LaunchLAB

Why is precise communication important?

Have you ever explained something to someone only later to find out that what you thought was a clear explanation was confusing, misleading, or even incorrect? Precise communication is an important skill.

Procedure [Eye Safety, Clothing Protection, Handwashing]

1. Read and complete the lab safety form.
2. Obtain an **object** from your teacher. Do not show it to your partner.
3. Write one sentence that accurately describes the object in detail without identifying or naming the object.
4. Give your partner the description and allow him or her a few minutes to identify your object.
5. Now use your partner's description to identify the object.

Analysis

1. **Identify** Were you able to identify the object? Why or why not?
2. **Error Analysis** Work with your partner to write journals to make them.
3. **Compare** Trade the journals with your partner. Have your partner describe the object to you. How did your partner do? Why?

LaunchLAB

iLab Station

Why is precise communication important?

Have you ever explained something to someone only later to find out that what you thought was a clear explanation was confusing, misleading, or even incorrect? Precise communication is an important skill. Practice your communication skills with this activity.

Launch Lab is found on the chapter opener.

VIRTUAL LABS

Oceanography

What are some characteristics of the ocean and the ocean floor?

Earth's highest mountains, deepest valleys, and flattest plains are found not on land but under the ocean. Beyond ocean shorelines, the continents extend outward. They slope first gradually and then steeply down to the ocean floor. Beyond the slope lie trenches, valleys, plains, and ridges of the ocean basin.

These features are formed by tectonic plate movements occurring on the ocean floor. Where tectonic plates diverge, new crusts form underwater mountain ranges. Where tectonic plates converge, old ocean crust descends into trenches and is destroyed.

The features of ocean basins affect organisms that live in the oceans. Ninety percent of marine life occurs in the upper zone of the ocean. This is because plants and algae, the first links in the marine food chain, need sunlight.

Journal Calculator Table

Reference Ocean Depth

Structure Labels

Continental Slope Continental Shelf Ocean Ridge

Ocean Trench Abyssal Plain Hydrothermal Vent

Location: D

Temperature

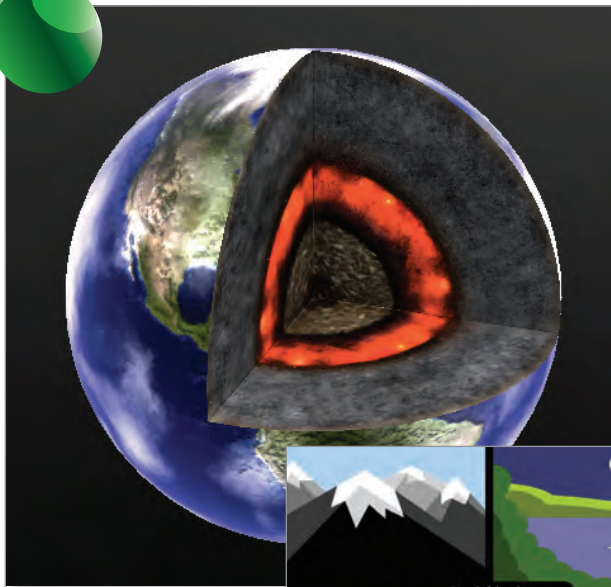
Light Intensity

A B C D E F G H

Check Label Reset



Cyber Science 3D[®]



Drag and Drop Tables

Special Properties of Minerals

Property	Double refraction occurs when a ray of light passes through the mineral and is split into two rays.	Effervescence occurs when reaction with hydrochloric acid causes calcite to fizz.	Magnetism occurs between minerals that contain iron; only magnetite and pyrrhotite are strongly magnetic.	Iridescence - a play of colors, caused by the bending of light rays.	Fluorescence occurs when some minerals are exposed to ultraviolet light, which causes them to glow in the dark.
Mineral	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Fluorite Calcite

Calcite Calcite-Variety Iceland Spar Magnetite Pyrrhotite Agate

Reset Submit Show me

Expanded features such as Interactive Tables, BrainPOP[®], and Cyber Science 3D[®] go beyond the limitations of the printed page.



Apply Interactive Practice.

Students have their own digital learning platform called the *ConnectED Student Center*, complete with student worksheets and digital resources. Assignments you create appear in their to-do lists. Students can message you directly and submit their work.

Use expanded Student Center features such as **Interactive Tables**, **BrainPOP[®]**, and **Cyber Science 3D[®]** videos to go beyond the limitations of the printed page and bring science into your student's lives like never before.



EFFECTIVE RESULTS...

To support student success

Easy-to-use *eAssessment* with reporting tools equip you with the data you need to make informed instructional decisions and keep students engaged.

- ***eAssessment*** supports diverse types of evaluations and includes online scoring and report generation for digital and/or print distribution.
- **Professional Development** resources including pertinent information on new science standards and implementation best practices are available to you at point-of-use.

Turn Students into Star Performers with **eAssessment**.

Turn your classroom into a earth science success center with **eAssessment** suite – a robust resource – giving you powerful tools to assess student progress and make data-driven instructional decisions.

The **eAssessment** reporting feature means you'll always have access to valuable data on individual students and whole classes to help you differentiate and support student mastery of concepts appropriately.

Identify students with knowledge gaps to make data-driven instructional decisions with **eAssessment**.

Other features of **eAssessment** to help increase your efficiency include:

- Question Bank with questions organized by strand, subject, and lesson.
- Report generation on proficiency and accuracy.
- Create and customize premade diagnostic and summative evaluations.

The screenshot displays the McGraw-Hill eAssessment interface. On the left, there are navigation panels for 'Question Sets' and 'Tests'. The main area shows a 'Chapter 1 Set (Student Edition) (English)' with several multiple-choice questions. An 'Assignment Results' window is overlaid on the right, showing a table of student performance data for a 'Practice Homework' assignment.

Question #	Question Type	Points	Response
X	1	0 / 1	T
X	2	0 / 1	F
	3	1 / 1	T
	4	1 / 1	T
X	5	0 / 1	T
	6	1 / 1	F
	7	1 / 1	T
	8	1 / 1	F
	9	1 / 1	F
X	10	0 / 1	F
	11	1 / 1	T
	12	1 / 1	F
X	13	0 / 1	T
	14	1 / 1	T

eAssessment suite collects valuable data for every student and the class.

Practical Professional Development

The right tools make all the difference in getting your work done efficiently. Seamlessly embedded digital resources and the convenient print materials of *Earth Science: Geology, the Environment, and the Universe* gives you everything you need to make science relevant, rigorous, and possible for every student. Designed on the principles of effective professional development (PD), *Earth Science: Geology, the Environment, and the Universe* PD includes self-paced courses, Foldables® and NGSS videos, and on-demand webinars.

Get Started

Online, self-paced Quick-Start course designed to get teachers and administrators up and running fast.

Learn More

Online Implementation course designed to help teachers connect professional learning to the classroom.

Watch It

Videos from Dinah Zike and on-demand webinars and videos support great instruction in the classroom.



Where and When You Need It

In just a few clicks, you can quickly access relevant, timely, and ongoing **Professional Development** videos and webinars available to you, on-demand.

Directly embedded in *Earth Science: Geology, the Environment, and the Universe* is your interactive professional learning program. Learn how other science educators have successfully implemented the program and increase your awareness of new science standards.

Relevant Resources for science educators

Rich, web-based resources include modeled classroom instruction videos, implementation support, technology resource optimization, and professional learning community support.

Use the ConnectED Professional Development tab to access on-demand webinars and these free video libraries:

- Dinah Zike/Foldable Videos
- Science and Engineering Practices Videos
- Pedagogical/Instructional Support Videos
- On-Demand Webinars

Customized, comprehensive, and expertly-crafted solutions translate into meaningful program success.

The screenshot displays the McGraw Hill Education Earth Science Teacher Center interface. The top navigation bar includes the McGraw Hill Education logo, a menu icon, and user profile and search icons. The main header reads "EARTH SCIENCE TEACHER CENTER". Below this, the "Professional Development" section is active, showing a sidebar with navigation options: ConnectED, Class Management, Resources, Assignment Tracker, Calendar, My Files, Home, Plan and Present, Assessment, Standards, Professional Development (highlighted), Glossary, Notebook, My Messages, and My Discussions. The main content area features a grid of video thumbnails under the heading "Implementation Support". The thumbnails include "Dinah Zike/Foldable Videos", "Science and Engineering Practices Videos", "Digital Instruction Videos", "On-Demand Webinars", and "Blueprints for Success". A "Media" window is open, showing a video of a woman holding a white card.



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To learn more about the McGraw-Hill Education *High School Science* program, visit www.mheducation.asia/high-school-science or contact your Sales Representative.

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