

Research and Philosophy

Introduction

Interactive Science © 2011 is a standards-based, next-generation, middle grades science program for Grades 6–8. The program utilizes essential best practices in science instruction, featuring the Understanding by Design instructional model, the 5E Learning Cycle, and reading and writing strategies for different content areas.



Interactive Science features flexible options for teaching and learning in three instructional paths: text, inquiry, and digital. Students interact with the instruction by using an innovative write-in student edition. Students also interact with inquiry-based, hands-on labs, and activities by using Lab Zone resources and kit materials. They can also interact online at My Science Online, which features a robust array of interactive science content and videos.

Understanding by Design



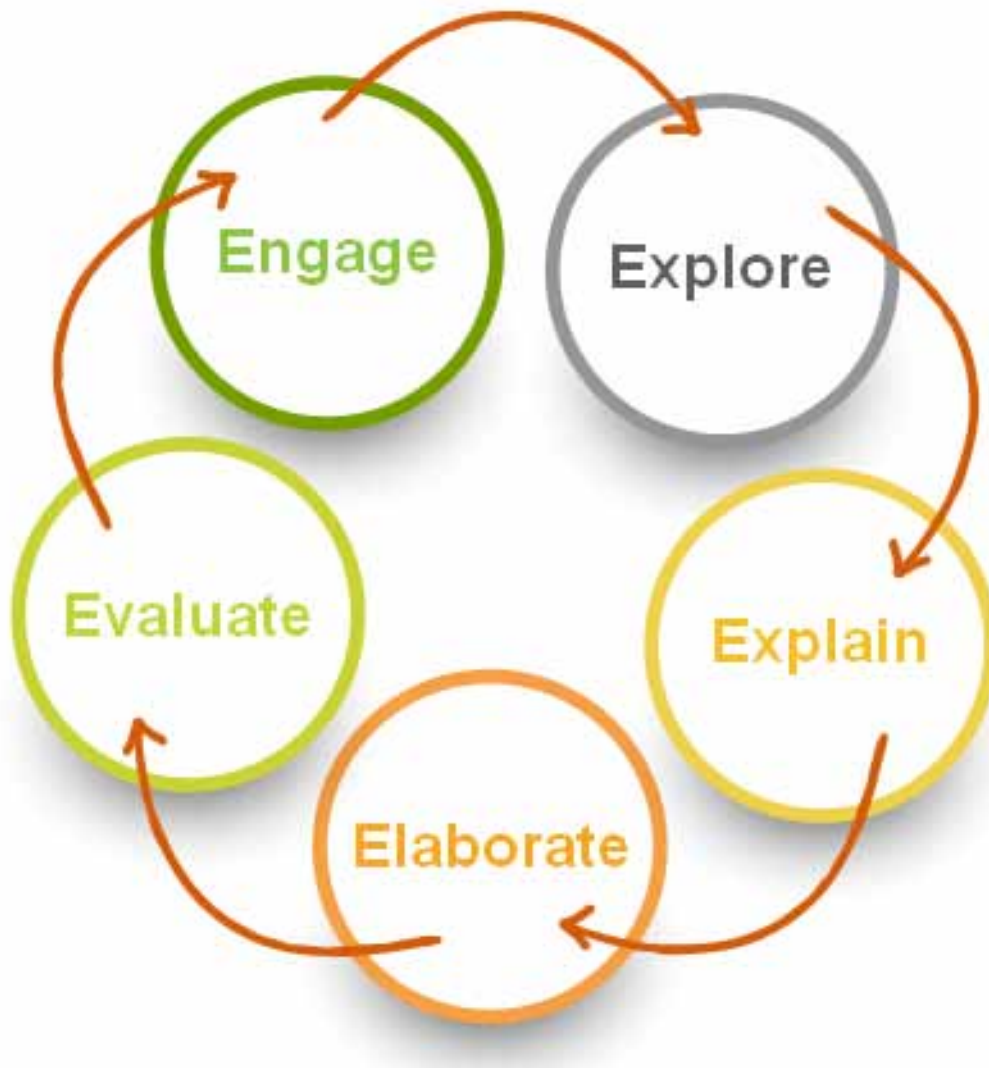
Understanding by Design (UbD) is a research-based way of thinking about the design of curriculum, instruction, and assessment. The UbD framework is described in detail in the book *Understanding by Design* by Grant Wiggins and Jay McTighe. Grant Wiggins, one of the book's coauthors, has worked with Pearson to incorporate his unique instructional philosophy across all academic disciplines and is also one of the lead authors of the *Interactive Science* program.

The goal of UbD is to develop a deep understanding of important ideas through focusing on the Big Ideas of the program. UbD provides a way to move from simply covering the curriculum to ensuring understanding. This is done through a process of learning that provides students with opportunities to investigate, explore, test, and verify important concepts. It really boils down to helping students learn how to transfer knowledge. To learn more about UbD, be sure to watch the tutorial on the Pearson SuccessNet Web site.


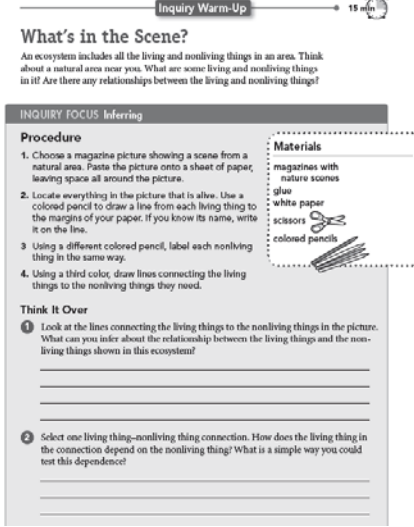
The Five E Learning Cycle



Interactive Science also aligns with the 5E Learning Cycle. This model, which originated with the Biological Science Curriculum Study (BSCS), is a best practice that is widely used in the development of science curricula.

The content and activities in every lesson are organized to guide students and teachers through the Engage, Explore, Explain, Elaborate, and Evaluate cycles. The 5E Learning Cycle is integrated throughout the program. This approach fosters inquiry-based learning and allows students to use and build upon prior knowledge and experience to construct meaning.



The Interactive Science Approach to the 5E Learning Cycle

	Description	Program Examples
Engage	Engage students by introducing a topic and an activity to activate prior knowledge.	 <p>My Planet Diary introduces the topic <i>Living Things and Their Environment</i>. This activity includes an engaging story, and a set of questions that help students begin to set purpose, and activate prior knowledge.</p>
Explore	Introduce activities to encourage students to begin investigate and explore the topic.	 <p>For this particular lesson, the Explore stage involves an activity (called an <i>Inquiry Warm-Up</i>). In this activity, students identify living and non-living things in a picture of an ecosystem.</p>

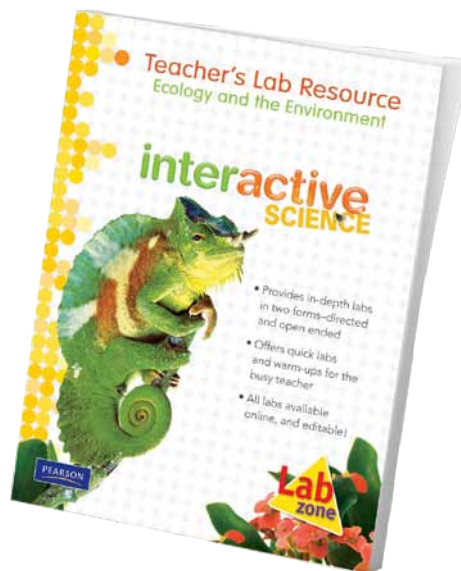
<p>Explain</p>	<p>Teach key concepts and vocabulary and have students explain their understanding.</p>	<p>What Does an Organism Get From Its Environment?</p> <p>If you were to visit Alaska, you might see a bald eagle fly by. A bald eagle is one type of organism, or living thing. Different types of organisms live in different types of surroundings, or environments.</p> <p>Icon: An organism gets food, water, shelter, and other things it needs to live, grow, and reproduce from its environment. An environment that provides the things a specific organism needs to live, grow, and reproduce is called its habitat.</p> <p>In a forest habitat, mushrooms grow in the damp soil and woodpeckers build nests in tree trunks. Organisms live in different habitats because they have different requirements for survival and reproduction. Some organisms live on a prairie, with its flat terrain, tall grasses, and low rainfall amounts. A prairie dog, like the one shown in Figure 1, obtains the food and shelter it needs from a prairie habitat. It could not survive on this rocky ocean shore. Likewise, the prairie would not meet the needs of a sea star.</p> <p>Figure 1</p> <p>What's Wrong With This Picture? Most people would never expect to see a prairie dog at the beach.</p> <p>% List Give three reasons why this prairie dog would not survive in this habitat.</p> <p>Sample: There is no grass for eat, it is too wet, there is no grass to hide from predators.</p>  <p>Students will read to learn more about a key concept. The key concept is identified by locating the key icon, and key vocabulary terms are identified by yellow highlighting. The lesson notes in the margins of the teacher's edition help the teacher clarify misconceptions, demonstrate a key concept, or provide a range of learning activities. Students explain their current understanding of the key concepts by responding to the activities in their write-in student edition.</p>
<p>Elaborate</p>	<p>Encourage students to participate in activities that build on what they have learned and extend their thinking about a key concept.</p>	<p>Quick Lab</p> <p>Organisms and Their Habitats</p> <p>An icon of habitat provides everything it needs to survive. Before you explore cross habitats for animals to use, they must first know a great deal about the animal's natural habitat.</p> <p>Support Icons</p> <p>Procedure</p> <p>1. Study the illustration of the fox, a rare mammal.</p>  <p>Think It Over</p> <p>1. Use the illustration to infer what specific survival needs this animal may have.</p> <p>a. Do you think this animal grows any plants or ferns other animals? On which habitats did you base your answer? Explain.</p> <p>b. Do you think this animal lives on the ground or in trees? On which habitats did you base your answer? Explain.</p> <p>2. Using your answers to Questions 1a and 1b, describe the fox's habitat, including an water, details as you can.</p> <p>In this Quick Lab activity, students will study a picture of an animal. Using what they observe and what they have learned about the key concept, they will make inferences about the animal's environment and survival needs.</p>
<p>Evaluate</p>	<p>Have students assess their understanding of the key concept.</p>	<p>Lab 2018 Do the Quick Lab Organisms and Their Habitats</p> <p>Assess Your Understanding</p> <p>got it?</p> <p><input type="radio"/> I get it! Now I know that an organism's environment provides food, water, and shelter for the organism to live, grow, and reproduce.</p> <p><input type="radio"/> I need extra help with See TE note.</p> <p>Go to MY SCIENCE COACH online for help with this subject.</p> <p>The Assess Your Understanding activity appears after the student learns about a key concept. Students identify what they know about the concept. Students can also indicate their need for additional help.</p>

Write-in Student Edition



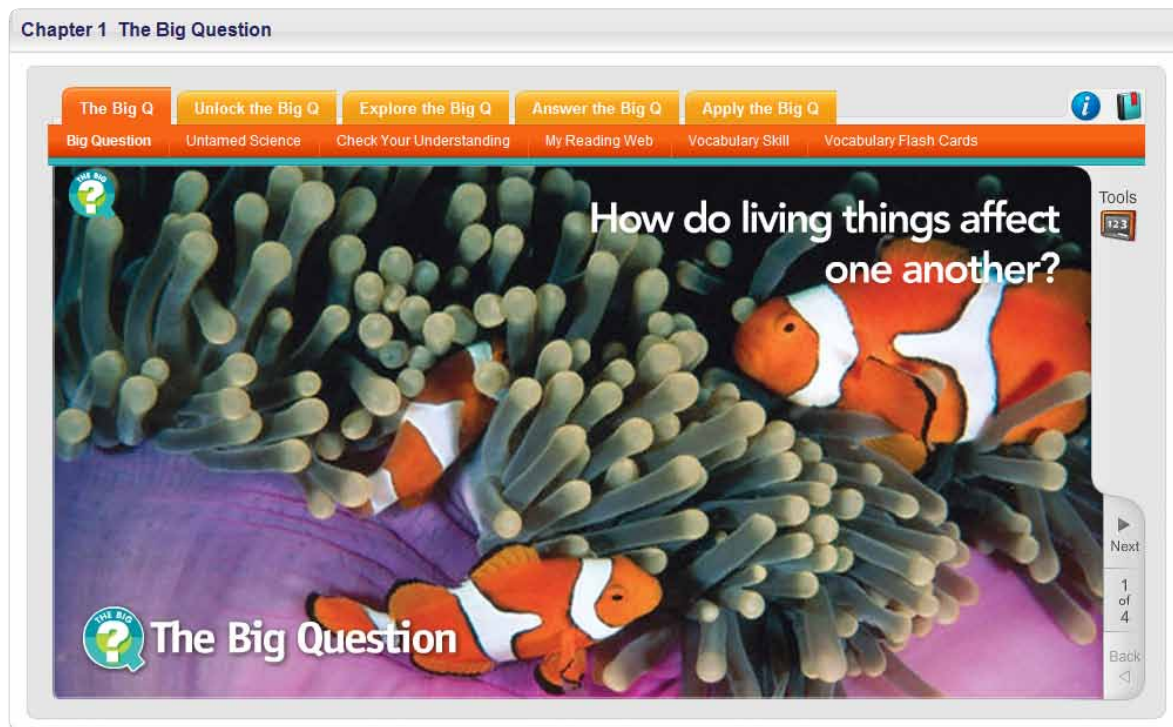
The *Interactive Science* write-in student edition provides students with a sense of ownership of their own learning. Students can record their understanding of key concepts, actively interact with the text, and communicate their need for clarification of concepts. Reading and writing strategies and practice are built in to the student editions. Metacognitive prompts are integrated into the design of the lessons—helping students to actively think about what they know and identify what they need to understand. Self-assessment is an important tool for students to use to monitor their understanding. Each key concept is followed by a Got It! self-assessment. Based on their response, students may venture online for further practice at My Science Coach. If they use My Reading Web, they can also access online Lexile leveled text passages that are written at an appropriate reading level for their ability.

Inquiry



The LabZone icon appears throughout the text and indicates a program inquiry activity. These activities are contained in the Teacher's Lab Resource. The lab activities require different levels of inquiry. In addition to Inquiry Warm-Ups and Quick Labs, lab activities feature options for conducting experiments in an open inquiry or directed inquiry. Direct inquiry supplies the students with the lab procedures. Whereas open inquiry requires students to plan, design, and implement their own procedures, record evidence, and share their findings.

Digital Path



While some science programs offer digital components that are static, such as digital e-books, *Interactive Science* comes with an interactive and engaging digital path. The digital path allows the students to view informative videos, interact with art, participate in virtual labs, and monitor their own progress. Many activities provide students with immediate feedback. Teachers can assign entire lessons, or strategically choose the components that students can experience online. Monitoring student progress is easy. Teachers can view quiz scores, evaluate open-ended questions, and assign additional practice. Using Success Tracker, the teacher may assign each student a diagnostic test. As a result of students' individual responses, the system can automatically assign students remedial learning content. Teachers may use the Success Tracker reports to show mastery of key concepts or deficiencies.

Research



During the spring of 2009, PRES Associates, Inc., a planning, research, and evaluation company, conducted a pilot study of the program. The pilot included 435 middle grade students and 7 teachers. This study used three of the *Interactive Science* modules. Researchers determined positive changes in regard to the following areas:



- Increased student interest and engagement in science
- Increased student ownership and pride
- Increased the students' application of science
- Increased student performance in other academic areas
- Improved monitoring of science learning
- Improved student organizational skills
- Increased projections of student performance on state assessments and future science courses
- Improved teacher performance and lesson preparedness

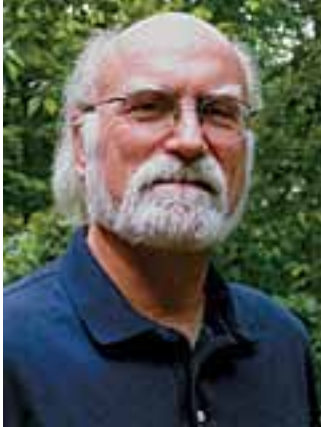

When the *Interactive Science* program was compared to the science texts that the participants are currently using, teachers said that *Interactive Science* was easier to use, that it increased the students' level of ownership, and that it provided the information and resources needed to teach science effectively.


In a comparison of pre- and posttests, the researchers identified significant growth in understanding for students who studied the Earthquake and Populations and Communities chapters. Students demonstrated growth across all demographic groups. Students who participated in the inquiry path outperformed students who experienced a blended learning approach.

Program Authors

<p>Don Buckley, M.Sc.</p> <p>Information and Communications Technology Director</p> <p>The School at Columbia University</p> <p>New York, New York</p>		<p>Don Buckley has been at the forefront of K–12 educational technology for nearly two decades. A founder of New York City Independent School Technologists (NYCIST) and long-time chair of New York Association of Independent Schools' annual IT conference, he has taught students on two continents and created multimedia and Internet-based instructional systems for schools around the world.</p>
<p>Zipporah Miller, M.A.Ed.</p> <p>Associate Executive Director for Professional Programs and Conferences</p> <p>National Science Teachers Association</p> <p>Arlington, Virginia</p>		<p>Zipporah Miller, former K–12 science supervisor and STEM coordinator for the Prince George's County Public School District in Maryland, is NSTA's associate executive director for professional programs and conferences. She has overseen curriculum development and staff training for more than 150 district science coordinators. Miller's commitment to providing high-quality professional development and resources to science educators and administrators nationwide has made her a respected leader in the science community.</p>

<p>Michael J. Padilla, Ph.D.</p> <p>Associate Dean and Director Eugene P. Moore School of Education</p> <p>Clemson University Clemson, South Carolina</p>		<p>A former middle school teacher and a leader in middle school science education, Dr. Michael Padilla has served as president of the National Science Teachers Association and as a writer of the National Science Education Standards. He is professor of science education at Clemson University. As lead author of the <i>Science Explorer</i> series, Dr. Padilla has inspired the team in developing a program that promotes student inquiry and meets the needs of today's student.</p>
<p>Kathryn Thornton, Ph.D.</p> <p>Associate Dean of Engineering and Applied Science</p> <p>University of Virginia Charlottesville, Virginia</p>		<p>Selected by NASA in May 1984, Dr. Thornton is a veteran of four space flights. She has logged over 975 hours in space, including more than 21 hours of extravehicular activity. As an author on the Scott Foresman Science series, Dr. Thornton's enthusiasm for science has inspired teachers around the globe. Dr. Thornton is currently the Associate Dean for Graduate Programs in the University of Virginia School of Engineering and Applied Science.</p>

<p>Grant Wiggins, Ed.D.</p> <p>President of Authentic Education</p> <p>Hopewell, New Jersey</p>		<p>Award-winning coauthor (Wiggins and McTighe) on the highly successful curriculum textbook, <i>Understanding by Design</i>, published by ASCD, Grant Wiggins is one of the most influential educational reformers today. Dr. Wiggins consults with schools, districts and state education departments on a variety of reform matters; organizes conferences and workshops; and develops print materials and Web resources on curricular change. Dr. Wiggins is the President of Authentic Education in Hopewell, New Jersey.</p>
<p>Michael Wyession, Ph.D.</p> <p>Associate Professor of Earth and Planetary Science</p> <p>Washington University</p> <p>St. Louis, Missouri</p>		<p>An author on more than 50 scientific publications, Dr. Wyession was awarded the prestigious Packard Foundation Fellowship and Presidential Faculty Fellowship for his research in geophysics. Dr. Wyession is an expert on Earth's inner structure and has mapped various regions of the Earth using seismic tomography. He is internationally known for his work in geoscience education and outreach. Dr. Wyession is an Associate Professor in Earth and Planetary Science at Washington University in St. Louis, Missouri.</p>

<p>Your Students</p> <p>The Main Authors</p>		<p>These authors have been highly involved in studying science for a number of years. They have been making observations, inferences and predictions, and really figuring out how the world of science works and communicating their findings to others. Among other things, they have been called curious, innovative experts in their field, and we think they'll be very influential in your classroom.</p>
---	--	--

Review

This guide discussed the program philosophy and research behind *Interactive Science*. For more information about the *Interactive Science* program, be sure to look at the *Interactive Science* Program Guide or visit the tutorials that are available on this Web site.