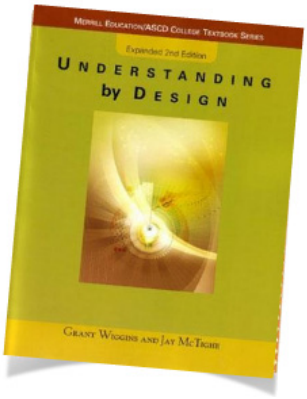
Applying the Understanding by Design® Framework

Introduction

This guide looks at the Understanding by Design® framework and discusses how it is integrated into the presentation and development of Interactive Science. The guide also points out the program strategies that apply the Understanding by Design® philosophy. These strategies move students from content recall to deep understanding.

What Is the Understanding by Design® Framework?

The Understanding by Design® framework (UbD™ framework) is a researched-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 lead authors of the Interactive Science program, has worked with Savvas to incorporate his unique instructional philosophy across all academic disciplines.

The goal of the UbD™ philosophy is for students to develop a deep understanding of the important ideas taught in the program. The UbD™ framework 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. Students learn how to transfer knowledge.

With the UbD™ framework, the curriculum is not just a series of discrete facts and skills. Big Ideas give context and meaning to the content. The Big Idea is a working concept, theme, or issue that a student uses to make sense of otherwise confusing and seemingly unconnected facts.

Big Questions are designed to challenge theories and force students to stretch their thinking, using course content to support and inform their answers. In doing so, students find meaning, value, and connections to what may have previously felt like rote memorization of boring content. The UbD™ framework does not help students just know something; it helps them understand why it matters and how they can apply what they have learned.

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The UbD™ framework emphasizes the use of a process called *backward design* to develop instruction. This process involves identifying the desired results first and working backward to figure out how to get there.

Backward design includes three stages:

Here is a concrete example of backward design.

Stage 1: Identify the desired results of instruction.

Mrs. Henry determines that the instructional goal for her students is to understand that living things interact with their environment. To help students meet this goal, she poses a unique Big Question. For example: "How do living things affect one another?" To support students in answering the Big Question, she also poses a series of Key Concept questions.

Stage 2: Determine acceptable evidence.

Mrs. Henry's students show their knowledge of how living things interact with their environment by correctly answering lesson assessments, drawing conclusions from evidence gathered in a lab activity, and demonstrating understanding by explaining how a familiar ecosystem is organized.

Stage 3: Plan learning experiences and instruction.

Mrs. Henry's instruction includes a reading assignment about living things in the environment, a lab experiment in which students observe the effect of abiotic factors on organisms, and the use of a computer resource that allows students to solve a mystery about an endangered species.

According to Grant Wiggins, the lack of transfer of knowledge is the primary reason that students fail to perform on state testing. Students have learned concepts in a particular context in the classroom, and then if that context is presented slightly differently on the state tests, they have a difficult time extrapolating to a different situation.

In the Understanding by Design® framework, the ability to transfer means that students are able to take the Big Ideas, facts, and examples they've learned, and adapt them to fit many different settings and problems.

The UbD™ Framework and Interactive Science

Interactive Science leverages the UbD™ framework to provide a way to move from simply covering the curriculum to ensuring understanding.

According to the UbD™ framework, understanding is not achieved through covering content alone. It is achieved through carefully designed instruction derived from specific goals.

The process of learning provides students with the opportunity to investigate, test, and verify important concepts to make sense of key science content.

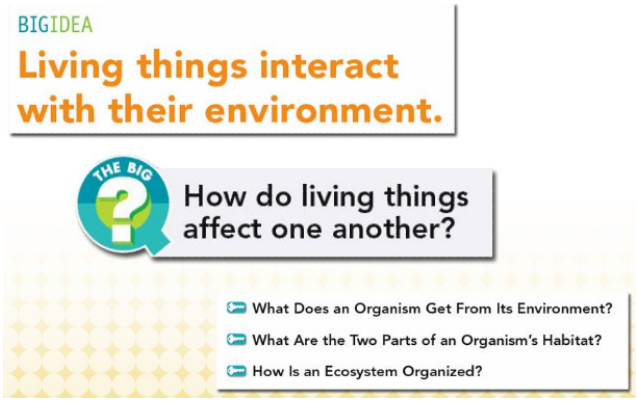
The UbD™ Framework in Practice

Interactive Science emphasizes the use of a backward design process to develop instruction. Rather than beginning the planning process with activities, materials, or textbook content, the backward design in Interactive Science begins with identifying the desired long-term results.

These desired results serve as the focal point for the planning of all curriculum, instruction, and assessment, and this process helps avoid superficial c verage of content.

The Interactive Science program integrates some of these concepts into the program features. Being familiar with these features allows teachers to begin using concepts from the UbD™ framework in their instruction.

The UbD™ framework calls for Big Ideas and Big Questions. In Interactive Science, each chapter and lesson in the student write-in text opens with Big Ideas and Big Questions.



Big Ideas form the backbone of each student text. Big Ideas are the essential concepts for the content of each chapter. These ideas are always accompanied by a Big Question or Key Concept questions.

The Big Question

Within the UbD™ framework, real-world connections, activities, and inquiries should make material relevant and meaningful.

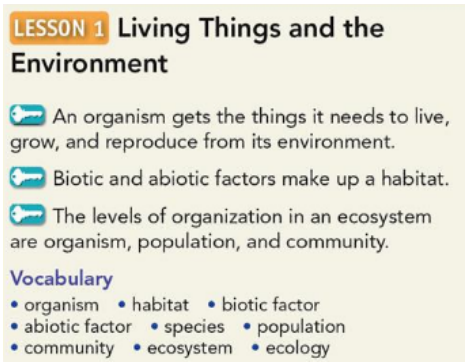
A high-interest, motivating visual opens each chapter and introduces the Big Question for that chapter. Teachers can use the Untamed Science videos to bring the Big Question to life.

For example, in one chapter, students can go with the Untamed Science Crew on a dive to learn more about clown fish.
The Teacher's Edition includes many suggestions for introducing the Big Questions. The margins list chapter launch materials and activities. The chapter launch suggests ways to begin a class discussion. Teachers can help students can make connections to their prior knowledge and address issues that are raised after viewing the Untamed Science video.

Throughout the chapter, students unlock the Big Question by answering Key Concept questions. In the process, they build a meaningful understanding of the content and how it relates to the Big Question.

Once per chapter, students have the opportunity to investigate the Big Question and show their knowledge and skills. For example, they will study the ecological organization of a prairie dog town and then use a model to draw and describe the organization in a familiar ecosystem.

Students also have a chance to use what they have learned in the Answer the Big Question. This activity occurs once per chapter in the Assess Understanding section at the end of a lesson.


LESSON 1 Living Things and the Environment

An organism gets the things it needs to live, grow, and reproduce from its environment.

Biotic and abiotic factors make up a habitat.

The levels of organization in an ecosystem are organism, population, and community.

Vocabulary

• organism • habitat • biotic factor
• abiotic factor • species • population
• community • ecosystem • ecology

At the end of the chapter, students use a study guide to review the Big Question and the key ideas for the chapter.

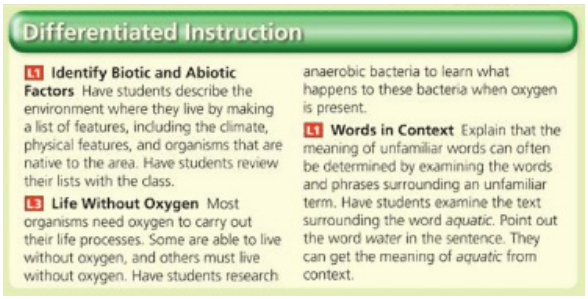
The chapter concludes with a Review and Assessment section. In the final activity, students show transfer of learning by applying what they have learned to a new situation. For example, students are asked to apply chapter vocabulary words to describe how human interaction has an effect on the environment.

Teacher Tools

In the Teacher's Edition, there are many customizable teaching, planning, and assessment tools to design the most effective instruction.

The Key to Understanding notes serve as a point of use for intervention. Use this section to address student misconceptions regarding these key understandings.

The Assess Your Understanding notes suggest discussion topics or activities to use as a quick check for understanding. In this section, teachers can find tips that will help them adjust instruction based on your students' understanding.


Differentiated Instruction

L1 **Identify Biotic and Abiotic Factors** Have students describe the environment where they live by making a list of features, including the climate, physical features, and organisms that are native to the area. Have students review their lists with the class.

L3 **Life Without Oxygen** Most organisms need oxygen to carry out their life processes. Some are able to live without oxygen, and others must live without oxygen. Have students research anaerobic bacteria to learn what happens to these bacteria when oxygen is present.

L1 **Words in Context** Explain that the meaning of unfamiliar words can often be determined by examining the words and phrases surrounding an unfamiliar term. Have students examine the text surrounding the word *aquatic*. Point out the word *water* in the sentence. They can get the meaning of *aquatic* from context.

Interactive Science also offers flexibility through differentiated instruction. Lesson options are noted throughout the Teacher's Edition.

The UbD™ Framework and Assessment

Using the UbD™ framework as a guide, the Interactive Science program offers a variety of assessment options. These options help measure each student's degree of understanding. There are assessments with every key concept question. These activities provide frequent and ongoing assessment tied to unlocking the Big Questions throughout the lessons. These activities include Assess Your Understanding, Do the Math, and Apply It.

The UbD™ Framework and Technology

Finally, the UbD™ framework supports the meaningful use of technology. Interactive Science makes meaningful connections to the Big Ideas of science through the use of technology. These instructional pieces are all accessible through MyScienceOnline.com.

Each digital chapter begins with Big Question activities like Untamed Science, and students revisit the Big Question as they progress through the chapter. Students can Unlock, Explore, Answer, and Apply the Big Question in one place.

Review

This guide explained that Understanding by Design® framework is used to design curriculum, assessment, and instruction. This framework focuses on Big Ideas and Big Questions. The goal is not coverage of isolated science facts; rather, Interactive Science presents Big Ideas from which students make many connections between science facts and arrive at new understanding about the natural world.

To use the process of backward design, first, identi y the desired outcomes; next, determine the acceptable evidence of understanding; and finally, plan the instruction.

To learn more about the UbD™ framework, Savvas offers workshops and professional development opportunities to help teachers integrate the principles into their teaching. Look for more information on myPearsonTraining.com or contact a Savvas sales representative.

To find out more about G ant Wiggins and the UbD™ framework, visit his Web site at grantwiggins.org.

For more information about the program features and components of Interactive Science, watch the other training tutorials on mySavvasTraining.com.