UBD in *Miller & Levine Biology*

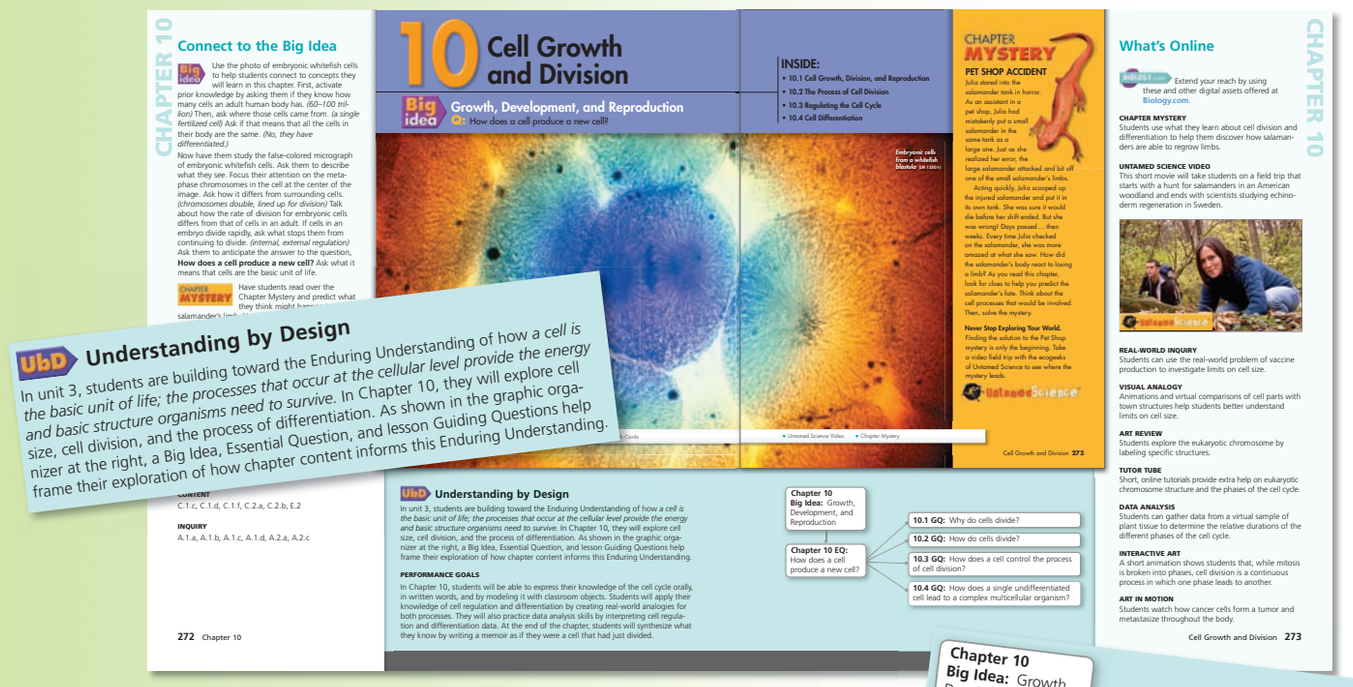
Understanding by Design® (UbD), developed by Grant Wiggins and Jay McTighe, offers a framework for creating understanding, not by accident or happenstance, but deliberately by design. UbD is a disciplined way of thinking about the design of curriculum, instruction, and assessment that moves teaching from covering the content to ensuring understanding. In the Teacher's Edition of *Miller & Levine Biology,* we've incorporated Understanding by Design principles into every lesson.

1 Plan for Understanding

The goal of teaching biology is not to teach students a bunch of facts about biology, but to develop a deeper understanding. Biology is the story of life—a narrative of concepts informed by investigations that help us explain the natural world. How do you help your students understand biology on this scale?

In *Miller & Levine Biology,* your students are introduced to Big Ideas, Essential Questions, and Key Questions in the Student Edition. The Teacher's Edition builds on these, providing questions to help students uncover a deeper understanding. These questions lay out a hierarchy of concepts your students need to understand and take away from their study of biology.

"The big-idea questions signal that education is not just about learning 'the answer' but about ***learning how to learn.****"*
—Grant Wiggins
Ed.D., Harvard University



Each unit is organized around an Enduring Understanding—a statement that describes the essence of the unit. Each chapter is represented by a Big Idea that can be explored using the Essential Question. In the Teacher's Edition, each lesson is also accompanied by a Guiding Question that is tied to the Essential Question. If students can answer these questions, you know they have grasped important concepts of biology.

Enduring Understandings

Unit 1 The Nature of Life: The process of science helps biologists investigate how nature works at all levels, from the molecules in cells to the biosphere.

Unit 2 Ecology: The existence of life on Earth depends on interactions among organisms and between organisms and their environment.

Unit 3 Cells: A cell is the basic unit of life; the processes that occur at the cellular level provide the energy and basic structure organisms need to survive.

Unit 4 Genetics: DNA is the universal code for life; it enables an organism to transmit hereditary information and, along with the environment, determines an organism's characteristics.

Unit 5 Evolution: The diversity of life is the result of ongoing evolutionary change. Species alive today have evolved from ancient common ancestors.

Unit 6 From Microorganisms to Plants: From microorganisms to plants, organisms vary widely in the way they carry out basic life processes.

Unit 7 Animals: Animals have evolved diverse ways to carry out basic life processes and maintain homeostasis.

Unit 8 The Human Body: The human body is a complex system. The coordinated functions of its many structures support life processes and maintain homeostasis.

2 Set Assessment Goals

A critical aspect of any UbD lesson plan is thinking backwards from the desired goal of enduring understandings to what you will accept as evidence of those understandings. The following features of the Teacher's Edition will help you identify desired accomplishments and plan appropriate assessment goals.

- Performance Goals, Chapter Opener—highlights activities by which students can demonstrate a transfer of a simple knowledge of facts to a broader understanding of biological concepts.
- Evidence of Understanding, Lesson Opener—alternative assessments that help you determine if your students can make meaning from what they read in a lesson.
- Performance Tasks, Chapter Study Guide—suggestions for both a Summative and a Transfer Task to ensure students grasp chapter content.

UbD Teach for Understanding

ENDURING UNDERSTANDING A cell is the basic unit of life; the processes that occur at the cellular level provide the energy and basic structure organisms need to survive.

GUIDING QUESTION Why do cells divide?

EVIDENCE OF UNDERSTANDING *After completing the lesson, give students this assessment to ensure they understand how a small size helps cells survive and function efficiently.* Have students use classroom objects to model how DNA overload or material exchange limits the size of cells. For example, they might limit the number of pencils available to the class. As the class size gets bigger, fewer people can be writing compared to the number who do not have a pencil.

3 Teach the Concepts

In addition to being goal-focused, a UbD lesson plan should include interim assessment tasks to assess students' progress through a lesson. The Teacher's Edition includes **Check for Understanding** boxes that can be used at a specific point in a lesson. These include a variety of informal assessment strategies—for example, follow-up probes, visual representations, question boxes, one-minute responses, and hand signals. Also included are suggestions for adjusting your instruction to address students' misunderstandings or misconceptions mid-lesson.

UbD Check for Understanding

ONE-MINUTE RESPONSE

Write the following prompt on the board, and give students about a minute to write a quick response summarizing their understanding.

Explain why an organized chromosome structure is an important adaptation for eukaryotic organisms. *(Essays should mention that having an organized structure helps cells use and pass on large amounts of DNA in multiple strands exactly and efficiently.)*

ADJUST INSTRUCTION

If student responses are incorrect or incomplete, review the advantages of chromosome structure by comparing it to a spool of thread. Point out that it is easier to sort two spools of thread than two long, tangled threads. Have them use the analogy to help them explain how chromosome structure helps cells divide.