Discovering Life Science

A complete textbook and a resource to integrate outlining

[Contact me (at KWilhelmi@aol.com) to obtain free handwritten model outlines of the lessons.]

Format of the Textbook

Discovering Life Science is divided into ten units. Within a unit, there are 5 to 12 lessons - a total of 72 lessons. [The Table of Contents is provided at the end of this introduction.]

Each lesson is short. In most cases the content is covered in approximately 500 words. Including the diagrams and photos that appear on every page, the core information typically consumes two or three pages - an amount well suited to a single assignment.

All lessons follow the same format.

Lesson Title

The title is in the form of a question that focuses on the key objective. Students should be able to answer this question after completing the lesson. In addition, behavioral objectives are provided in the teacher's guide.

Exploring Science / Historical Steps

Following the title, there is a short story related to the lesson's topic. The story is designed to spark interest and encourage further reading. In most cases, this section incorporates a historically significant scientist or event. The scientists included are listed on the fourth page of this file. Note that this list includes historically famous people (such as Louis Pasteur and Edward Jenner), as well as people whose efforts have for too long been given inadequate credit (such as Angela Ferguson, Rachel Carson, and Charles Drew).

A secondary goal of the Exploring Science / Historical Steps section is to demonstrate that science material can be read simply for enjoyment. While this section introduces content that will be elaborated upon in the next part, it does so in a less formal style.

In most cases, this section closes with an inference question or a suggestion for further research. These are designated by a "➢".

Teachers may want to use this section to concentrate on students' reading skills. For example, students might be asked to share what key point is being made, what supporting information helped to make the story convincing, or what topic seems to be foreshadowed in the story.

Content

The key content of the lesson is introduced via a subtitle. Important words are printed in heavy type, and a pronunciation guide is provided (in parentheses) after the more difficult words.

To Do Yourself

Most lessons include a simple hands-on activity. While, as the title suggests, these are opportunities for individuals to delve deeper into a lesson's topic, they are based on labs that are commonly employed in life science courses. Nearly all of these investigations are safe for students to complete alone or in small groups, but a few require adult supervision. As shown on pages 5 and 6, the bulk of the materials are inexpensive, household items. This guide provides suggestions for implementing each activity, and expected outcomes.

Lesson Reviews

The review material at the end of each lesson contains three or four parts, indicated by Roman numerals. Types of questions include fill-in-the-blanks, multiple choice, matching, arranging the steps of a process in the correct order, true/false (often with the requirement that false statements be corrected). A final question challenges the student to infer or to predict; this answer will require a complete sentence or two.

Unit Reviews

All units end with a review of the content, entitled **Review What You Know**. The unit review is divided into four parts. **Part A** reviews material in the unit in a motivational context. It is always a puzzle of some sort. **Part B** is a set of multiple-choice questions. **Part C** is visually oriented, focusing on student learning in a different modality. **Part D** consists of one or more projects that can be used to extend the unit or to challenge motivated students to deepen their understanding. Most of these projects could be used as group activities.

Teachers may find it useful to look at **Part D** before they begin a unit. In some cases, they may want students (or a select few students) to work on a project prior to or while the unit is being taught - and perhaps share what they've learned with the class. On the other hand, even completing a project long *after* a unit has been taught helps reinforce (or expand upon) key material.

Summing Up / Cumulative Reviews

Except for Unit 1, odd-numbered units are followed by a cumulative review. As with **Part C** of the unit reviews, the cumulative review relies largely on a visual modality.

In general, half or more of each review is concerned with the content of the previous two units, while the remaining parts of the review are on earlier units. Since there is a cumulative review every two units (starting with Unit 3), this plan ensures that all of the units are reviewed intensively. In all cases, the questions in **Summing Up** are keyed in this *Teacher's Guide* to the units that they cover.

Support for Thinking Skills

In addition to the strategies mentioned previously (the inference question at the end of each **Exploring Science / Historical Steps** section, the inference question at the end of each lesson's **Review**, and the **To Do Yourself** hands-on activities that challenge students to 'go deeper'), Lessons 2 and 3 of Unit 1 are devoted to the thinking strategies used by scientists. Unit 1 Lesson 2 (How Do Scientists Study Living Things?) focuses on the steps of the scientific method. In addition, students are introduced to the CER strategy (claim, evidence, reasoning) - a guideline for producing good conclusions. Unit 1 Lesson 3 (Ready For More Scientific Thinking?) describes the following: pattern recognition; inferring; incorporating controls; avoiding biases; and the role of verification.

Careers in Life Science

A careers page is provided after the first unit, and then after each even-numbered unit. These pages introduce careers that are related to that particular unit. At least two careers are presented on each page; the first career requires less preparation or training, while the others require more extensive education.

Format of the Teacher's Guide

The teacher's guide consists of twelve google doc files: the copyright page, this file introducing the textbook and teacher's guide, and one file for each of the book's ten units. Within each unit's file, the information appears lesson by lesson, using the same format as the textbook's lessons.

There is one exception to the previous statement; for most lessons, I've added a section entitled **Reinforce / Enrich**. Here, I've provided links to videos and articles to support teachers.

Why are some pages blank? Occasionally, on lessons (of this guide) that end near the bottom of a page, I've inserted a blank page in expectation of adding links later.

Videos

I base my selection of videos entirely on careful viewing, but I do not claim to have vetted the organizations or individuals who produced them. I welcome feedback in this regard.

WARNING: Before displaying the opening scene of any YouTube video, make certain to expand the screen to full size. This will prevent showing students YouTube's "suggested videos" (commonly displayed at the right). These suggested videos sometimes have no connection to the chosen video and may even contain images or titles not intended for adolescents.
Needless to say, anytime a video is to be shown in class it should first be previewed by the teacher.

Great care has been taken to list videos that are well-suited to middle school students, and frequently I indicate specific *portions* of videos that would be useful to show to the entire class in order to reinforce the content of a lesson. In addition, I often list and describe videos that teachers might consider for enrichment. Occasionally, I've listed videos that contain narration and imagery that is obviously intended for elementary students, but that clearly (and often entertainingly) present middle school level content.

I used some of these videos during my career. Most, however, were located since I retired in 2020. Of course, as time passes it is inevitable that some information will become dated; I encourage teachers to let me know if they discover a video that is no longer useful.

While the videos I've recommended come from a variety of people and organizations, teachers will notice that quite a few are from the following sources (listed alphabetically):

Amoeba Sisters Most of these are intended for high school students, but specific segments of some of them are well-suited to middle schoolers, too.

Be Smart Apparently, PBS supports this individual's production of some of his impressive videos, many of which seem to be made with middle school and high school students in mind.

Crash Course With their rapid pace as well as their advanced content, these videos are usually better suited as tools for review by teachers or as enrichment opportunities for highly motivated students. Note: The Crash Course biology series is now produced in collaboration with the HHMI Biointeractive organization.
Please note: In a few Crash Course videos the narrator makes "suggestive" comments best suited for older students. Teacher previewing is imperative.

HHMI Biointeractive This organization offers an extensive range of videos, many of which reinforce evolution and natural selection.

PBS Eons A large assortment of top quality videos, many focused on evolution-related life science topics.

Science Sauce The content, illustrations, and pace of these brief videos are often well matched with Discovering Life Science.

SciSchow Among the many high quality videos of this series are some that are well-suited to middle school; others are intended for individuals with more science background.

Stated Clearly The name of this organization was well chosen! Their website states - "We produce animations on genetics, evolution, biology, and chemistry that are in line with NGSS standards for use in classrooms."
[For free guided questions for five of these videos, see my TPT store.]

The Shape of Life Moving at the perfect pace to hold MS and HS students' attention, these impressive videos integrate remarkable graphics to illustrate structures of the key taxonomic groups.