

Student Scope

The Science of Studying Science

by Georgia Green, CMT

Reading a science textbook can be exciting or boring, but it is almost always misleading. Science texts are rich with facts and figures, making it almost impossible to retain all the information the first time through. This may not be apparent until test day, when students who thought they came to class well prepared may begin to wonder if they are even sitting in the right classroom.

The basic strategies for success in school—regular attendance, completing assignments prior to class, and preparing for each exam well in advance of test day—can fall short when it comes to a science course. If you find yourself struggling to understand readings and are performing below expectations on exams, you can master the study of science by adapting your study strategies for your own learning style.

Science Is a Left-Brain World

People think and learn in different ways, and these differences contribute to the ease with which they comprehend scientific topics. Students with left-brain dominance tend to learn in a sequential fashion, beginning with details that lead to a conceptual understanding. This is the traditional way science is taught in classrooms and textbooks. Students with right-brain dominance prefer to begin with a general concept and then go on to specifics to fill in any gaps. Right-brain dominant students may truly enjoy science, especially medical science, but get lost in a sea of scientific data that may obscure the principles being taught.

The chart below describes the characteristics of the left-brain or analytic learner and the right-brain or global learner. If you see yourself as the latter, use the adaptive strategies presented in this article to compensate for the difference between the way learning materials may be presented and the most effective learning method for you.

Adaptive Strategies for Reading Assignments

Use a map. Learn how your material is organized before you begin reading so that you have a map to follow throughout the course. Introductory material in academic textbooks, including the preface and the author's or publisher's note to teachers or students, are seldom assigned but give valuable clues to how a textbook is arranged. For example, the author may state that the information contained in chapter sidebars is for enrichment only—OR—is provided to emphasize main points. Without this information, you might devote too much time memorizing extraneous facts or, worse, overlook material from which exam questions will be drawn. Discover whether your textbook has a glossary or index and what information is contained in any appendices. Review the chapter organization and note which topics are covered in each chapter.

Preview. You will retain information more readily in a scientific reading if you know what to expect before you begin. A reading preview gives you a frame of reference and

Left Brain (Analytic)

1. Is a verbal/auditory learner
2. Responds to word meaning
3. Prefers sequential presentations
4. Processes information linearly
5. Responds primarily to logic
6. Plans ahead
7. Recalls people's names
8. Speaks with few gestures
9. Is punctual
10. Prefers traditional study methods
11. Prefers bright lights while studying

Right Brain (Global)

1. Is a visual learner
2. Responds to tone of voice
3. Prefers random or simultaneous presentations
4. Processes information in varied order
5. Responds primarily to emotion
6. Is more likely to be impulsive
7. Recalls people's faces
8. Gestures when speaking
9. May be less punctual
10. Prefers sound/music background while studying
11. Prefers variety/mobility in learning environment

is like setting up file folders in an empty filing cabinet, making it quick and easy to retrieve needed information. These are the steps for previewing scientific readings:

1. Read the learning objectives at the beginning of the chapter. These spell out exactly what the author wants you to know.
2. Read through exercises at the end of the chapter, whether or not they are assigned. Again, this lets you know what information the author considers most important.
3. Create a mental outline of the material by reading the introductory and conclusion passages, section headings and sub-headings, and any figures or diagrams.
4. Note any bolded terms and their definitions provided in the context of the reading.
5. Review (if necessary) any old terms and definitions referred to in the new material.
6. Re-read the learning objectives and consider your understanding of each objective at this point. Jot down any questions that come to mind.

Remember that the purpose of previewing is not to fully understand the material but to get a general idea of what it will cover. Think of the file folder analogy and how the data is neatly filed away when you begin a formal reading. Previewing should not be a very time-consuming process and will pay off in increased comprehension and retention.

Become a graphic artist. Visual learners recall information more easily if there are visual elements that can help them form connections to the material. A textbook that has no illustrations, photos, or tables may be particularly hard to comprehend, but you can enhance your readings by supplying your own graphical elements. Use color pencils, markers, or crayons to draw blood cells, bones, medications—whatever is discussed in the readings—in the margins of your text (or in a separate study journal if you are not using your own book). The accuracy of your drawings is not nearly as important as the visual cues they provide. For example, you can draw your own x-rays even though they are invisible.

Another method to add graphical interest and help you visualize a reading after the fact is to select a set of highlighting markers and assign specific colors to call attention to different parts of the text. For example, use a yellow marker for all bolded terms and their definitions. Use pink for summary sentences at section ends. A blue marker can represent data that must be memorized, such as lab values. This will aid you in reviewing material prior to as well as during actual testing.

Utilize references. Keep English and medical dictionaries handy and look up terms that are not defined in the reading assignment. If your textbook has a glossary, consult this as your

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first reference. Don't overlook the textbook index to help you locate a term that may have been defined in a previous chapter.

Take small bites. After previewing the material, you can begin a full reading. But just as elephants are best consumed one bite at a time, so is a lengthy chapter in a science text. Read one section at a time, reviewing pertinent exercises and learning objectives before proceeding to the next section. If your level of alertness drops, close the book and come back to it later. Reading too close to bedtime is generally not a good idea unless you are able to remain wide awake. If you feel overwhelmed by the length of a chapter, reward yourself with a break or a treat after completing one or more sections.

Adaptive Strategies for Textbook Exercises

Finding the answers. Reviewing end-of-chapter exercises as part of your reading preview will help you recognize answers as they appear when you read the material in full. Stop and jot down answers as you find them, reviewing the exercises as needed. Although most exercises are drawn from specific sections of a reading and can be answered sequentially, this is not always the case. Some questions may require that information be distilled from several sections within a chapter or even from previously assigned chapters.

Just one more? It is not necessary to complete exercises that are not assigned; however, it is useful to review unassigned exercises as part of a reading preview and to direct your study in an area where you may be having difficulty. If answer keys are not available for the unassigned exercises, talk with your instructor about reviewing them with you.

Adaptive Strategies for Taking Notes

Consistency counts. There are many effective note-taking methods and you may need to try several to find the one that works best for you. Once you choose a method, stick with it so that you can retrieve information more easily. One approach is to divide the page in half and use the left side for taking notes and the right side to write down questions about the material being presented. Identify important points in your notes in the same way each time so that you can find them later. You can underline key words or phrases or draw geometric shapes around them to call attention to their location in your notes. Use a highlighting marker.

Don't attempt to make a verbatim transcript and don't become so absorbed with taking notes that you fail to listen to the meaning of what is said. Ask questions if there are unclear concepts.

Look for clues. All lecturers have their own style for emphasizing key points. Listen for signal words like “in summary,” “remember,” or “first, . . . second.” Body language is also important. A lecturer may be writing notes on the board, then turn toward the class and make eye contact to make a point. Hand gestures may also give clues. And if the instructor tells you that certain material will appear on a test, this should be well marked in your notes.

Prioritize. Don't attempt to make a verbatim transcript and don't become so absorbed with taking notes that you fail to listen to the *meaning* of what is said. Ask questions if there are unclear concepts. If you miss something in the lecture or don't understand what's being presented, write down what you can catch—especially key words. Be sure to skip several lines so you can fill in the missing material later. Before leaving class, quickly read through your notes to get an overview of the material and to check for any errors or omissions. As soon as possible after class, summarize, review, and edit your notes.

Be sure to make arrangements in advance to obtain notes from a classmate should you anticipate missing a class. Exchange phone numbers on the first day of class as a safeguard against an unplanned absence.

More Adaptive Strategies

There are many right-brain dominant learners struggling in the left-brain world of science courses, and you can benefit from their experience and advice. Utilize resources at hand—your instructor, your classmates, and campus-based learning centers or peer tutoring services. Your school or community library will have many books on learning styles and learning strategies (if you can squeeze in one more reading assignment!). And any Internet search engine will return thousands of hits if you look for “study tips,” “how to study,” or “how to study science.” These include Web sites from colleges and universities, learning centers, educational publishers, and even individual teachers who are happy to share wonderful resources with students around the world.

Mastering the study of science is essential to the success of the medical transcription student and the professional medical transcriptionist, for whom continuing education is a way of life.