FROM – Strategies for Success
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Owning the Scientific Method

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As a corollary to these activities, I ask the students to imagine themselves in a very different place and time, living in a culture in which the scientific method was not as accepted and prevalent as it is in ours. How might they answer questions about the natural world? I often find it is difficult for students to imagine living their lives without scientific inquiry. This leads to a discussion of alternative means of learning about the world—seeking the advice of elders, praying for enlightenment, etc.—that helps clarify the scientific method by defining what it is not.

Through this series of exercises, I hope to guide the students into a state of ownership of the scientific method. Once students appreciate that they, too, apply the scientific method in their everyday lives, I can begin to teach them specific course content within the established context. This is a good first step in developing the next generation of "citizen scientists." ■

Editor's Note: Eric J. Simon is co-author of several textbooks from Benjamin Cummings, including *Essential Biology, Third Edition* and *Essential Biology with Physiology, Second Edition.*

BUT I STUDIED REALLY HARD LAST NIGHT ...

Lori Garrett, Danville Area Community College
lgarrett@dacc.edu

We have heard these or similar words countless times, and we greet them with a sigh of resignation, thinking that if our students *really* studied, they would be successful. The next time you hear this phrase, though, take a moment to ponder what is behind it. I hear it in all my classes and have learned that it doesn't matter whether it comes from students in remedial or advanced courses: they are almost always serious—and frustrated!

Many students simply don't understand what it means to study. Many are straight from high school where they sat in class five days a week for a whole year. Most of their learning occurred in class and many never needed to open a book outside of class. We get them just a few hours a week for one semester, so most learning must occur outside of class. What looks of shock have you seen when you tell students they should study 2–3 hours for each hour of class? They have never had to study this much before, so this is a challenging transition, and they often don't understand why it is necessary. Other students may have been out of school for a while, leading established lives with daily routines. They may be working and have family responsibilities, as well. Finding time for studying may seem impossible.

In short, students today often lack basic study skills. They must move past mere memorization to recognize relationships between concepts and how to apply their knowledge, but they may have had little practice doing so. Consequently, our students often really do spend hour upon hour memorizing information, but then the information becomes jumbled as it tumbles out of their brains during the exam, or they fail to realize that they know the answer to a question just because the wording is not exactly as memorized. Also, our students do tend to cram the night before or the day of an exam. For many students, this is the first time they have looked at the material outside of class, and it is too little too late. They just don't understand the importance of routine daily studying.

So how do we get them to study? It must begin with compassion. We must first acknowledge that most of our students truly do want to learn and be successful, but they have simply come to us unaware of and unprepared for the work that is required. We must mentor them, guiding them to become better students. We often bristle at this notion—this is college, after all. However, too often the reality is that we either assist these students, improving their shot at a bright future, or we fail them. As an educator, I always prefer success. Here are some ideas that might gently prod them into more and better studying.

Clear Expectations

Students should know our expectations from the beginning. Be very clear about what will be graded, how it will be graded, and the level of mastery expected. Then hold to it—if we vary our standards, curve exams, or give extra credit, students may take our classes less seriously and they may try to negotiate grades.

Take time at the beginning of your course to explain how you recommend that they study. Be explicit. Show them available resources, including online support from textbook publishers. Consider having previously successful students return to discuss their personal study strategies. Prior to each quiz or exam, provide a list of topics to be covered, or learning objectives for that section.

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