

# Teaching Metacognitive Learning Strategies to Individuals or Groups: A Procedure that Works!

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Most students who enter colleges and universities have not developed effective learning strategies. Many have achieved success in high school by memorizing information for tests that have not required them to demonstrate critical thinking skills. After they fail their first test in college, students are at a loss as to why the strategies that worked so well up to this point are now failing them. They often begin to doubt their ability to succeed, and many drop out of classes, or even leave the institution without achieving the success of which they are capable. These students sometimes seek assistance from a faculty member or advisor, but often are told to “study harder” or to “focus on learning *concepts*” or to “do more homework problems. However, these suggestions do not help students who do not know how to interpret “study harder” or “focus on concepts”. These students need explicit instruction and very specific strategies.

The Center for Academic Success at Louisiana State University ([www.cas.lsu.edu](http://www.cas.lsu.edu)) has developed a method to teach these strategies to students in both **individual** and **group sessions**. Whereas the process varies somewhat, depending on the learning strategies consultant who is conducting the session, the basic process is constant. This will be detailed below. [Note: Variations of this process have been replicated and used effectively at other student success centers across the country.]

## Individual Learning Consultations with Students

When a student comes in for an individual consultation, it is most often because they have experienced academic difficulty, or they are concerned about their ability to succeed. Therefore, the first thing that I do is try to make the student feel comfortable being in an otherwise embarrassing situation in which they are confronting their failure (or potential failure).

**Building the Relationship:** To make the student feel comfortable, I ask them to tell me about where they are from, their high school academic experience, their academic interests, their extracurricular activities, etc. Asking for this information allows the student to discuss their prior success, while I assure them that they can be as successful in college as they were in high school. (When I am working with a graduate or professional school student, the message is that they can be as successful as they were in undergraduate school.)

**Creating Hope:** I then show students some “before and after” test scores of students with whom CAS has worked in the past. (See Summer Scholars presentation). Seeing that other students who made test scores in the 30’s and 40’s before hearing the strategies increased their scores to the 80’s and 90’s after learning the strategies, definitely arouses

the interest of the student. This is the point at which students tend to become much more mentally engaged in the discussion. For the first time, they see evidence that their low scores will not necessarily doom them to failing the course.

**Building Confidence:** Next I will do the Count the Vowels exercise to actively demonstrate to the student how s/he can miserably fail on a task one minute, and then perform at an A or B level minutes later if they understand the task and have strategies to learn it. Students are even more motivated after the Count the Vowels exercise. I then proceed to help them develop effective learning strategies.

**Guiding Analytic Reflection:** The first reflection question I then ask is “What’s the difference between studying and learning?”. The most common answer I get is something like “Studying is just memorizing information for a test or a quiz” but learning is really “understanding and mastering the information so that it will not be forgotten soon as the test. I then ask if, up to this point, the student has been in “study” mode or “learning” mode. Every student I have asked to date has indicated “study mode”. I then enthusiastically respond “YES! That’s the reason you haven’t done as well as you can. In this session we’re going to learn to stay in ‘learn mode’.”

**Introducing New Ideas:** The next step is to introduce students to the concept of metacognition and to Bloom’s Taxonomy as a hierarchy of learning levels. Almost none of them have heard of metacognition or seen Bloom’s Taxonomy before, but they embrace it enthusiastically. Some even say “I wish I had known THIS in high school!”

I then ask “Up to this point, what’s the highest level you’ve had to operate to make As’ and B’s in high school (or in undergraduate school)? The typical response is either Knowledge or Comprehension. And then I ask “What the LOWEST level you have to operate HERE in college to make and A or a B? Most say either application or analysis, with a few suggesting higher levels. Again, I reassure the student that we now know exactly what the problem is! They’ve been studying at the lower two levels, so they’ve got to “kick it up a few notches”! And I am quick to follow with “Boy, do we have a strategy for accomplishing that!” I then introduce the Study Cycle\*, which involves previewing the information to be covered in class, attending class, reviewing class material immediately (or as soon as possible) after class, engaging in “intense study sessions” to thoroughly learn the information, and assessing their learning strategies.

After learning about Bloom’s Taxonomy and the Study Cycle, the student appears to be overjoyed that s/he not only knows what the problem is, s/he knows how to fix it!” The confidence level is visibly increasing.

There are several additional specific learning strategies we discuss at this point.

1. A READING COMPREHENSION STRATEGY involving: previewing the material, developing questions to be answered during the reading, reading on paragraph at a time and paraphrasing the paragraph.
2. A HOMEWORK PROBLEM STRATEGY that involves working all problems without using an example as a guide.

\*Adapted from Frank L. Christ’s Preview-Learn-Review-Study Learning Cycle

3. A CONCEPT MASTERY STRATEGY involving “teaching the material” as a way of testing for complete understanding, and to discover when understanding is less than originally thought

To help the student understand the value of “teaching the material” as a learning strategy, I ask the student the following reflection question:

“For which task would you study harder: If you had to take a test on three chapters and make an A on the test? Or if you had to teach the material to the class?” Students immediately say “Teach the material!” And when I ask why they would study harder if they had to teach the material, they invariably say: “You have to really *know* the material if you have to teach it!” When I ask if, to this point, they have been in “make an A on the test mode”, or in “teach the material mode”, students say “make an A on the test mode”. They see how preparing to teach the material results in a deeper understanding of the material.

**Building Motivation to Change:** I usually end the session with two final questions, each designed to get information about whether the student will implement the strategies we have talked about.

The first question is: “On a scale of 1 – 10, how different are the strategies we have talked about from the ones you have been using up to this point? (1 is not at all; 10 is as different as day and night) If the student gives a number between 8 and 10, I know that the student recognizes that there is a difference between what s/he has been doing and the strategies that we have been discussing during the session. Although I know that the strategies are different, if the student doesn’t recognize this, s/he won’t do anything different.

The second question is: “On a scale of 1 to 10, how motivated are you to start using the strategies? (1 is not at all; 10 is “I can’t wait to start them today!”) Again, I am happy with a number between 8 and 10.

I then reinforce the idea that the student’s performance will depend on use of the strategies, not on how smart s/he is, and leave the student with the added confidence that s/he *can* be successful. I ask students to email me to let me know how they are doing, and I let them know that I’ll be available for future meetings.

### **A Group Session for Students in a Particular Course**

The process described above for use in one-on-one consulting situations with individual students can also be used by teachers with a group of students in a specific course. I have done this with students in my own chemistry courses; other teachers have done it with their courses.

What I often do is offer one special, 50-minute session that students in the course can opt to attend. This session lasts approximately one hour and typically is scheduled after the first or second exam in the course. The purpose of the session is to help the class as a whole improve its performance. I then proceed to ask the class the same types of reflection questions I ask in individual sessions. Additionally, I provide examples of

questions from past exams to show them how using the learning strategies is crucial to success. After presenting strategies, I challenge the class to improve its performance, and have the students indicate in writing what strategy they are willing to implement. Data collected in selected general chemistry classes in which this session was provided show that the students who attended the session improved their performance whereas those who were absent experienced a decrease in performance on subsequent examinations.

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## Developing Learning Strategies for Success in Science

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### Scenarios of Students Having Difficulty

- A. **John** is a transfer student from a two year college. He came to UW to play football, but has been injured and will probably not get to play. He was pursuing an engineering degree at his two year institution, and entered UW with a 3.5 GPA. He comes to see you because he has no idea why he is flunking his exams. He says he does all of his homework and gets almost perfect scores on them. He took an intro chem course at his previous college and earned a B. He is exasperated and feels that he must be too dumb to learn the material.
- B. **Kenyatta** is a first year student who has known she wanted to be a doctor since she was in eighth grade. She was valedictorian of her high school class, and was president of her school's chapter of the National Honor Society. She made straight A's in high school even though she didn't have to study a lot. She knows she is naturally smart, and thinks that the tests in the class must be unfair because she is not making the A's she should be making. She is very frustrated that her chances of going to a top medical school seem to be slipping away because the exams are not allowing her to demonstrate that she really does know all of the material.
- C. **Robert** is a non-traditional student who is returning to school after having been out for twenty years. He is up for a promotion at his job, but the new position requires that he will have completed two semesters of General Biology, earning a grade of at least a C in both courses. He is extremely dedicated and very hard working – spending hours and hours on the material. But no matter how much time he spends learning the material, his grades on tests never seem to be higher than a D. He says he doesn't know what else to try, and is about to give up. He also seems reluctant to come to office hours because there are usually about three or four other students will be there.
- D. **Megan** is not doing well at all in her General chemistry course, in spite of the fact that she comes to every class, sits on the first row, and seems to be paying very close attention to everything that goes on in class. She is highly motivated and says she is willing to do whatever it takes to earn an A in the course. She says she took chemistry in high school, but that the teacher was not good at all. She says that everybody in her high school class got an A or a B because the teacher would just tell them stories and jokes during class. She says that she's not doing well because she doesn't have a proper high school background like all of the other students do. She wants to know how she can possibly make up for her poor background.

## Analysis of Scenarios

### A. John

1. *What went wrong:*

John had no prior experience with courses that required more than memorization and regurgitation of facts and/or procedures. Additionally, he did not know that learning the material required lots of time, practice, repetition of problem solving tasks, and self-testing. In order to complete the assignments he was using the examples in the textbook as a guide. He also was extremely prone to moving too quickly through problems and making unnecessary careless mistakes, which resulted in grades that were not indicative of his real understanding of the material.

2. *What he did to rectify the situation after receiving information on learning strategies:*

To rectify the problem he started practicing teaching the information, paying REALLY close attention to problem solving so that he did not make careless mistakes on the tests, and quizzing himself on the material.

3. *Before and after scores:*

55, 53, 75, 73

Note that John had taken the course three times before at LSU. He had received an F, a W, and another F. He was demoralized when he started working with the CAS, and he had a personal situation that prevented him from fully utilizing the strategies. Even with that, he made a C in the course.

### B. Kenyatta

1. *What went wrong:*

In addition to the problems mentioned above, Kenyatta was using [www.cramster.com](http://www.cramster.com) to work her homework problems. Also, she assumed that she must not be smart enough to make the A's in college that she made in high school, and was ready to change her major.

2. *What she did to rectify the situation after receiving information on learning strategies:*

Kenyatta stopped using the examples and [cramster.com](http://www.cramster.com), started using the study cycle consistently, and started practicing teaching the material.

3. *Before and after scores:*

80, 54, 91, 97, 90 (final) A in course

### C. Robert

1. *What went wrong:*

Robert did not realize that to learn chemistry, you have to see the conceptual structure of the material. For example, to determine the polarity of substances, you must be able to produce correct Lewis dot structures, determine shapes of molecules, and understand bond dipoles. He was totally in memorization mode.

2. *What he did to rectify the situation after receiving information on learning strategies:*

He started focusing on the “why, how, and what if” questions, rather than on just the “what” questions. This allowed him to understand concepts so that he could apply those concepts to

answer questions he had not seen before. Previously he could only answer the items he had memorized verbatim.

3. *Before and after scores:*

30, 28, 80, 91                      B in course

**D. Megan**

1. *What went wrong:*

In addition to the problems mentioned in scenarios A, B, and C, Megan was blaming all of her difficulties on her high school chemistry instructor, and not taking any responsibility for her performance. In attribution theory, she had attributed her failure to external and uncontrollable factors – task difficulty and prior preparation, rather than to internal and controllable factors – study time and learning strategies.

2. *What she did to rectify the situation after receiving information on learning strategies:*

We taught Megan learning strategies that proved to her that her success or failure was not due to her prior experiences, or to the fact that the material was too difficult for her to master, but rather to the amount of time she puts into her studies, AND the things she does during study time. When she started using the study cycle and other strategies, her performance improved rapidly and substantially.

3. *Before and after scores:*

60, 100, 99, 84                      A in course