Emphasizing Two Underutilized Dimensions of Learning: Metacognition and Motivation

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Abstract

Teaching students about metacognition or thinking about the thought process often provides the tools necessary to turn mediocre or failing academic performance into excellent performance. Metacognition allows students to diagnose their own learning deficiencies and develop strategies to attack them. This paper presents strategies to help faculty teach students metacognitive skills. It also discusses the factors that motivate students to attempt deeper learning. The dramatic improvement realized by four students is presented as evidence that when students are taught metacognitive skills they become motivated and empowered to excel academically. Attached is a list of resources.

Introduction

Students generally enter college with a number of misconceptions. Most have spent very little time studying outside of class in high school. They are entirely unaware of the difference between memorizing information and learning concepts, and they expect that the behaviors that earned them A’s in high school will have the same result at the university level. In addition, students think they have good evidence that they don’t need to study to earn high grades. The Higher Education Research Institute’s study of entering freshmen at one large western public university found that over 46% of the students reported earning an “A” average in high school. However, only 34% of these students reported studying or doing homework six or more hours per week in their senior year of high school. Furthermore, 70% of these students felt that their academic ability was above average, or in the upper 10% of people their age. (Sax, Lindholm, Astin, Korn, and Mahoney, 2003). The combination of these factors: a) students’ lack of understanding of the difference between memorization and learning, b) their overconfidence in their academic ability, and c) their minimal effort at studying during their senior year of high school puts them on a collision course with academic failure. However, this collision course can be avoided if students are taught why and how to change their academic behaviors, and are motivated to make a commitment to using their newly acquired strategies.

Teaching Students the Difference between Studying and Learning

When a group of LSU students was asked to explain the difference between studying and learning, they posited that studying would involve forcing yourself to memorize uninteresting information, whereas learning would involve gaining insight into material of interest to you. They all agreed that learning was fun but studying was tedious. They further indicated that
learning could and often does happen in the absence of studying, and studying does not necessarily result in learning. It was evident during the discussion that these students had not previously reflected on the difference between studying and learning, but that after the discussion they clearly understood the difference. This understanding was the first step in helping them to turn unwelcome and tedious study sessions into engaging and interesting learning sessions. They began to understand why a greater investment of time devoted to their academics was necessary for success.

Teaching students about metacognition and metacognitive strategies has proven to be very effective at helping students understand why their behavior should be changed if they want to succeed academically. Metacognition involves thinking about thinking. It involves the ability to 1) be consciously aware of oneself as a problem solver, 2) monitor and control one’s mental processing, 3) recognize when one is simply memorizing facts and formulas and not understanding the application of the information, and 4) to know that knowledge and understanding are not handed out by an instructor, but must be constructed by the learner. (See http://www.gse.buffalo.edu/fas/shuell/cep564/Metacog.htm for a brief overview of metacognition.) Introducing students to constructivist learning theory has also proven quite useful in helping them to develop metacognitive strategies. For information on constructivist learning theory see http://carbon.cudenver.edu/~mryder/itc_data/constructivism.html.

The examples of four LSU students provide the evidence that when students are taught how to learn their performance usually takes an immediate and dramatic turn for the better. The performance of the four students, contrasting their performance before and after being taught metacognitive strategies, is shown below. (The after performances are underlined.)

- Travis, junior psychology student
  Test scores: 47, 52, 82, 86

- Robert, freshman chemistry student
  Test scores: 42, 100, 100, 100

- Aimee, junior organic chemistry student
  Test scores: 54, 82, 76, 78

- Terrence, junior Bio Engineering student
  Cumulative GPA (after four semesters) 1.67, 3.54 (fall 2003), 3.80 (spring 2004)

When interviewed, each of these students indicated that understanding the difference between the way they had been studying before being taught metacognitive skills and the way they studied after they were taught metacognitive skills, was the reason for their immediate and drastic improvement in their performance.

How Can Students Be Taught that Memorizing and Learning are Different?
Cognitive psychologists make a distinction between rote learning and meaningful learning (Ausubel, Novak, and Hanesian, 1978). Rote learning is verbatim memorization and is not necessarily accompanied by any understanding of the terms. Students are unable to explain information that is learned by rote, and they are not able to paraphrase the information in their own words. Meaningful learning, on the other hand, is learning that is tied to previous knowledge, and it is understood well enough to be manipulated, paraphrased, and applied to novel situations. Most learning is neither completely rote nor entirely meaningful and can be placed on a rote-meaningful learning continuum (Ausubel, 1968).

Although most students enter college not knowing the difference between rote learning and meaningful learning, when they are taught this distinction they are able to implement strategies that promote meaningful learning. When they fully understand the difference between memorizing facts and formulas for a test and working to understand the course concepts and how the concepts relate to each other, students’ greater conceptual understanding and their success on problem solving tasks and examinations increases substantially.

One particularly effective way to present the different types of learning is through a discussion of the hierarchy of learning levels, shown below, similar to Bloom’s taxonomy (Bloom, 1956).

![Hierarchy of Learning Levels](image)

Although faculty generally assumes that students know that memorizing information is not the same as learning, this assumption is unwarranted. Formally introducing them to differences in the levels of learning is crucial to developing the understanding of this distinction in today’s students.

What Learning Strategies Can Students Be Taught?

The Center for Academic Success at Louisiana State University has had great success teaching students to use The Study Cycle with Intense Study Sessions. The four-step process is described below.

**THE STUDY CYCLE**
Step 1: Preview or pre-read the information that will be covered in class before class. Spending 10 – 15 minutes reviewing chapter material (concentrating on the bold-face print, italicized writing, figures, graphs, diagrams, etc.) prepares the mind to receive and comprehend the material that will be discussed in lecture. These previewing provides background knowledge for what will be covered in the lecture. Cognitive scientists have empirically demonstrated the importance of background knowledge to understanding and acquiring new information (Bransford, Brown, and Cocking, 2000).

Step 2: Go to class, and actively participate in lecture. This step needs to be explicitly stated because the absenteeism in large introductory science classes is often extremely high (approaching 50% after mid-semester).

Step 3: Review and process class notes as soon after class as possible. Spending 10 – 15 minutes reviewing and reworking lecture notes shortly after the lecture provides the mechanism for the information to be transferred from short-term to long-term memory, significantly improving retention.

Step 4: Use Intense Study Sessions
Intense Study Sessions are concentrated study sessions of approximately 60 minutes duration. During this short, but focused, study time, a considerable amount of learning can be accomplished. The Intense Study Session consists of four segments, each of which is important for the session to have the maximum effect on learning.

a). 2 – 5 minutes: Set goals for the next 40 minutes
b). 35 – 38 minutes: Work to accomplish the goals that were set.
c). 10 minutes Review what was studied
d). 10 minutes Take a break

Most students find that The Intense Study Sessions are real “procrastination busters” – providing a means for targeted study sessions that are efficient and “doable”. Short, focused sessions are more effective than three to four hour study marathons during which there is little meaningful learning accomplished.

How can Students be Motivated?
Whereas knowledge of metacognitive strategies is a necessary condition for academic success, it alone is not sufficient. Students must be motivated to expend the time and effort to implement the strategies. Many instructors think that students must come to a course with their own motivation to succeed and that the instructor plays a minimal role in student motivation. However, Eric Hobson (2001) has shown that faculty members have a very large impact on both positive and negative student motivation. He has found that the instructor’s attitude and the course structure account for 49% of positive motivation and for 58% of negative motivation. In discussions at LSU, students have indicated several course characteristics that either increase or decrease their motivation for the course. These are presented below as motivation boosters and motivation busters.

Motivation Boosters
- Partial credit for partially correct answers
• Letting students use their own problem solving method
• Somewhat flexible grading scale based on student performance
• Demonstrated personal interest in having EVERY student succeed!

Motivation Busters
• Multiple choice tests with no opportunity for partial credit
• Requiring students to use one problem solving method
• Absolute grading scale with no flexibility
• Attitude that most students are not prepared to do well and probably won’t!

When students find that they can increase their learning by using metacognitive strategies, and that instructors have structured the course in a way that motivates the students to excel, most students can shift their paradigm from simply memorizing information to perform well on a test or quiz to learning the material for conceptual understanding. This results in an increase in critical thinking, problem solving skills, test performance, and grades!

What Additional Resources are Available to Students?

The campus learning support center, found on many campuses, is a very important but underutilized resource to help students develop metacognitive skills. Instructors can partner with the learning center to have learning strategies information presented in classes and to assist individual students. Often students will utilize the learning center if their instructor recommends it, but most are not likely to visit it on their own.

**Final Note:** Please visit the LSU’s Center for Academic Success Website at [http://www.cas.lsu.edu/](http://www.cas.lsu.edu/). We have on-line workshops that will introduce instructors and students to effective learning and study strategies. Our students can change their attitudes and behaviors about learning. However, we must help them do this by teaching them strategies and holding them accountable for meaningful learning.

References and Resources


Website for the Center for Academic Success at Louisiana State University.

http://www.cas.lsu.edu/