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Improving Student Performance by Addressing Student and Teacher Misconceptions about Learning

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How to Get the Most Out of Studying: A Video Series

I've created a unique series of videos to help students make the transition to college level studying. They are based on cognitive research on how people learn. The webpage for the videos is http://www.samford.edu/how-to-study/. The overall theme of the videos is that if students use ineffective or inefficient ways of studying, they can study long and hard and still fail; but if they use effective strategies, they will get the most learning out of their study time and be more likely to succeed. Each video lasts 7-8 minutes.

Video 1: Beliefs That Make You Fail…Or Succeed
This video identifies and corrects common mistaken beliefs students often possess that undermine their learning.

Video 2: What Students Should Understand About How People Learn
The second video introduces a simple but powerful theory of memory, Levels of Processing, which can help students improve their study.

Video 3: Cognitive Principles for Optimizing Learning
The third video operationalizes the concept of level of processing into four principles that students can use to develop effective study strategies.

Video 4: Putting the Principles for Optimizing Learning into Practice
The fourth video applies the principles of deep processing to common study situations, including note taking and highlighting while reading.

Video 5: I Blew the Exam, Now What?
This video addresses what students should and should not do when they earn a bad grade on an exam.

Supporting Materials for Using the Videos

I published an article describing the presentation I give for freshmen on how to study, including the demonstration of Levels of Processing that I use. The article can be found at http://www.psychologicalscience.org/index.php/publications/observer/2010/april-10/improving-classroom-performance-by-challenging-student-misconceptions-about-learning.html .

I've posted a series of Think-Pair-Share (TPS) Items based on the videos on ToPIX. These items can be used for formative assessment activities to test student understanding of the videos. They can be used as clicker questions or to initiate discussion of the videos.

I've also posted an "exam wrapper" activity which I call an Exam Debrief Activity based on the videos. This activity is designed to help students to reflect on their level of preparation for the exam, examine their metacognitive awareness going into the exam, and plan how they will change their preparation for the next exam. Both the TPS and the Exam Wrapper are appended to the end of this document. Copies of both documents in MS Word can be found at
http://topix.teachpsych.org/w/page/19981017/Memory%20Video

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A video of a similar presentation I gave (for NAC&U) on the development of the presentation for freshmen as well as the video series and more on cognition and instruction can be found at: http://www.youtube.com/watch?v=RgPE1Xc0Yis

For Further Reading

Cognition and Instruction

Daniel Willingham Science and Education Resources and Blog: Daniel Willingham is a cognitive neuroscientist who maintains a website on current research applied to education. While the focus is on K-12, there is much that applies to higher education as well. He has two books out, but you can learn a lot just by reading the resources here, especially his blog. http://www.danielwillingham.com/index.html

The best summary of cognitive research applied to teaching is:
Ambrose, S. A.., Bridges, M. W., DiPietro, M., Lovett, M. C., Norman M. K. (2010). How Learning Works: Seven Research-Based Principles for Smart Teaching. San Francisco, CA: Jossey-Bass

The Center for Psychology in Schools and Education (CPSE; part of the American Psychological Association) has published a really useful set of online modules on psychology applied to educational practice. They are called *The Teaching Modules (Application of Psychological Science to Teaching and Learning).* From the description from CPSE: "An APA task force identified the psychological science behind ten areas of teacher practice and has developed an online module for each topic that includes: An Overview of the Topic, Do's and Don'ts, Evidence and Explanation, FAQ's, For Whom Do the Interventions Work, and Resources for Additional Information." The modules can be found on the Curricular Resources page at http://www.apa.org/education/k12/curricular-materials.aspx

Mental Mindset and Education:

Carol Dweck conducted the groundbreaking work on mental mindset, such as beliefs about fixed versus fluid intelligence, affects academic success. There is plenty about her work on the Internet. She has a book out that is not specifically about teaching, but teachers still find it very useful. *Mindset: The New Psychology of Success*. Ballantine Books, 2007.

The Office of Educational Technology has a draft report available on promoting grit, tenacity and perseverance in students. It focuses on K-12, but once again much of it is relevant to higher education, and it is free. Here is the link (or you can Google "promoting grit"):
http://www.ed.gov/edblogs/technology/files/2013/02/OET-Draft-Grit-Report-2-17-13.pdf

Here are two reports on self-regulation and education that cover the research area. There are lots of books on this topic, but I don't know how good they are:
http://merc.soe.vcu.edu/Reports/Self%20Regulated%20Learning.pdf
http://www.gifted.uconn.edu/siegle/selfregulation/printversion.pdf

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Miscommunication and conflicting expectations between teacher and student can undermine instruction even when both the student and teacher are motivated to succeed. Cox makes this point in her book: Cox R. D. (2011). *The College Fear Factor: How Students and Professors Misunderstand One Another*. Harvard University Press.

Formative Assessment

The class reference on formative assessment is Angelo, T. A., & Cross, K. P. (1993). *Classroom assessment techniques: A handbook for college teachers* (2nd ed.). San Francisco, CA: Jossey-Bass.

There are many good resources on formative assessment both online and in published books. Here is one book I have seen that is geared to K-12 but is also applicable to college level teaching.
Making Thinking Visible: How to Promote Engagement, Understanding, and Independence for All Learners. Ron Ritchhart, Mark Church, Karin Morrison. Jossey-Bass, 2011.

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Appendix 1

Think-Pair-Share Activities for Videos on How to Study

Note for Instructors

In August 2011, I posted a series of brief videos on YouTube about how to study effectively in college. They can be found at www.samford.edu/how-to-study. From my own experience and feedback from teachers and students, it quickly became clear that many students, especially the ones who most need help with study skills, require some kind of scaffolding activities to help them understand and utilize the information in the videos. They really weren't grasping it by just viewing the videos. I decided to create a set of Think-Pair-Share questions based on the videos that instructors can use to promote discussion of the information. I know other faculty have also developed activities using the videos. I welcome feedback about these activities and any suggestions for modifications, additions and other kinds of activities.

These are Think-Pair-Share questions. The item is presented to the class. First, each student should think of their answer to the question and be prepared to explain their reasoning. Next, students pair up and discuss why they chose respective answers and not others. Finally, the class discusses the question and possible answers as a whole. The teacher reveals and explains the answer.

Some of these questions overlap. Instructors should select the ones they think will be most useful. These questions can be easily modified to be used as quiz or "clicker" questions.

Video 1:

1. Which of the following statements does ***NOT*** reflect a mistaken belief about learning that can undermine learning?
   a) I plan my study so that I finish reading all the assigned material the night before the exam.
   b) I won't do well in my science class because I'm just not good at science.
   c) I write out the definitions of key terms on note cards and memorize them.
   d) I keep my phone and computer on while I study so I don't miss any texts or updates from my friends.

2. Which of the following is an example of poor metacognition?
   a) Joe failed an exam because he memorized definitions but his professor tested him over comprehension.
   b) Amy felt confident she did well on the exam but was stunned to find out she barely made a D grade.
   c) Cindy studied by reading her notes and her textbook over and over again, but still made a bad grade.
   d) Sam thought he could learn the material well enough if he just read the chapter summaries, but he ended up failing the exam.

3. Many first year students have poor metacognition. This could result in which of the following?
   a) They are likely to stop studying before they truly understand a concept
   b) They believe they have a complete understanding of a concept when really their understanding is shallow, with both gaps and misconceptions.

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c) They feel they do not need to radically change their study habits when they really need to do so.
d) They will overestimate how well they do on exams.

4. Which of the following statements is TRUE about multitasking?
   a) People have a pretty accurate sense of how good they are at multitasking
   b) You become better at multitasking the more you do it
   c) Younger people who have been raised with technology are good at multitasking
   d) Multitasking virtually always hurts performance compared to focusing on one task at a time.

5. The danger of using note cards to study is that
   a) They promote the tendency to memorize without understanding concepts
   b) They promote the tendency to learn isolated facts
   c) Creating them out makes you feel like you are studying when you really are not
   d) All of the above are dangers of using note cards

Video 2:

6. Which of the following is the most important ingredient for learning?
   a) The intention and desire to learn
   b) Paying close attention to the material as you study
   c) Learning in a way that matches your personal Learning Style?
   d) The time you spend studying
   e) What you think about while studying

7. Which of the following statements is true?
   a) The more you pay attention while studying, the more you learn.
   b) Students who are more motivated to learn will learn more.
   c) Students who spend more time studying will learn more.
   d) Any study strategy will lead to learning.
   e) Taking notes using a laptop computer leads to better learning.

Video 3:

8. Which of the following does ***NOT*** represent studying at a deep level?
   a) As I read, I relate the information to what I already know.
   b) As I read, I relate the information to my own personal experience
   c) As I read, I think of the key distinctions between this concept and other concepts I've learned about.
   d) As I read, I repeat the information to myself multiple times.
   e) I often close the book and my notes and just try to write out all the information I can remember on my own.
9. Say you were assigned to read the story of *The Three Little Pigs* for a class. Which of the following does NOT represent deep processing of the story?
   a) It involves a bad wolf, just like Little Red Riding Hood. Wolves are often evil in fairy tales.
   b) The key to the story is the different priorities of the three pigs for selecting building materials for their houses.
   c) Pig 1-straw; Pig 2-sticks; Pig 3-bricks

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d) I should try to explain the story as I understand it to a classmate to see if I can explain it clearly
e) Asking yourself, "How does the moral of the story apply to my own experience?"

Video 4:

10. Which of the following is NOT a purpose of note taking?
    a) Recording key information from the presentation
    b) Recording as much of what the professor says as possible
    c) Engaging yourself meaningfully in the presentation
    d) Creating memory cues in your notes that will help you recall the important themes of the presentation.

11. Which of the following strategies could be used instead of memorizing note cards to promote deeper learning?
    a) Concept mapping
    b) Self-testing
    c) Question generation
    d) None of these methods are as good as creating and memorizing note cards.

12. When highlighting while reading a text, the best way to achieve deep processing is to
    a) Highlight the key terms and definitions, especially if they are bolded
    b) Highlight complete sentences and even whole paragraphs if necessary
    c) Highlight the topic sentence of every paragraph
    d) Read the text multiple times and highlight only the key portions of the material.

13. Which of the following is ***NOT*** a rule for effective group study?
    a) There should be a goal for the study session
    b) Everyone come prepared to participate, for example by having read the chapter and having generated three possible test questions
    c) Everyone one in the groups should have similar learning styles
    d) Every group member should be able to describe the understanding developed by the whole group.

Video 5:

14. Which of the following is ***TRUE*** regarding improving your study skills?
    a) If you follow the advice in the videos, you should see rapid improvement
    b) Developing a good study strategies will take time and there will likely be set backs
    c) What constitutes good study strategies will be different for different students and different subjects, but they will follow the principles of deep processing.
    d) If your study strategies are strenuous, difficult and time consuming, then that means they are effective.

15. If you blow and exam, which of the following should you do?
    a) Review your exam to try and figure out where your study strategies went wrong
    b) Create a workable plan for improving your study strategies and implement it right away

c) Don't bother seeing your teacher unless you fail multiple exams and it becomes really clear you need help.
d) Consider your poor performance a fluke and plan to study the same way for the next exam.

16. According to the videos, which of the following statements are TRUE concerning poor study skills?
    a) Poor study skills increase confidence without increasing learning
    b) Poor study skills are mindless or make you focus on superficial aspects of the material
    c) Poor study skills are often similar to good study skills, but they don't make you think meaningfully about the material.
    d) Poor study skills take time and effort to change and improve.
    e) If you use study skills that are too shallow for how the teacher tests, you will fail regardless of how much you study and how motivated you are.

Answer Key

Here are the answers (at least, my answers).

1. All the alternatives reflect mistaken beliefs

2. Alternatives b and d are both examples of poor metacognition. Alternatives a and c simply represent bad study strategies.

3. All of the alternatives are consequences of poor metacognition

4. Alternative d is the correct answer. The other alternatives represent beliefs that students feel are true, or want to be true, but research is quite clear they aren't. Some students might argue that alternative b is true, but I'm unaware of research that supports the idea. What tends to improve multitasking is when one or more of the tasks becomes automatic from repeated practice, thus taking less mental effort. This rarely occurs in classes where most information is new. Furthermore, research indicates that people who believe they are good at multitasking often are terrible at it.

5. Alternative d is correct. Note cards can be used effectively as long as students study the information conceptually and they make linkages among the concepts. The problem is that the temptation is to memorize isolated facts and spend more time making the note cards than studying them. Although it is true that preparing note cards is better than not studying at all, there are better methods of study, such as concept maps or making note cards of self-testing questions for you to answer.

6. Alternative e. This is straight from the video. Some people wonder why the pleasantness rating group (deep processing) remembers the same amount as the control group which was just instructed to learn the words. Remember, these were highly meaningful and familiar word pairs. The performance of the deep processing groups and the control groups represents optimal group performance for this material. (There are individual differences in peoples' ability to memorize words.) The point of this experiment was to show that first, shallow strategies actually undermine performance over what it can be and second, intention to learn is not as important as the strategies you use to process information.

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7. All of these are false. These are common misconceptions students have about studying that the video seeks to debunk.

8. Alternative d. If you are mindlessly repeating information, that is superficial processing. Now if you are repeating it to keep it in mind so you can think about it meaningfully, then OK, that would be deep processing.

9. Alternative c. I was going for a simple example of applying the principles of the video. Some students may say that you do have to memorize the actual story. That may be true, but it doesn't represent deep processing and comprehension. And if you do understand the story, often it makes it easier to recall the story.

10. Alternative b. Note taking should not be mindless stenography. Note taking should help students engage in the class and students should think about what is being said and write down key points and memory cues. One danger of taking notes with laptops is that it promotes stenography and poorer learning.

11. Alternatives a, b, and c are all better alternatives than memorizing note cards. The key here is that rote memorization is a bad strategy. Students can use note cards as long as they don't just memorize them. Any of the three strategies can be used with note cards to go beyond memorization. The study strategies are all discussed in Video 4, albeit briefly.
12. Alternative d. Highlighting should be seen as an active, orienting task that makes the reader think about the material at a deep level. Only enough text should be highlighted to remind the reader of the key point in the text, which means that the reader has to read the text multiple times to select the key parts and that only parts of sentences might be highlighted. It is also important to note that students must review their highlighted text at a later time. They can't just read it once and highlight and expect to learn it.

13. Alternative c. Group study can be a complete waste of time or very effective. Alternative c is the only one that is not related to running an effective study group. It actually goes back to Video 1 which says that there is nothing to so-called learning styles.

14. Alternatives b and c. The other alternatives get at misconceptions about improving study skills. Students probably won't see a rapid improvement because usually their bad study habits are overlearned and hard to change. They will have to try different strategies to find what is right for them, and there will likely be set backs in terms of some poor test performances. There is no single recipe for effective study for all students for all subjects. The videos provide a framework for students to develop effective learning strategies for themselves, but the exact strategies will differ from student to student and from subject to subject. Finally, just because you are studying hard does not mean you are studying effectively. Learning is hard work, but not all hard work leads to learning.

15. Alternatives a and b. This is from the video. Don't wait until you have failed multiple exams before taking action.

16. All of the alternatives are true.

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Appendix 2

Exam Debrief and Follow-Up Activity

Name: _____

This activity is intended to help you analyze what beliefs and habits might have hurt your exam performance and how you can improve for future exams. Changing beliefs and habits takes time and effort. This activity is intended to get you moving in the right direction. Complete this form ***honestly and to the best of your ability.*** Your answers should reflect the thoughtfulness and reflection. The form must be completed to my satisfaction to earn extra credit. Worth up to 4 exam points based on how thoroughly the activity is completed.

Section 1: Your Previous Exam Preparation and Performance

1. Rate your agreement with each statement:

a. I felt I was really well prepared for the last exam.

Strongly Disagree 1 2 3 4 5 Strongly Agree

b. I was surprised by how poorly I did on the exam.

Strongly Disagree 1 2 3 4 5 Strongly Agree

2. Did you read all assigned reading thoroughly (and view the assigned videos) before the exam?

Yes____ No____

- If yes,
  - How many days before the exam did you complete the reading? _____
  - Did you review the reading after completing the reading the first time? _____
- If no, which of the following applies to you?
  - Skimmed the chapters quickly _____
  - Read only some sections of the chapters, such as the summaries _____
  - Did not complete the readings. About what percentage of the readings did you complete? _____

3. Did you ***review*** your notes and the readings before the exam? Yes____ No____

a. If yes, How many days before the exam did you begin your exam preparation (this means reviewing materials for the exam. This does not count reading the material for the first time).

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b. If yes, list the methods you used to study your notes and the readings before the exam besides just reading over them.

4. About how many total hours did you spend studying for the last exam? Do not count reading the material for the first time, but only review of notes, textbook, and other study activities.

5. What percentage of your test-preparation time was spent in each of these activities? (This should add up to 100%).

- Reading textbook section(s) for the first time _____
- Re-reading textbook section(s) _____
- Answering questions for practice _____
- Reviewing your own notes _____
- Other (please specify): _____

100%

6. Go and review your previous exam(s), making note of the items you missed. For those items, try to understand why you missed them. Estimate the percentage of points you lost due to each of the following (make sure the percentages add up to 100):

- I thought I had answered the question correctly, but was fooled by a reasonable sounding answer _____
- The information needed to answer the item was not in my notes, nor highlighted in reading _____
- I didn't know the answer so I guessed _____
- I didn't understand the concept as well as I thought I did. _____
- I didn't understand the concept that the question was addressing _____
- Other (Please specify) _____

7. What aspect(s) of your preparation for the second exam did you change from the first exam? Did these changes have any effect on your performance?

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8. Review all your responses above. Now check all the reasons below that may have undermined your last exam performance:

_____ Overconfident in my level of understanding of the material and preparation for the exam

_____ Missed classes. How many classes did you miss? _____

_____ Did not read or view all assigned materials

_____ Did not spend sufficient time in reviewing materials

_____ Did not highlight the critical information to review in the readings or notes

_____ Did not pay sufficient attention in class to the presentation; allowed myself to be distracted during class.

_____ Did not pay sufficient attention to the material while studying; allowed myself to be distracted while trying to concentrate on the material.

_____ My class notes were not sufficiently detailed or comprehensive enough to allow me to answer the questions correctly

_____ Did not understand materials with sufficient depth and detail to answer questions correctly

_____ Used poor study strategies or did not pay sufficient attention for effective learning in reviewing material for the exam

_____ Never sufficiently understood concepts and did not take steps to deepen my understanding

_____ List any other reasons

Section 2: Your Current Exam Preparation

1. View the videos on *How to Study* found at www.samford.edu/how-to-study.
   a. Identify the ineffective or counterproductive beliefs and study strategies you used in preparing for the last exam.

   b. Identify at least three changes you will make in your preparation for the next exam. ***Relate the change specifically to the videos.*** For example," Video 1 says that it is a mistake to write out note cards and memorize them because it leads to learning isolated facts. Next time I will create diagrams that show how concepts are related and distinct from other concepts (Video 1, 3, and 4)." Or, "I will finish reading the material a week in advance and review them by trying to explain the concepts to my roommates (Video 3)." Or, "I will remove distractions when I study so I can concentrate better (Video 1)."

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2. Describe your exam preparation below:

   a. How many days before the exam will you complete reading and viewing all materials for the first time?

   b. How many days before the exam will you begin reviewing and studying the materials?

   c. About how many hours each day do you plan to study for the exam?

   d. How do you plan to minimize distractions while studying?

3. What study strategies will you use to make sure that you are processing the information deeply? Try to address the four components of deep processing: elaboration, distinctiveness, personalization, and appropriate retrieval and application.

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Appendix 3

Multitasking Activity
An Activity Comparing Unitasking and Multitasking

Multitasking occurs when you attempt to do two or more tasks simultaneously, switching your attention between them. People often multitask or are tempted to multitask, even when they are trying to accomplish important tasks. Just how good are we at multitasking, and are we hurting our performance by multitasking? This activity will help you find out. First, please answer the following questions as honestly as possible:

Rate your level of agreement with both statements by circling the appropriate number (1 is Strongly Disagree):

1) I am pretty good at multitasking.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

2) I can study effectively even while multitasking and dealing with distractions.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

This activity will compare your ability to complete two tasks under two different conditions. In one condition, you will unitask; that is, you will complete one task and then go to the next one. In the second condition, you will multitask, in which you will complete both tasks at the same time by switching back and forth between them. Your time to complete two tasks will be recorded, so it is important that you complete both tasks as quickly as possible, but you must perform both tasks completely and correctly. If you make any errors, you must correct them. You will also be asked to rate the difficulty of each condition.

You will complete this task with a partner. One of you will complete the task while the other times you and records your times. You will then switch roles. Once you both have data, you can each compute the statistics for your results. So decide which of you will be the ***participant*** first and which of you will be the ***observer***, then proceed.

Practice: This will give the participant practice on the two tasks.

1) As quickly as you can, but correctly, say the alphabet out loud from A through K in order.
2) As quickly as you can, but correctly, count down from 10 through 0 out loud.

Condition 1:
You will be timed on how quickly you correctly perform these tasks together:
As quickly as you can, but correctly, first say the alphabet out loud from A through K in order and then count down from 10 through 0 out loud. Complete both tasks. Once you start you must continue on, correcting any errors, until you complete the task. You may not start over. The observer will give you the starting signal and record the number of seconds it takes you to complete both tasks.

Time: _____

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Rate your level of agreement with both statements by circling the appropriate number (1 is Strongly Disagree):

1) This task was easy for me.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

2) I had to really concentrate in order to complete this task.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Condition 2:
You will be timed on how quickly you correctly perform these tasks by alternating from one to the other: As quickly as you can, but correctly, ***alternate*** between saying out loud the alphabet from A through K and counting down from 10 through 0. You will start with A-10 and then alternate going up with the alphabet and down with numbers. Complete both tasks. Once you start you must continue on, correcting any errors, until you complete the task. You may not start over. The observer will give you the starting signal and record the number of seconds it takes you to complete both tasks.

Time: _____

Rate your level of agreement with both statements by circling the appropriate number (1 is Strongly Disagree):

1) This task was easy for me.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

2) I had to really concentrate in order to complete this task.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

Computing the Cost of Multitasking

Once you have your two times, compute the cost of multi-tasking using the formula below. The first task was Uni-tasking and the second task was Multi-tasking.

% Cost of Multi-Tasking = ((Time Unitasking – Time Multitasking)/Time Unitasking) * 100

A negative score indicates a cost of multi-tasking. A positive score indicates you multi-task better than you perform tasks singly.

Your % Cost of Multitasking: _____

Examine your responses to the questions about task difficulty and concentration. Do you see a difference in how easy the two tasks were and how much concentration they took? Based on your results, what can you conclude about your ability to multi-task? How much more difficult does multitasking make it for you to accomplish your goals? (Note that these were simple, easy tasks. Difficult, unfamiliar tasks would probably show even greater costs of multitasking.)