

STUDYING SUCCESSFULLY

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Entire books are devoted to the subject of studying. One of them is “How to Study in College,” by Walter Pauk. The few lines below provide the essentials that, if practiced, could allow a purposeful student to not only succeed in college but also to excel. Without much elaboration, we note that these essentials are grounded into current knowledge in cognitive science, on memory, and on behavior.

- (a) “Practice partly begets and certainly enhances sensory-motor (athletic), artistic (creative), and intellectual (cognitive) abilities.” Hence, over the years, people develop and enhance the rational powers (i.e. intellectual skills or attributes) they apply frequently. It is through practice that expertise is developed – in any athletic, artistic, or cognitive (intellectual) endeavor.
- (b) The first-time memory retention curve, well established in psychology, shows that only 25 percent (25%) of extensive and new information is still in memory after 48 hours. Of course, this means that “bright” students will tend to study their lessons, every one of their lessons, within 48 hours after the classroom lecture, laboratory, or activity. In doing so, they spend a lot less time on a lesson and it stays with them a lot longer. Naturally, they have to review, from time to time, what they have learned (see the importance of practice in “a” above). *Never confuse understanding (in class or elsewhere) with knowing; knowing requires studying, the commitment of key elements (i.e., definitions, principles, laws, etc.) to memory, and the ability to recall and to utilize correctly key definitions, concepts, principles, laws, formulas, theorems, and skills!*

With the above points in mind, essentials of a successful way of studying follow.

- 1) Take complete and clear notes in class. (Note-taking skills are enhanced through practice!)
- 2) Read the entire chapter in the textbook on the classroom lesson (preferably before and after class; assigned texts and many other resources are available in libraries and on the web.)
- 3) Take extra time to understand anything that is unclear, in the notes or in the book.
- 4) Use the chapter in the book to complete the classroom notes, if needed, or vice versa.
- 5) Be aware of difficulties due to your background in the specific topic; consult teachers, professors, or tutors when multiple reading fails to clarify a point.
- 6) After step 5 above, read/study the completed notes to find key or fundamental definitions, concepts, principles, laws, theorems, and skills (DC-PLaTS); note that the selected DC-PLaTS must be such that one can *derive* from them the entire lesson or lecture covered in class or in the textbook. Construct, if possible, concept maps. (*Organization of knowledge.*)
- 7) LEARN/KNOW these fundamental DC-PLaTS to the point of recitation. (Understanding is not knowing; you can only recall or generate and use that which you know.)
- 8) PRACTICE! USE the learned/known DC-PLaTS. See questions, homework, and problems assigned by the teachers/professors or in the book. (*Basics are needed to solve problems.*)
- 9) Schedule a review of lessons from time to time. (Without a schedule, it may not happen!)
- 10) Research results in Education, Vol. 115, No. 1, pp. 31-39, Fall, 1994, scientifically prove that YOU have the intellect to excel in any field; the question is one of background, efforts, resource, and of practice in applying and enhancing your intellect and skills.

The Timbuktu Academy received the 2002 U.S. Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring. Its director received the individual U.S. Presidential Award for Excellence in 1996. The Timbuktu Academy and its Director won the 2007 National Benjamin Banneker Legacy Award, and the 2009 AAAS Lifetime Mentor Award. Web Site: <http://www.phys.subr.edu/timbuktu.htm>

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MAKING A GENIUS OUT OF ONESELF

The first publication below explains, using the power law of human performance, that anyone can be made an intellectual giant (a genius)! The power law of performance, also known as the power law of practice, simply says that “*Effort and practice partly beget and certainly enhance athletic, artistic, and intellectual abilities and related achievements.*” (Please see the publications given below.) The authors also discuss the details of “how to make an intellectual genius” or a well-educated and productive citizen out of any individual. **Key points include the following.**

- Spend *adequate time on learning tasks* (studying, and doing assignments) during the academic year and the summer! The secret here is that difficulties one may think exist in a science, engineering, or mathematics discipline are replaced by simple challenges as one learns and practices. *Remember that in the beginning there was reading, and the rest of learning followed.*
- I may watch some educational and other programs on **TV** or other media, from time to time, but **I shall not reduce my existence to that of “watching” or “listening to” others do their jobs!** I shall study and prepare for my future, irrespective of how enticing the shows may be. These shows will not invent new medicines, produce food, construct buildings (or space shuttles), defend a country against weather, man-made, or cosmos-borne calamities. They will not pay my bills either. And, they will not care for someone's elderly parents either!
- The **sequential rigidity** of mathematics and science disciplines dictates the proper exposure (scope and depth) to the proper courses in the proper order. Algebra, English, and science are needed in the middle school for advanced placement (AP) mathematics, English, and science in high school to be available options. These latter courses, in turn, maximize science, engineering, and mathematics options in college and beyond. *“Mathematics is done in a language (i.e., English) and science and engineering are done in mathematics.”* **Please see the last paragraph on Page 2.**

Judgment is the ability to distinguish right from wrong and to set priorities. Character is the ability to do what has to be done (i.e., studying) even if it may seem that one does not like it or that one's friends are not studying! *Intellect is developed through learning, so says the power law of performance.* A big secret not known to many is that standardized test scores reflect not only the studying done but also judgment and character (two things of great importance to any employer). Employers see a good set of courses and good grades as a measure of a student's priorities, focus, determination, and self-discipline. *(At some stage, all learning is individual.)*

Ladies and gentlemen, it is believed that about half of the actual learning, over the school years, happens outside the classroom! What happens in the classroom is very important but it is not sufficient. Teachers teach; students study (at home and at school)!

Please also remember that the above regular studying, reading, and exercising have a profound impact that is sometimes not understood: *they form the character of the learner!* They help define his/her priorities, help focus him/her, and help develop self-discipline, study habits, etc. Not only do these character traits help the learners the rest of their lives, but also they help keep them out of some other things too numerous to list here. *“Luck is what happens when preparation meets, recognizes, and acts on opportunity.”*

1. *The Dynamics of Student Retention*, D. Bagayoko and Ella L. Kelley, Education, Vol. 115, No. 1, pp. 31-39, Fall 1994.
2. *A Paradigm for SEM Undergraduate Education*, Bagayoko and Kelley, Proceedings, National Action Council for Minorities in Engineering (NACME) FORUM, 1993.