

Effective Study

1. Memory

Many students feel that their memory is a fixed personal characteristic, that they are either good or poor at memorizing new material, and that there is nothing they can do to change their ability. To some extent, they are right: Programs of "memory enhancement" rarely provide a substantial *general* increase in retentive capacity. However, great improvements in the ability to *recall* information *can* be made.

a.) Short- and long-term memory

Most people know about differences between short- and long-term memory: Short-term memory (or "working-term memory") is limited in capacity (three to four chunks of information) and duration (<30 seconds); long-term memory is more stable and capacious.

Trying to improve short-term memory is probably a waste of time. An experiment comparing chess Grand Masters and ordinary players in memorizing random positions of pieces revealed that everyone has about the same short-term capacity. After 5 to 10 seconds of viewing the *randomly arranged* board, both groups, expert and non-expert, remembered the positions of only about a half-dozen pieces accurately (experiments by Adriaan de Groot, published in *Het Denken van den Schaker*). The key to retentiveness lies not in the strength of short-term memory but in the way information is *organized* in long-term storage.

b.) Storage and retrieval

Not only techniques of *storage* but of *retrieval* are important. The chess study is again relevant. While the Grand Masters had the same capacity for *random* information as anyone else, they recalled *real* board positions reflecting *real* games with 100% accuracy. They managed to achieve lasting storage of a high volume of information almost instantly. Apparently, new information is readily recalled if it connects with material already stored in a "pool" of patterns. We can make the following observations:

- we all have about the same (very limited) short-term memory capacity;
- we have a limited (but large) capacity for storing *patterns* of related information;
- the *organization* of items in memory is of key importance.

c.) Practical implications

Repetition is certainly a key part of any study system; however, repetition is not enough: It is possible to read the same chapter repeatedly and yet learn nothing. You must find ways of organizing the material so that it becomes part of the readily accessible storage of a field of knowledge. Doing so efficiently requires some understanding of the factors that affect the recognition of information and its assimilation into long-term storage.

2. Factors Affecting Learning

a.) Distribution

Learning (unlike work) advances more quickly in many short sessions than it does in a few long ones. This is especially true of definitions and lists (but language learning sessions should be both *long* and *frequent*).

Implications for practice:

- Break large tasks (indigestible chapters, complex assignments) into manageable stages.
- *Plan* your study carefully so that you have *time* to tackle material in stages.

b.) Intervals of repetition

Knowledge of new material declines rapidly, typically dropping to 10% within a week. If you review the topic *before* forgetting, the review will be brief and the benefits pronounced. Each time you return to the material, your long-term memory of it will improve. If you review only *after* you have *forgotten* the material, you will absolutely lose your labour: You will be re-learning rather than reviewing.

Implications for practice:

- Review repeatedly; reviewing only once or twice is not usually enough.
- Avoid waiting too long (until you forget); delay wastes study time.
- Expect to review difficult material at shorter intervals--the more difficult and unfamiliar the material, the shorter the review interval will be.

c.) Proactive/retroactive inhibition

Each successive item learned interferes with those you have already learned and are trying to keep in memory. As you try to recall the earlier items, you forget the later; as you learn the later, you forget the earlier.

Implications for practice:

- Avoid cramming; you can actually end a session of cramming knowing *less* than you did at the start.
- Distribute initial study and review at intervals to reduce competition for short-term memory space.

d.) Clustering

Joining together related details makes each item easier to recall. Isolated facts are difficult to remember by sheer effort of mind. Even the most experienced actors acknowledge that the lines they always forget are the ones that have no obvious part in a dialogue and no essential colouring of their own. Concentrate on the way a detail works with other information; when you remember the relationship, you will remember the minor point as well. A bare date, for example, is easy to forget. If you master a whole cluster of related information, the

relationships between pieces of information will help reinforce your memory.

Example of target data:	Single date in Elizabethan History--1558, accession of Queen Elizabeth I
Cluster:	11 years after death of Henry VIII (1547) 6 years before birth of Shakespeare (1564) ruled for 45 years (until 1603) accessed to the throne at age 25 (b. 1533)

e.) Association

Memory aids based on the natural associations between words and groups of words can help solidify specific information. All the features of poetry -- rhymes, meter, epithets, metaphors -- are in origin mnemonic devices. This oldest system of making material memorable still works.

Implications for practice:

- Create memorable rhymes to fix related terms in your mind.
- Memorize cycles, series, and processes with narrative jingles.

f.) Knowledge of performance

Testing yourself has a far greater impact than simply reviewing. Testing focuses your attention on specific elements (areas of ignorance), turning a passive review into a motivated search for answers.

Implications for practice:

- Use a note-taking approach like the Cornell System, which creates an automatic testing system.
- Create questions as you read, and test yourself at the end of each section of text.

g.) Interest level

While most people enjoy possessing knowledge, few enjoy the process of acquiring knowledge. Learning is hard work, and much of the early work is dull.

Implications for practice:

- Practice *forcing* your interest -- actively seeking aspects of a course that interest you.
- Keep in mind the *application* of your learning -- the greater possibilities it will open up (especially when these seem remote!).

h.) Habituation

At the age of 20, George Bernard Shaw quit his office job to become a writer. Years later he wrote about the lasting effects of his office discipline:

My office training had left me with a habit of doing something regularly every day as a fundamental condition of industry as distinguished from idleness. I knew I was making no headway unless I was doing this, and that I should never produce a book in any other fashion. I bought supplies of white paper . . . and condemned myself to fill five pages of it a day, rain or shine, dull or inspired. I had so much of the schoolboy and the clerk still in me that if my five pages ended in the middle of a sentence I did not finish it until the next day. On the other hand, if I missed a day, I made up for it by doing a double task on the morrow. On this plan I produced five novels in five years. . . . I have risen by sheer gravitation, too industrious by acquired habit to stop working.

Shaw was *not* a "natural" as a novelist; he had no special facility for the occupation, and he received no rewards for his work -- yet was *was* productive. Habit is everything. The more conscientiously you adhere to a specific system, the more likely you will be to perform what you intend.

Implications for practice:

- Adopt a definite, systematic study system adapted to each subject.
- Maintain a regular study schedule.

3. Practical Study and Memory Tips

Understanding the way you learn helps you explore your study skill repertory. The brute-force approach is not the only way to tackle mastering information! Any number of special arrangements of material or approaches to studying may make retention easier. Here are ten useful memory tips; you have undoubtedly tried some of them already:

1. Teach it!

One of the best ways of fixing something in your mind is by teaching it. Teach difficult work to a friend, or establish a study circle, and put one another in charge of particular sessions or topics.

2. Change your study habits.

If your system is not working, change it--change every feature of it. Study in a different place if your room is too comfortable or too noisy. Study at different times if you find there are too many interruptions or if you feel too tired. Experiment--don't pursue a losing course!

3. Map or illustrate material.

Maps and pictures are memorable and the details are spatially connected. Try *drawing* your notes, even when they concern an abstract concept. You may find the image more effective than any amount of repetition.

4. **Compete.**
Part of the pain and alienation of studying derives from isolation. Make study a social event by turning it into a competition. Find someone of about your own ability, and compete to master your program. Have contests for mnemonics and systems of memorization--even prizes! Alternatively, you can post a performance bond, with the winner collecting from the first to default on planned study sessions.
5. **"Walking through" the material.**
Standing desks are becoming popular once more. Standing or even walking as you study can help you concentrate. After all, motionless sitting is usually a signal for the body to relax and sleep. Try walking through your work.
6. **Recite material aloud.**
Reciting was once the standard approach to mastering material; it is still useful. When you say material aloud, you link the concepts not only to mental images of the words but to your memory of speaking and hearing. If you find a proposition that you absolutely cannot retain, try studying it until you understand it--and then say it out loud a half-dozen more times. Singing is sometimes even more effective, as it brings rhythm and rhyme into play.
7. **Use the information.**
What you use, you remember. Reading, writing, and reciting are the standard ways of "using" information while studying, but many other approaches are possible, particularly in problem-based courses.
8. **Write it down.**
Writing is useful, although it is both slow and painful (and recalls elementary school punishments!). Writing a grocery note, even if you lose it in the parking lot, helps you remember what you need. Writing forces us to be logical and coherent; the process also encourages us to focus on the key points and make our statements concise.
9. **Burn daylight.**
Work during daylight when you can. Most people concentrate more effectively during the day--if they can find the time and motivation to work then. Late-night study may well be ideal for a few people, but most will suffer more and learn less than they would if they rearranged their schedules.
10. **Keep the body alert.**
Sitting motionless (or worse, lying down) is a signal to your body to shut down. Keep alert by spending brief periods--about ten minutes each hour--in vigorous exercise. Don't break off your study session, but spend a brief time in vigorous motion.