

# Working Memory Strategies

*The following ten general strategies are offered to help students develop a more efficient and effective memory.*

**1. Give Directions in Multiple Formats:** Students benefit from being given directions in both visual and verbal formats. In addition, their understanding and memorizing of instructions could be checked by encouraging them to repeat the directions given and explain the meaning of these directions. Examples of what needs to be done are also often helpful for enhancing memory of directions.

**2. Teach Students to Over-learn Material:** Students should be taught the necessity of "over-learning" new information. Often they practice only until they are able to perform one error-free repetition of the material. However, several error-free repetitions are needed to solidify the information.

**3. Teach Students to Use Visual Images and Other Memory Strategies:** Another memory strategy that makes use of a cue is one called word substitution. The substitute word system can be used for information that is hard to visualize, for example, for the word *occipital* or *parietal*. These words can be converted into words that sound familiar that can be visualized. The word *occipital* can be converted to *exhibit hall* (because it sounds like exhibit hall). The student can then make a visual image of walking into an art museum and seeing a big painting of a brain with big bulging eyes (occipital is the region of the brain that controls vision). With this system, the vocabulary word the student is trying to remember actually becomes the cue for the visual image that then cues the definition of the word.

**4. Give Teacher-Prepared Handouts Prior to Class Lectures:** Class lectures and series of oral directions should be reinforced by teacher-prepared handouts. The handouts for class lectures could consist of a brief outline or a partially completed graphic organizer that the student would complete during the lecture. Having this information both enables students to identify the salient information that is given during the lectures and to correctly organize the information in their notes. Both of these activities enhance memory of the information as well. The use of Post-Its to jot information down on is helpful for remembering directions.

**5. Teach Students to Be Active Readers:** To enhance short-term memory registration and/or working memory when reading, students should underline, highlight, or jot key words down in the margin when reading chapters. They can then go back and read what is underlined, highlighted, or written in the margins. To consolidate this information in long-term memory, they can make outlines or use graphic organizers. Research has shown that the use of graphic organizers increases academic achievement for all students.

**6. Write Down Steps in Math Problems:** Students who have a weakness in working memory should not rely on mental computations when solving math problems. For example, if they are performing long division problems, they should write down every

step including carrying numbers. When solving word problems, they should always have a scratch piece of paper handy and write down the steps in their calculations. This will help prevent them from losing their place and forgetting what they are doing.

**7. Provide Retrieval Practice for Students:** Research has shown that long-term memory is enhanced when students engage in retrieval practice. Taking a test is a retrieval practice, i.e., the act of recalling information that has been studied from long-term memory. Thus, it can be very helpful for students to take practice tests. When teachers are reviewing information prior to tests and exams, they could ask the students questions or have the students make up questions for everyone to answer rather than just retelling students the to-be-learned information. Also, if students are required or encouraged to make up their own tests and take them, it will give their parents and/or teachers information about whether they know the most important information or are instead focused on details that are less important.

**8. Help Students Develop Cues When Storing Information:** According to the memory research, information is easier retrieved when it is stored using a cue and that cue should be present at the time the information is being retrieved. For example, the acronym HOMES can be used to represent the names of the Great Lakes – Huron, Ontario, Michigan, Erie and Superior. The acronym is a cue that is used when the information is being learned, and recalling the cue when taking a test will help the student recall the information.

**9. Prime the Memory Prior to Teaching/Learning:** Cues that prepare students for the task to be presented are helpful. This is often referred to as priming the memory. For instance, when a reading comprehension task is given, students will get an idea of what is expected by discussing the vocabulary and the overall topic beforehand. This will allow them to focus on the salient information and engage in more effective depth of processing. Advance organizers also serve this purpose. For older students, Clif Notes for pieces of literature are often helpful aids for priming the memory.

**10. Review Material Before Going to Sleep:** It should be helpful for students to review material right before going to sleep at night. Research has shown that information studied this way is better remembered. Any other task that is performed after reviewing and prior to sleeping (such as getting a snack, brushing teeth, listening to music) interferes with consolidation of information in memory.

# Recommendations On Improving Memory and Executive Functioning

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## Optimize work performance by simplify, routinize, and organize job tasks.

1. Simplify - break overly complex activities into simple step by step job tasks, keep these steps written down on a story board or note book and then check them off as you complete them to stay on task and make sure the task is completed.
2. Routinize- develop standard operating procedures (SOPs) for all job tasks. SOPs should be clear step-by-step instructions of how to carry out a specific task. The SOP should be complete and include all steps even if they appear obvious. This is because it only takes one missing step to derail an activity. Included in the task analysis should be a list of all materials that are needed to complete the task and all information for the task. Keep in a single notebook clearly labeled on the front and side as Standard Operating Procedures Manual. Pages should be numbered and there should be a table of contents indicating which SOPs are on which page for quick reference. Dividers with labels can also be used.
3. Organize-Structure your day, week, and month. Use of your palm pilot appears to be effective in managing appointments. Organize work area so everything you need to do the job is readily available and labeled. Work in an uncluttered work area or desk which only contains the material you need for the task on which you are currently working.

## Memory Difficulties

1. Performance is improved with additional learning trials. Plan extra rehearsal or practice to better encode and consolidate the information to be learned (REHEARSE/PRACTICE).
2. Information should be systematically recorded to be learned as entries in your palm pilot or a small tape recorder (RECORD).
3. Employ strategies in which you organize (CHUNK) information to be learned in meaningful associations. Try to learn information deeply rather than just superficially, by elaborating on the information in such a way as to understand its full meaning.
4. We learn by VERBALIZING (putting information into words or verbal concepts) or by VISUALIZING (putting information into mental pictures. The best way for you to learn is to employ both strategies, that is both verbalize and visualize the information to be learned and remembered. For example, try to verbalize visual material and visualize verbal material.
5. Learn memory techniques such as:
  1. Mnemonics - to use a meaningful acronym or sentence to remember a series of items. HOMES for the great lakes, Roy G. Biv for the colors of the rainbow, etc.

2. Flash cards - record individual facts on separate index cards that can be reviewed periodically is recommended to facilitate learning and retention.
3. Memory journal - to record continuous pieces of information, palm pilot could be used.
4. Link Technique - making a link or association between pairs of words to be remembered by visualizing in one's mind an unusual or ridiculous association between the pair, e.g., to remember the sequence of words lamp, typewriter, truck you need to form an unusual visual association between lamp and typewriter, e.g., picture a lamp with arms typing on a typewriter, then a link between typewriter and truck, e.g., picture a pickup truck hauling an enormous pile of typewriters. In this way, when you lamp this will trigger the mental image involving the typewriter which in turn will trigger the image of a truck and so on.
6. Time allocation - because it takes you longer to complete tasks, you need to allow whatever additional time is necessary for you to complete those tasks.