
Ergonomics for Enhancing Learning Skills

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ABSTRACT

The Internet has revolutionized the learning of the present day students in colleges and universities. A lot of information is available in the resources available through the internet to students. Though internet is a blessing to the present generation of students, the understanding of fundamental concepts, storing them in the permanent memory and application of acquired knowledge for solving engineering as well as social problems appear to have declined. Students as well as young IT professionals spend a lot of time with computers and are deprived of normal sleep. This paper presents the importance of 8 hours of sleep required for preventing memory loss compared to activities that occur while one is awake. Ways to improve memory are discussed. Mnemonics: Memory "Tricks" are explained with suitable examples to enhance learning skills of students. The effect of ergonomically designed class rooms/buildings, design of teaching process and design of educational materials for enhancing learning skills of students are explored.

Key words: Ergonomics, learning skill

INTRODUCTION

Present day life style for students as well as IT professionals demands a lot of work stretching for about 18 hours a day. There is little time left for personal hygiene and for allowing the physical system to recover. As a result, occupational health is affected and they are not able to contribute much after some period. Before the invention of Television, internet and mobile phones, it appears that people had enough rest during nights and they had much time to think, plan and contribute to the growth. After all these inventions, information flows to everyone through these gadgets, but many of them are unable to comprehend and use this information in the right way. This paper presents the importance of 8 hours of sleep, ways to improve memory, Mnemonics, and ergonomics for enhancing learning skills.

The Importance of 8 Hours of Sleep for Enhanced Memory

A recent survey found that more people are sleeping less than six hours a night, and sleep difficulties visit 75% of us at least a few nights per week. A short-lived bout of insomnia is generally nothing to worry about. The bigger concern is chronic sleep loss, which can contribute to health problems such as weight gain, high blood pressure, and a decrease in the immune system's power, reports the *Harvard Women's Health Watch*.

Learning and memory: Sleep helps the brain commit new information to memory through a process called memory consolidation. In studies, people who'd slept after learning a task did better on tests later. [1]

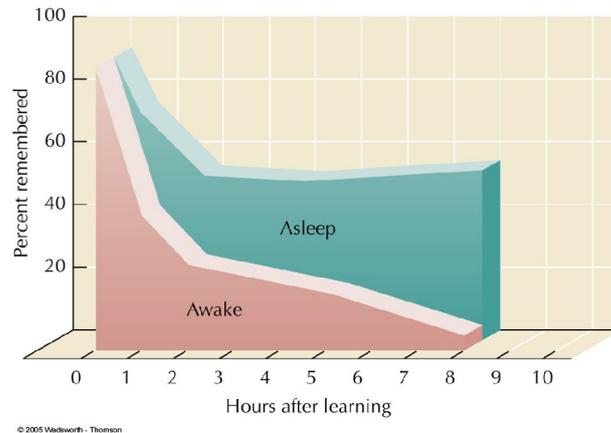


Fig 1: The amount of forgetting after a period of sleep or of being awake. Notice that sleep causes less memory loss than activity that occurs while one is awake. [2]

It is seen from fig. 1 that 55% of the information received are retained in memory after 8 hours of sleep and 5% of the information is remembered if one is awake after learning. Sleep loss may result in irritability, impatience, inability to concentrate, and moodiness. Too little sleep can also leave you too tired to do the things you like to do. Sleep debt contributes to a greater tendency to fall asleep during the daytime. These lapses may cause falls and mistakes such as medical errors, air traffic mishaps, and road accidents.

METHODS TO IMPROVE MEMORY

The following are the ways to improve memory:

- Knowledge of Results: Feedback allowing you to check your progress
- Recitation: Summarizing aloud while you are rehearsing material
- Rehearsal: Reviewing information mentally (silently)
- Elaborative Rehearsal: Look for connections to existing knowledge
- Selection: Selecting most important concepts to memorize
- Organization: Organizing difficult items into chunks; a type of reordering
- Whole Learning: Studying an entire package of information at once, like a poem
- Part Learning: Studying subparts of a larger body of information (like text chapters)
- Progressive Part Learning: Breaking learning task into a series of short sections
- Serial Position Effect: Making most errors while remembering the middle of the list
- Recalling each item in a 15-item list. Recall is best for the first and last items.
- Overlearning: Studying is continued beyond bare mastery
- Spaced Practice: Alternating study sessions with brief rest periods
- Lack of sleep decreases retention; sleep aids consolidation
- Hunger decreases retention

- Cognitive Interview: Technique used to improve memories of eyewitnesses

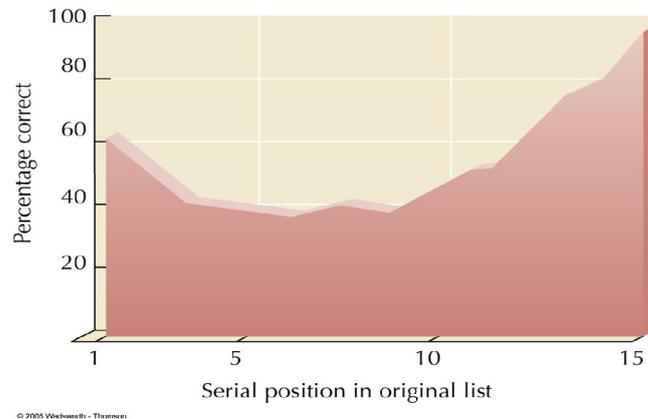


Fig 2: The serial position effect. The graph shows the percentage of subjects correctly

MNEMONICS: MEMORY TRICKS

One can use memory tricks or mnemonic devices to remember information. Mnemonics is a weird word that means "memory tool". Mnemonics are methods for remembering information that is otherwise difficult to recall. Mnemonics use as many of the best functions of your brain as possible to store information. Researchers say that

- We remember 20% of what we hear;
- We remember 50% of what we read;
- We remember 75-80% of what we see and do.

By using all your senses, but especially your ability to create visual images, you can increase your power to memorize [3]. Examples of Mnemonics are given below:

Example: How can you remember the order of the planets away from the sun?

- Think about this sentence: My Very Elegant Mother Just Served Us Nine Pizzas.
- Were you able to figure out the planets (when Pluto was considered a planet) in order of position from the sun?
- *Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto*

Any kind of memory system or aid : Use mental pictures, make things meaningful and make information familiar.

Keyword Method: Memory aid; using a familiar word or image to link two items

Form a Chain: Remember lists in order, forming an exaggerated association connecting item one to two, and so on.

Take a Mental Walk: Mentally walk along a familiar path, placing objects along the path.

EDUCATIONAL ERGONOMICS

Educational ergonomics relates education performance and educational design. The performance of students depends on the design of educational system. Ergonomic interventions and design improvements benefit students. The field is concerned with how and why design of the education process and system influence the performance of participants in the system as a whole [4]. Fig 3 shows the behavioral cybernetics of educational ergonomics.

EFFECT OF ERGONOMICALLY DESIGNED CLASS ROOMS/ BUILDINGS

Class rooms are designed using ergonomic principles. Students are provided ergonomically designed chairs and tables for providing comfortable learning environment. Smart class rooms are developed for providing LCD projectors, PA system and Wi-Fi facility for connecting the class room with the rest of the World. Conducive teaching and learning environment is provided to teachers and students so that the outcome is a knowledgeable, skilled and efficient human who will be able to solve social as well as problems related to mankind.

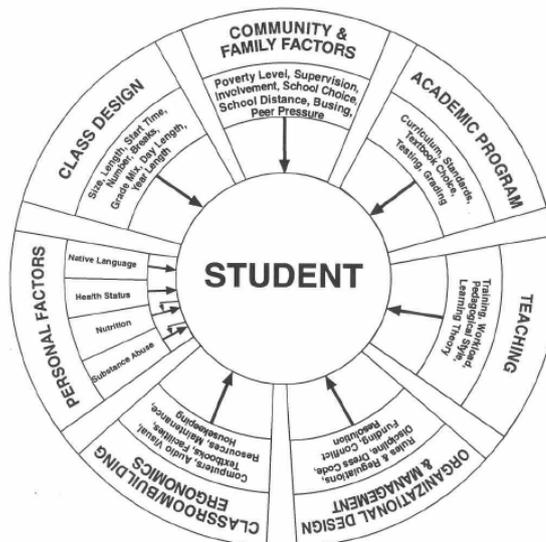


Fig 3: Behavioral cybernetics of educational ergonomics [4]

DESIGN OF TEACHING PROCESS

Several teaching methods are available as given below:

- Lecture by teacher
- Class discussion conducted by teacher
- Lecture-demonstration by teacher

- Lecture-demonstration by another instructor(s) from a special field (guest speaker)
- Student reports by individuals / group
- Debate (informal) on current issues by students from class
- Textbook assignments / Term papers
- Panel discussion
- Reports on published research studies and experiments by students
- Working Models

The teacher has to select suitable teaching methods based on the subjects handled. The teaching process has to be ergonomically designed and delivered so that students are able to enjoy the subject during their learning. The teacher has to communicate the syllabus, teaching plan and handouts well before the actual teaching takes place so that students are mentally prepared to receive the information, understand them and increase their knowledge base.

SUMMARY

- Ergonomic principles for enhancing teaching and learning skills are presented in this paper.
- The importance of 8 hours of sleep for preventing memory loss is highlighted
- Mnemonics: Memory Tricks are explained with examples.
- Behavioral cybernetics of educational ergonomics is presented.
- Ergonomically designed class rooms and design of teaching process are discussed.

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REFERENCES

1. Harvard Health Publications, Harvard Medical School http://www.health.harvard.edu/press_releases/importance_of_sleep_and_health
2. General Psychology: Guang Dong University of Foreign Studies, Chapter 7, Memory. www1.gdufs.edu.cn/jwc/bestcourse/kecheng/.../chapter7%20Memory.ppt?
3. Barbara Awbrey, Goode-Pasfield Center for Learning and Teaching, [roanoke.edu/.../clt/Mnemonics%20PowerPoint.pptx%20\[Repaired\].pptx?](http://roanoke.edu/.../clt/Mnemonics%20PowerPoint.pptx%20[Repaired].pptx?)
4. Thomas J. Smith, Educational Ergonomics: Educational Design and Educational Performance <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.136.733&rep=rep1&type=pdf>