CS192: Learning

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Learning (your first job)
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Dartmouth, MA, 2002
Introduction: learning

- Learning does NOT just happen to you
  it is something you do to yourself.

The instructor can teach you theory and practice,
point the way, give you exercises, problems to solve,
etc., BUT

- learning is all YOUR ACTIVITY

  The basic assumption is that you want to learn
  something. Without that, nothing will work
Some definitions

- **Learning** is a biological process. It occurs when networks of neurons in your brain send each other signals.

- **Thinking** is webs (of neurons) sending signals to other webs.

  Two aspects:
  - Understanding
  - Remembering
Understanding

- Comes sometimes in a “flash” (Oh I get it)
- Other times it takes repeated exposure, examples
- If you don’t get it, try more circuits in your brain
  what does that mean?
- This requires FOCUS of ATTENTION (= concentration) and ACTION (do it, do it!)
  Understanding cannot be achieved passively; it demands an active and focused mind.
Remembering

- Memory: also a biological process involving firing of neurons.
- Memories are RECONSTRUCTED each time remembering happens.
- Use it or lose it: our brains web connections are not permanent, they need to be reused/reactivated.
- Neural nets that get used become stable.
Consequence

BOTH

understanding and remembering require

CONCENTRATION, ACTION, PRACTICE
“Taking” notes implies passive reception: hastily writing down what the instructor says (the worst), or scribbles on the board (unreadable, erroneous), or what’s on a slide (unnecessary) …

… and turns off *listening* and trying to *understand*.

We miss the line of thought, and the rest of the lecture becomes much harder to follow.
Notes

- Make short, limited notes (lists, keywords, short phrases), so you can keep listening and following the lecture.

- Shortly after the lecture, use your book, slides, other sources, to REWRITE your notes into real sentences. This rephrasing will help you understand and remember.

- Most learning goes on outside the classroom, when you actually work with the material. That’s why we want you to go to recitation.
Slides

- Nowadays, slides are usually available.
- That does not mean you have nothing to do. The slides are usually too terse to learn from.
- You still must put effort in understanding and remembering. Use the slides (print a copy) and only “make” a note as a comment to the bullets on the slides.
- Read the provided material, know the definitions, preferably before you go to class.
Information vs. knowledge

- **Information.** The world is chock-full of it. It is provided to you by the instructor, in books, and other teaching material, in the form of symbols (symbols, text, images).

- You need to understand the notation used to even start using the information.

- **Knowledge.** What you actively construct in your own head. (e.g. Understanding a process, algorithm, theorem. Remembering rules to compute something.)
So what?

- Or, so what do you have to do:
  Align your activities with understanding and remembering.

- For this you need the proper amount of TIME.

- Time cannot be stretched, saved, bought. If you have 1 hour left to do your programming assignment, you will not do a good job nor learn from that assignment.
Time

- It is your PRIORITIES, not the clock, that will determine the outcome of your college experience.

- Use your calendar on your smart phone to slot in sufficient time for learning, practicing, exercising, playing, having fun, resting, sleeping.
Studying

- Most students study for tests.
  - purpose of studying: pass the test

- Most instructors are amazed by this.
  - purpose of studying: understand and remember the material

- Most of the material we teach you will come back to you later. You need it for much longer than for the test!!
Studying (cont’)

- **Pulling an all-nighter** before a test is based on the completely erroneous belief that the only thing that works and that you need is short term memory. It’s like playing football for 12 straight hours before you play the super bowl.

- Better to get a good night sleep before an exam.

- Understanding and remembering are brain functions and become LESS EFFICIENT the longer you put demands on it.
Quizzes, Tests, Exams

- Tests not only *assess* what you have learned, but also *enhance* learning for tested material.
- Don't just read and re-read.
- Don't just study and re-study.
- Instead, take some of that time you would've devoted to re-reading or re-studying, and use it to engage in practice testing. E.g., get together with classmates and test each other.

Ed Delosh, Psychology, CSU
Testing (cont’)

- Again, Ed Delosh, CSU:

  Research in well-controlled laboratory conditions as well as real-world classroom environments shows that you can expect practice testing to enhance your learning and boost test performance.
Exam questions

- **Exams do not just test memory, they also test understanding.**

- Rarely are exam questions asked about something that has never been discussed, assigned…

- … so if you see something unfamiliar, it probably is a question asking you to APPLY something familiar.

- You need concentration and thinking **DURING** the exam (hence a good night sleep)
Interest

- What if the material isn’t interesting?
- Your interests have to be learned. Something becomes interesting when you get into it. When you do it.
- So if you believe something cannot be learned unless it’s interesting, you may never get started on something.
- You are here for a reason, right? What is it?
- Wake up your childhood curiosity.
You won’t learn unless you want to!

- Learning relies on your brain, which demands the same maintenance as the rest of your body.

- Learning is difficult and it requires effort.

- But if done right, it is marvelous! I wish you the best in your college days.
Reference

A much more technical paper on this:

“Learning to Learn”
Karl R. Wirth, Macalaster College
Dexter Perkins, University of North Dakota

I have a copy if you want to read it