

# Perception: Psychophysics and Modeling

01c | How to learn

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## How to learn

CARRIER, C. A. (1983). Notetaking research: Implications for the classroom. *Journal of Instructional Development*, 6(3):19–26.

Educational researchers have been accused of trying to prove through experimentation what everybody else has known for a long time. (p. 19)

From a purely technological perspective, notetaking seems archaic. Inexpensive duplications procedures make it feasible for instructors to provide students with copies of detailed lecture notes. (p. 19)

- i. Students who take notes during a lecture learn more than those who simply listen.
- ii. In general, students will learn more from a lecture if they both record and review their own notes.
- iii. Review of notes will lead to improved performance.

## How to learn (cont'd)

1. Well established that multi-tasking decreases performance—i.e. laptops and internet in classrooms is a bad idea.

## How to learn (cont'd)

RAVIZZA, S. M., UITVLUGT, M. G., and FENN, K. M. (2017). Logged in and zoned out: how laptop internet use relates to classroom learning. *Psychological Science*, 28(2):171–180.

RAVIZZA et al. study is about the internet as a constant distraction.

*We found that nonacademic Internet use was frequently observed and was inversely related to performance on the cumulative final exam. This relationship was observed regardless of interest in the class, motivation to succeed, and intelligence. Moreover, accessing the Internet for academic purposes during class was not related to a benefit in performance. Collectively, these findings raise questions about whether students should be generally encouraged to bring their laptops to class ... . (p. 177)*

*Despite the intuitive and established link between nonacademic portable device use and poor classroom performance, students downplay this relationship and report little or no effect of their portable device use on learning class material ... . (p. 171).*

## How to learn (cont'd)

1. Well established that multi-tasking decreases performance—i.e. laptops and internet in classrooms is a bad idea.
2. Students using laptops are less concentrated during lectures.
3. Laptop users show decreased academic performance.
4. **Laptop users are less satisfied with their education than their peers (!!!)**
5. ... but no.' s 1–4 were shown in studies focusing on laptops distracting students, or inviting them to multi-task, obviously decreasing student performance.

## How to learn (cont'd)

MUELLER, P. A. and OPPENHEIMER, D. M. (2014). The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychological Science*, 25(6):1159–1168.

MUELLER and OPPENHEIMER study **is about the quality of in-class note taking, even if distraction is accounted for**. Students can type faster on laptops, resulting in a lot more verbatim copies of what was said, instead of having to process and condense information on the fly if writing by hand.

*Whereas previous studies have shown that laptops (especially with access to the internet) can distract students, the present studies are the first to show detriments due to differences in note-taking behaviour. (p. 1166)*

*The studies we report here show that laptop use can negatively affect performance on educational assessments, even—or perhaps especially—when the computer is used for its intended function of easier note taking. (p. 1166)*

## How to learn (cont'd)

Use pen & paper and make yourselves **your own notes in your own words** of the material covered and discussed during the lecture.

The stress and exhaustion this necessarily causes is part of the learning processes!

Yell out if things are moving too fast, or if you need time to complete your notes!

There will not be a single, coherent set of lecture notes (“Skript”) for you to download and memorise.



## How to learn (cont'd)

J.D. KARPICKE and J.R. BLUNT (2011). Retrieval Practice Produces More Learning than Elaborative Studying with Concept Mapping. *Science*, 331, 772–775.

*Educators rely heavily on learning activities that encourage elaborative studying, whereas activities that require students to practice retrieving and reconstructing knowledge are used less frequently. Here, we show that practicing retrieval produces greater gains in meaningful learning than elaborative studying with concept mapping. The advantage of retrieval practice generalized across texts identical to those commonly found in science education. The advantage of retrieval practice was observed with test questions that assessed comprehension and required students to make inferences. The advantage of retrieval practice occurred even when the criterial test involved creating concept maps. Our findings support the theory that retrieval practice enhances learning by retrieval-specific mechanisms rather than by elaborative study processes. Retrieval practice is an effective tool to promote conceptual learning about science. (Abstract, p. 772)*

**Write down your Qs and discuss them in class—this is essential for your own retention!**