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Can Handwriting Make You Smarter?

Students who take notes by hand outperform students who type, and more type these days, new studies show

By **ROBERT LEE HOTZ**

Updated April 4, 2016 2:08 p.m. ET

Laptops and organizer apps make pen and paper seem antique, but handwriting appears to focus classroom attention and boost learning in a way that typing notes on a keyboard does not, new studies suggest.

Students who took handwritten notes generally outperformed students who typed their notes via computer, researchers at Princeton University and the University of California at Los Angeles found. Compared with those who type their notes, people who write them out in longhand appear to learn better, retain information longer, and more readily grasp new ideas, according to experiments by other researchers who also compared note-taking techniques.

“The written notes capture my thinking better than typing,” said educational psychologist Kenneth Kiewra at the University of Nebraska in Lincoln, who studies differences in how we take notes and organize information.

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Ever since ancient scribes first took reed pen to papyrus, taking notes has been a catalyst for the alchemy of learning, by turning what we hear and see into a reliable record for later study and recollection. Indeed, something about writing things down excites the brain, brain imaging studies show. “Note-taking is a pretty dynamic process,” said

cognitive psychologist Michael Friedman at Harvard University who studies note-taking systems. “You are transforming what you hear in your mind.”

Researchers have been studying note-taking strategies for almost a century. Not until recently, though, did they focus on differences caused by the tools we use to capture information. Note-taking with a lead pencil, first mass-produced in the 17th Century, just isn't so different than using a fountain pen, patented in 1827; a ballpoint pen, patented in 1888; or a felt-tipped marker, patented in 1910.

Today, however, virtually all college students have portable computers; lectures are the main vehicle for instruction; and the keyboard clatter of note-taking is the soundtrack of higher education.

Generally, people who take class notes on a laptop do take more notes and can more easily keep up with the pace of a lecture than people scribbling with a pen or pencil, researchers have found. College students typically type lecture notes at a rate of about 33 words a minute. People trying to write it down manage about 22 words a minute.

‘The very feature that makes laptop note-taking so appealing—the ability to take notes more quickly—was what undermined learning.’

—Kenneth Kiewra at the University of Nebraska in Lincoln

In the short run, it pays off. Researchers at Washington University in St. Louis in 2012 found that laptop note-takers tested immediately after a class could recall more of a lecture and performed slightly better than their pen-pushing classmates when tested on facts presented in class. They reported their experiments with 80 students in the *Journal of Educational Psychology*.

Any advantage, though, is temporary. After just 24 hours, the computer note takers typically forgot material they've transcribed, several studies said. Nor were their copious notes much help in refreshing their memory because they were so superficial.

In contrast, those who took notes by hand could remember the lecture material longer and had a better grip on concepts presented in class, even a week later. The process of taking them down encoded the

information more deeply in memory, experts said. Longhand notes also were better for review because they're more organized.

In three experiments during 2014, psychologists Pam A. Mueller at Princeton and Daniel Oppenheimer at UCLA arranged for students to listen to talks on a variety of topics including algorithms and bats, while taking notes either via keyboard or pen and paper. The 67 students were tested immediately afterward and then again a week later, after being given an opportunity to review their notes.

Those who wrote out their notes longhand took down fewer words, but appeared to think more intensely about the material as they wrote, and digested what they heard more thoroughly, the researchers reported in *Psychological Science*. "All of that effort helps you learn," said Dr. Oppenheimer.

Laptop users instead took notes by rote, taking down what they heard almost word for word.

When tested, "the longhand note takers did significantly better than laptop note-takers despite the fact that laptop note takers had more notes to look at," Dr. Mueller said. "Having all these notes did not help refresh their recollection."

The problem is a typist's tendency to take verbatim notes. "Ironically, the very feature that makes laptop note-taking so appealing—the ability to take notes more quickly—was what undermined learning," said Dr. Kiewra.

In one experiment, Dr. Mueller explicitly warned students using laptops to avoid taking verbatim notes, saying it would hurt their performance later. They couldn't help themselves. "The tendency of people to take verbatim notes on a laptop is really hard to break," she said. "It seemed really ingrained to type and type and type, even when you are told that it is not beneficial to your performance."

These note-taking studies were conducted under laboratory conditions, but their findings likely apply equally wherever we try to collect our thoughts in writing, whether in a classroom, a business meeting or a doctor's office, the experts said.

College lecture halls commonly are filled with students typing. At Princeton, about two-thirds of the students take class notes with laptops, while at UCLA less than half do. At the University of North Carolina, about 41% of students in a recent survey said they use laptops to take class notes.

"At Princeton, it was a sea of MacBooks," said Dr. Mueller. "Few students were taking longhand notes."

Any notes are better than none, studies show. While handwritten notes may be more memorable, there is room for improvement.

At the University of Nebraska, Dr. Kiewra conducted 16 experiments to gauge the completeness of handwritten notes and found that people usually took down only a third or so of the information presented. Moreover, in their haste to keep up with the spoken word, people omitted important qualifiers, failed to record context, and skipped key details.

Because it requires such concentration, the process of taking notes itself can be distracting. Dr. Kiewra recalled that when he was still a student, one of his professors banned note-taking in class because he wanted students to pay full attention to the lesson. The teacher instead supplied prepared notes for the entire class.

Nonetheless, Dr. Kiewra recalled that he continued taking his own notes, cradling his head in his arms to shield his notebook as he wrote. One day, however, the professor caught him in the act.

“Mr. Kiewra, are you taking notes in my classroom?” he demanded. The flustered student dissembled. “I’m only writing a letter to a friend back home.”

“Oh thank goodness,” the professor said. “I thought you were taking notes.”

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