

Book Review

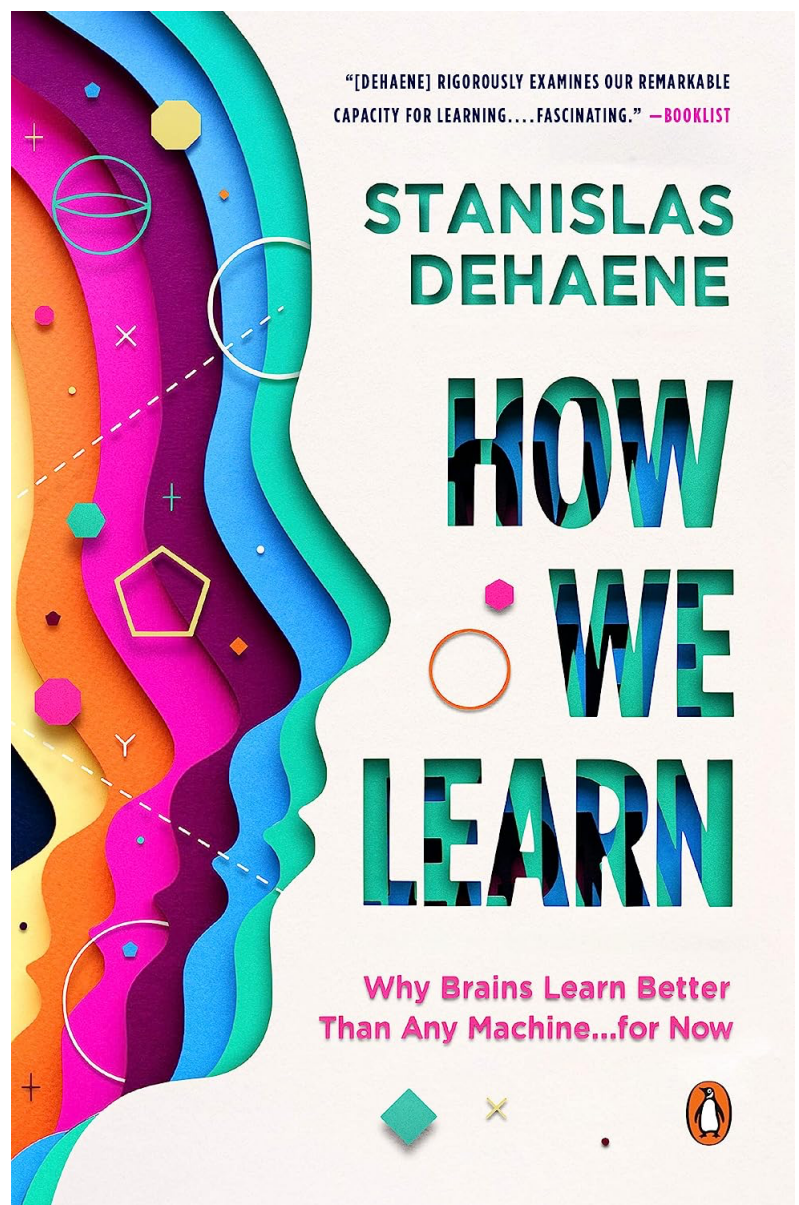
Brains are still better than machines

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Dehaene, S. (2020). *How we learn: Why brains learn better than any machine...for now*. Penguin.

In the EFL/ESL field, teachers often face situations that center on the question of how people learn. *How we learn: Why brains learn better than any machine...for now* is entirely dedicated to educators who want to understand more about the most powerful machine humans have: the brain. This book is divided into three major parts that explain how we learn. In this work, the author provides information fundamental to any TESOL teacher.

The first part of the book is dedicated to defining what learning is. According to Dehaene, there are seven different definitions for learning, but two particularly stood out to me. The first one, "Learning is adjusting the parameters of a mental model," explains how human brains adapt their internal language model to the phonemes they grew up with. These modes have different levels, from speech sounds at the earliest stages to more complex parameters such as grammatical rules. The second one is "Learning is optimizing a reward function." Dehaene explains how computer scientists changed the feedback system in the machines to make them more effective while playing games. In the past, machines would only receive a reward at the end of the game, not knowing exactly why they lost points during the game. Now, machines learn through trial after trial, and the main goal is to learn from their mistakes and enhance their intelligence. Dehaene compares this artificial reward system to the brain's reward system and its capacity to predict the rewards or the punishments we might get. This made me reflect on the assessment system promoted by schools. Wouldn't students benefit more from constant feedback?



After describing the learning process, Dohaene compares the human brain to artificial intelligence. It is enlightening to see what artificial intelligence (AI) is missing and why our brain still learns better than any machine. “In the field of learning, the effectiveness of the human brain remains unmatched” (Dohaene, p. 30). According to Dehaene, AI can only perform operations that our brain does unconsciously. In contrast, the conscious brain can do much more, such as questioning beliefs and refocusing attention, which are key elements in any learning process. However, Dohaene recognizes that computer science is evolving fast, and that AI is already capable of performing operations at human-like levels. In addition, it is believed that learning from sharing in social contexts is exclusive to our species, as we voluntarily use language to share information. Our brain can also learn on a single trial, such as when we learn a new word. Humans can immediately learn and use a new word by integrating it into pre-existing networks, such as when conjugating a new verb. In other words, the human brain can reuse rules in different contexts.

In the second part of the book, Dehaene brilliantly explains essential features that are innately human. He refutes the idea that babies' brains are like white sheets of paper. He argues that newborns have complex circuitry and well-organized neuronal structures that support the concept of the sensitive period in the early years of life when neuroplasticity occurs at its highest level. Dehaene suggests that the capacity for learning reduces with age but never really reaches zero, which suggests that adults can benefit from learning at any age. He also posits the existence of one universal human nature, even though he does not deny individual differences and traits. The book details the microcircuits that are involved in the process of learning such as neurons, synapses, memory, and neuroplasticity, as well as other factors that influence the learning process such as the environment, nutrition, and the sensitive period.

In the third and final part of the book, Dehaene suggests four pillars that constitute learning: attention, active engagement, error feedback, and consolidation. According to Dehaene, these four elements are crucial for successful learning, and teachers who can activate them in class will

help learners to succeed. However, it is becoming increasingly challenging for teachers to keep their learner's focus and attention while our brains receive constant massive stimuli. Therefore, it is essential that teachers become aware of the neural mechanisms of the brain in order to provide more efficient teaching methods and strategies. It is also essential to understand what a synapse is so that we can adapt our strategies to make them stronger. Stronger synapses lead to more efficient long-term memory, which improves recall.

Dehaene suggests that a passive individual does not learn. However, he warns against confusing active learning with constructivism and discovery learning methods. He points out that students should never be left alone with their learning—they need to receive meaningful content, be engaged, have efficient pedagogical guidance, and constant feedback, in order to remain motivated and curious. All teachers should note that this book highlights the importance of receiving efficient feedback and how this can impact the quality and speed of the learning process. As the author aptly notes, “...every error offers an opportunity to learn” (p.200).

Dehaene stresses that what happens in our brains when we sleep is one of the most critical discussions in neuroscience: It is during the night when we sleep that our brain consolidates important information and discards what we do not need. Therefore, having a good night's sleep is just as important as having attention while learning.

Thanks to advanced research in neuroscience, psychology, and artificial intelligence, we know much more about how the brain learns. In *How we learn: Why brains learn better than any machine...for now*, Stanislas Dehaene offers an informative guide to help teachers understand what their learners are going through when facing new content. Even though technology, especially AI, has changed and improved a lot since 2020, I highly recommend this book to teachers of students of all ages because it provides essential information that assists educators in improving their classroom strategies and methodologies.

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