



## IT IS COMPLICATED: LEARNING AND TEACHING IS NOT ABOUT “LEARNING STYLES”

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### YOUNG REVIEWERS:



EMILY

AGE: 11



MIHAJLO

AGE: 16

Learning styles is perhaps one of the most widespread and believed myths in education. The idea is based on the claim that all students can be classified according to their particular learning style, and that they learn best when teachers match instruction to the preferred style of the student. This popular theory has been proven false by many learning scientists. Learning styles theory reduces sophisticated and complex processes like teaching and learning into overly simple categories and labels students in ways that can limit their potential. Studies performed by scientists who study the brain and education have found that learning and teaching are much more complicated than simply matching teaching to a student’s learning style.

## LEARNING STYLES

A theory about how people can be classified according to a preferred way of learning, such as visually, auditory, or kinesthetically and instruction works best when it is matched to their preferred way of learning.

## NEUROSCIENTISTS

Scientists that study the brain and how it impacts thinking and behaviors.

## NEUROMYTH

A commonly held false belief about how the brain functions.

## NEUROSCIENCE

The scientific study of the structure and function of the brain and nervous system.

<sup>1</sup> See [danielwillingham.com](http://danielwillingham.com)

## WHAT DOES THE IDEA OF LEARNING STYLES CLAIM?

You might have heard some teachers say that students have different **learning styles**. For example, maybe they said some people are “visual learners” who prefer to learn by seeing, or that other students are “auditory learners” who learn best by listening, or “kinesthetic learners” who learn best by doing. Maybe you have even taken a survey or test to find out your own learning style. Many people believe that all students can be classified according to their preferred learning styles and that students learn best when teachers match the way they teach to the preferred learning style of the student. Although the theory of learning styles is very popular, it has been proven false by many **neuroscientists**. Despite evidence to suggest that learning styles are not true, many educators still believe it [1]. The idea of learning styles is an example of a **neuromyth**, which is a commonly held false belief about how the brain functions. In this article, we will describe why the learning styles claim is a neuromyth and discuss why it could be harmful to believe this myth. We will also explain how **neuroscience**, which is the study of how the brain works, helps us to understand the complexities of teaching and learning.

## WHY IS THE LEARNING STYLES CLAIM A NEUROMYTH?

The idea of learning styles lacks scientific evidence to support it. However, many teachers, and much of the general population, believe that learning styles exist. Learning styles is perhaps one of the most widely believed neuromyths [2]. One research group [3] found that over 90% of teachers believe in learning styles and another [4] showed that over 60% of teachers think that teaching to students’ learning styles helps the students to learn.

Apparently, many people are easily convinced to believe in unproven claims if those claims seem to include neuroscience details. Learning styles is an example of an educational tool that seems so right because there are parts of the claim that are true<sup>1</sup>. For example, people do have preferences for how they learn, or ways they like to learn the best. Presenting information in several different ways is an important educational practice that teachers learn about in teacher’s college. However, this does not mean matching teaching to a student’s preferred way of learning actually improves their understanding, because the brain does not work that way.

## WHY IS THE LEARNING STYLES NEUROMYTH HARMFUL?

The belief in learning styles can be harmful because the theory of learning styles reduces complicated processes like teaching and learning into overly simple categories and labels students in ways that

### Figure 1

How you learn info graphic. The info graphic illustrates how you learn is not easily reduced or categorized. Created by Brendon Ehinger (<http://ehinger.ca/>).

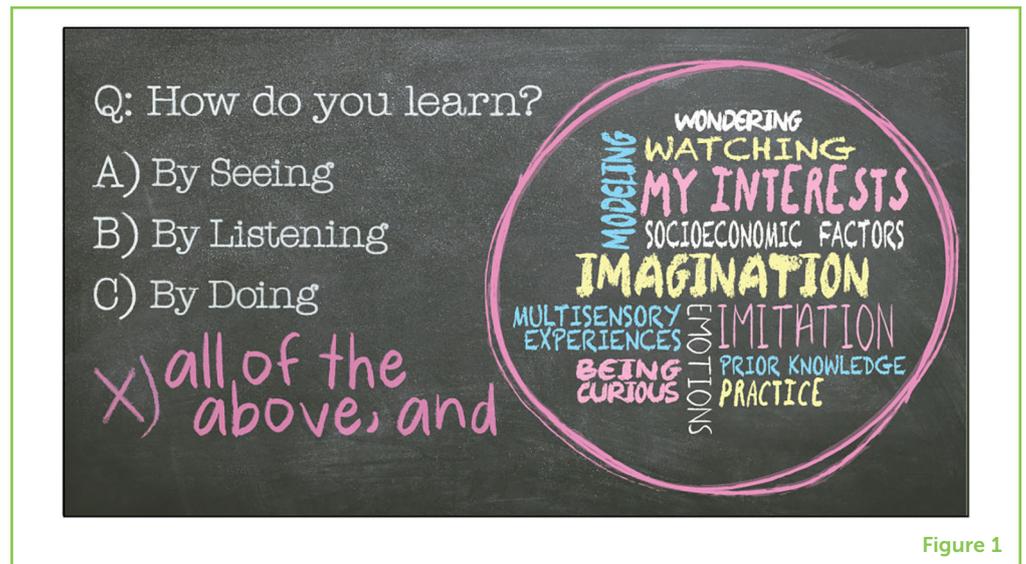


Figure 1

can limit their potentials (see Figure 1). It is appealing to assume that students could learn more easily if instruction was simply changed to match their individual learning styles, but the way the brain processes information is much more complicated than that.

Imagine this: you determine you are a visual learner, meaning you prefer instructions that are presented visually. In French class, you are working on developing your conversational skills and accent. You read and see many written examples of conversations and there are even phonetic spellings presented (the words are written out the way they sound), but your preference for visual information is really not helping you speak better French. You struggle to pronounce many words and to understand what a French speaker is saying. Your learning style, “visual learner,” does not seem to help you learn better in this situation! Learning a language and the practice of that language require the coordinated use of seeing, hearing, and doing. In addition to these three skills, memory, emotion, motivation, thinking, and imagination are also important parts of the learning process [5]. It is often not possible for teachers to try to limit their teaching to specific learning styles, and it could potentially be harmful to learning if they try to do so—it could create a lot of frustration! We ask that teachers be extremely cautious of the neuromyth of learning styles, because there is no scientific evidence that teaching to specific learning styles actually produces better learning.

Instead, learning happens in an interconnected way. When you remember any piece of information, you process that information using multiple senses, combining what you heard, said, remembered, saw, felt, smelled, etc. Therefore, if teachers believe in the learning styles claim and attempt to limit students to a particular learning style, this could significantly reduce which senses and processes are used

for learning, which could impair the ability of some students to learn new information.

### PLASTICITY

The brain's ability to form new connections, be flexible, and ability to be modified by experience.

### NEURAL NETWORK

Consist of many interconnected neurons.

### NEURON

A cell in the nervous systems that sends information to other cells (other nerve cells, muscles, or gland cells). Nerve cells are considered the basic units of the brain.

<sup>2</sup> See <https://husman-memory.net/brain-neurons-synapses/>

### MULTIFACETED

Includes many parts.

## NEUROSCIENCE HELPS US TO UNDERSTAND THE COMPLEXITY OF TEACHING AND LEARNING

Neuroscience helps us understand the complexity of how the brain grows and changes when learning happens. Teachers should know that neuroscience research indicates that learning is based on experience, not learning styles. Therefore, learning about neuroscience helps teachers provide better instruction in the classroom. In teacher's college, we learn about how our brains have **plasticity**, which means our brains adapt to our experiences. So, teachers should expose students to a lot of experiences, in many different ways, and also take into consideration students' prior knowledge, abilities, and interests. Daily events in our lives and the lessons we learn in the classrooms create **neural networks** that help us use and remember what we have learned. A neural network consists of many interconnected brain cells, called **neurons**. At birth, a human has only a small percentage of the neural network and the vast majority of the network is created through life experience<sup>2</sup>. Meaningful explorations and practice strengthen neural networks and also help students feel more confident, capable, and connected to what they are learning. In response to experiences, neurons form and eventually whole networks of connections can become specialized for functions like speaking an additional language. So, as we learn new things, our brains adapt by creating new connections between neurons, changing the neural network. Learning takes time and practice, just like learning to speak a new language the more you practice and the more you are exposed to the language, the more efficient you will be at processing and performing skills like speaking and comprehending.

## LEARNING IS COMPLEX

The neuromyth of learning styles can be very problematic, as it reduces learning and teaching process into overly simple processes that do not actually help students learn more efficiently. Even though this theory has been proven false, many people still believe it! Learning styles is one of the most popular neuromyths among teachers. What is important to remember is that learning actually involves underlying thinking processes and relies on our experiences. We know that students' background knowledge, abilities, and interests are central to their learning, not learning styles. The process of learning and the ways that our bodies and brains are interconnected is **multifaceted**, and scientists who study learning are still discovering and understanding how these processes work. Learners need to be exposed to a variety of tasks and have information presented in multiple ways. The ways information is presented must be meaningful not only to what is being

learned (like a new language), but also to the learner. We hope you can see that teaching is much more complicated than simply matching a learner to a learning style!

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## YOUNG REVIEWERS



### EMILY, AGE: 11

My name is Emily and I am an 11-years-old aspiring lawyer and astronaut. I live in London, England and will move to secondary school this year. My favorite subject is English literature. In my free time I enjoy swimming, Irish dancing, and reading Harry Potter.



### MIHAJLO, AGE: 16

Hi. I am Mihajlo and I am currently a sophomore at Third Belgrade Lyceum. My favorite thing about science is that you never know what is going to happen in the end. What drives me to neuroscience is the fact that we know so little about the brain and the nervous system and that there are many things waiting to be discovered by us, passionate scientists. I like learning new things and it is the reason why I do a lot of scientific research with my science mentor.

## AUTHORS



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Breanna is a professor of educational psychology (the study of teaching and learning) and a counselor educator. She teaches students who would like to become teachers about child and adolescent development and learning theories and also teachers about becoming school counselors. Breanna researches issues related to child and youth resilience, which has been informed by her professional background working in educational and clinical mental health settings with families over the past decade. She loves prairie sunsets and outdoor adventures with her husband and two kids. \*lawrenceb@brandonu.ca



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Burcu is an education professor at Brandon University in Canada. She teaches students who would like to become teachers, and teaches graduate courses to teachers and principals who would like to improve their teaching. Advocating for diversity and equity in education, Burcu is interested in how students develop their languages and literacies in an increasingly global world. Burcu gets to watch a lot of ice hockey games in her free time since she is the proud parent of two boys Deniz (16) and Derin (10) who are both hockey players.



### TODD MILFORD

Todd M. Milford is an associate professor in science education at the University of Victoria and chair of the Department of Curriculum and Instruction. He was a previously a lecturer in the Art, Law, and Education Group at Griffith, University in Brisbane Australia. He likes to ride his bike and play basketball in the street in front of his house.