

# INTRODUCTION

*Educational neuroscience for all means changing our practice so that we make the fundamental shift from “doing school” to learning.*

**-Whitman and Kelleher (2016)**

Superheroes are everywhere—in the movies, comic books, the internet, cereal boxes, kids’ clothing, and even classrooms! Yes, teachers can be superheroes, too! The question becomes, then, what makes a superhero? From Superman to Spider-Man, Captain Marvel, the Hulk, and even a Jedi Knight, their superpowers are a defining characteristic.

Now, let’s return to the matter of becoming a superhero teacher. Researchers in educational neuroscience, a burgeoning new field integrating brain science, cognitive psychology, and education, are beginning to discover what happens in the human brain as it learns. This book was written so that you may unleash your inner teacher-superhero as you use these potent teaching/learning principles and claim them as your very own *superpowers!*

Using a lighthearted format, this book will identify 10 categories of superpowers you may activate to optimize how your students’ brains take in, process, and store information.

Most of us can easily recount the superpowers attributed to the world’s favorite superhero, Superman: “faster than a speeding bullet, stronger than a locomotive, able to leap tall buildings in a single bound.” Similarly, when speaking about educational neuroscience, Tokuhama-Espinosa (2011) shares this playful analogy: “Better than education, more powerful than psychology and easier to understand than neuroscience . . . this is a paradigm shift in our understanding of the teaching profession” (p. 1). In the succeeding chapters, the following superpowers will be revealed.

**Superpower #1 *Introducing Your Superpowered Brain: Knowing How It Works*** outlines the book's thesis that new neurosciences advances have uncovered "superpowers" readily available to all teachers through a clearer understanding of the science of learning and brain-informed teaching methods.

**Superpower #2 *Fueling the Neurobiology of Attention and Engagement*** will examine the human brain's remarkable interplay of attention and engagement and how they are powerfully connected to student learning. Highlighted will be ways teachers may create conditions that increase student motivation by tapping into brain factors that affect attention and engagement.

**Superpower #3 *Engaging Emotions and Mindsets: Two Potent Forces*** will discuss the critical role of emotions in cognition by addressing two aspects: (1) why it is essential for teachers to understand the central role of emotion in cognitive processes and (2) how growth mindset theory is rooted in neuroscience through the construct of brain plasticity.

**Superpower #4 *Collaboration: The Brain-to-Brain Learning Boost*** will demonstrate how neuroscience explains how student-to-student collaboration boosts the teaching-learning equation.

**Superpower #5 *Making It Sticky: Boosting Long-Term Memory*** will focus on the neurobiological factors of long-term memory storage.

**Superpower #6 *Transformative Questioning*** will transform practices related to traditional classroom questioning into ones for which all students may reap both the learning and the social benefits making it a virtual superpower.

**Superpower #7 *Transforming Assessments Into Learning Opportunities (LOPPS)*** will explore the changing landscape of assessments, including the potency of renaming summative assessments as *learning opportunities*, the power of formative assessments, and the untapped learning potential of student self-assessment.

**Superpower #8 *Sparking the Brain's Creative Forces*** will demonstrate to teachers how the pedagogies of service-learning and changemaking will invite teachers to consider a broader view of creativity beyond the arts, including decision-making, problem-solving, and design-thinking.

**Superpower #9 *Promoting Culturally Responsive and Relevant Teaching*** will address the brain principles underlying why culturally responsive/culturally sustaining teaching is effective and its critical importance in meeting the needs of our growing culturally, racially, ethnically, and linguistically diverse student body.

**Superpower #10 Championing Neurodiversity: Valuing the SMART in Every Student** will explain how teachers may embrace neurodiversity and even convert it into a superpower by diversifying ways for learners to receive information, process it, and demonstrate their understanding.

And, if you will pardon one additional reference to Superman ... Up, up, and away!

## REFERENCES

- Tokuhama-Espinosa, T. (2011). Why mind, brain, and education sciences is the "new" brain-based education. *New Horizons for Learning*, 9(1).
- Whitman, G., & Kellaher, I. (2016). *Neuro-teach: Brain science and the future of education*. Roman & Littlefield.

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