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# *Introduction*

*David A. Sousa*

**T**his volume is an overview of the concept of educational neuroscience, featuring excerpts from eleven works by recognized experts. The following is a synopsis of what you will find in each chapter.

## **PART I. THE DEVELOPING BRAIN**

### **Chapter 1. The Physiology of the Brain**

*David A. Sousa*

Chapter 1 presents an overview of some basic brain structures and their functions in a reader-friendly format and style. It discusses new insights into brain growth and development, such as windows of opportunity, and explains how the brain of today's student has much different expectations of school than the brain of just a decade ago. These modern expectations can pose significant challenges for teachers, and this chapter offers some suggestions on how to deal with them.

### **Chapter 2. The Child's Brain**

*Robert Sylwester*

Humans are mobile creatures. One daunting challenge facing a toddler's brain is mastering the physiological and cognitive networks that direct movement in all its forms. This intriguing chapter discusses how that process happens and what parents and teachers of young children can do to foster the healthy and robust development of these vital networks.

### **Chapter 3. The Adolescent's Brain**

*Sheryl G. Feinstein*

Working with adolescents can be challenging, sometimes because of the misconceptions we have about them. This valuable chapter debunks some of the common myths about adolescents and discusses how the various stages of brain development affect teenagers' cognitive, emotional, and physical growth. It offers many practical instructional strategies for getting and maintaining their attention and emphasizes the importance of feedback during the learning process.

## **PART II. THE BRAIN IN SCHOOL**

### **Chapter 4. The Literate Brain**

*Pamela Nevills*

One of the most difficult tasks we ask the young brain to undertake is to learn to read. Chapter 4 explains how the brain develops pathways to decode reading. It then suggests teaching strategies, such as the importance of connecting reading, writing, and spelling; of identifying word form areas for vocabulary development; and of analytical word analysis. The strategies are research-based and include practical classroom examples.

### **Chapter 5. The Numerate Brain**

*David A. Sousa*

Children are born with number sense—the ability to approximate and to recognize when objects are added or removed from a group. Number sense develops as the young brain matures, and, eventually, children have to learn to calculate through multiplication, a process that many find difficult. Chapter 5 explains the development of the conceptual structures in the brain that are involved in calculations, and offers instructional strategies for helping children successfully learn multiplication.

### **Chapter 6. The Male and the Female Brain**

*Abigail Norfleet James*

For decades, parents and educators have debated whether male and female brains learn differently. In Chapter 6, you will read the latest research on gender differences and how these differences may affect learning; certain

teaching strategies may be more effective with boys than with girls and vice versa. The chapter also examines how learning disabilities may develop differently in males and females.

## **Chapter 7. The Special Needs Brain**

*Eric Jensen*

In Chapter 7, we explore the growth and development of the brain's social and academic operating systems. Problems arising in these systems can cause students to have learning difficulties. This chapter offers many suggestions to teachers for helping students build their social skills as well as develop the mindset that can help them overcome academic challenges.

## **PART III. INSTRUCTIONAL STRATEGIES FOR EVERY BRAIN**

### **Chapter 8. Calming the Brain**

*Michael A. Scaddan*

Stress has a negative impact on learning because it shifts the brain's focus to dealing with the cause of the stress. Chapter 8 suggests proven techniques that teachers can use for lowering stress in students and for raising their motivation to learn.

### **Chapter 9. Engaging the Brain**

*Marcia L. Tate*

If we expect students to remember what they learn, then the learning must make sense and be relevant. Chapter 9 offers numerous strategies that teachers can use to connect learning to real-world experiences, thus maintaining student interest and increasing retention of learning.

### **Chapter 10. Focusing the Brain**

*Marcia L. Tate*

Students today are accustomed to constantly interacting with all types of visual media. As a result, visual tools can be powerful instructional devices for capturing students' attention and helping them remember what they learn. Chapter 10 suggests several effective visual organizers that enhance comprehension and the retention of learning.

## **Chapter 11. Energizing the Brain**

*Eric Jensen*

Recent research has pointed out that movement improves blood flow to the brain, thereby helping it stay focused and engaged during learning. In this chapter, we see how music and other high-energy activities can invigorate students and help them overcome boredom or fatigue.