Second Edition

DIFFERENTIATION *and* THE BRAIN

How
Neuroscience
Supports the
Learner-Friendly
Classroom

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TOMLINSON

A joint publication

ASCD

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About the Authors

David A. Sousa, EdD, is an international consultant in educational neuroscience and author of more than a dozen books that suggest ways educators and parents can translate current brain research into strategies for improving learning. He has made presentations to more than two hundred thousand educators across the United States, Canada, Europe, Australia, New Zealand, and Asia. Dr. Sousa has taught senior high school science and served as a K–12 director of science and a district superintendent in New Jersey schools. He has been an adjunct professor of education at Seton Hall University and a visiting lecturer at Rutgers University.

Dr. Sousa is past president of the National Staff Development Council (now Learning Forward). He has received numerous awards, including the Distinguished Alumni Award and an honorary doctorate from Bridgewater State University and an honorary doctorate from Gratz College in Philadelphia. Dr. Sousa has been interviewed on the NBC *Today* show and by National Public Radio about his work with schools using brain research.

Dr. Sousa has edited science books and published dozens of articles in leading journals on staff development, science education, and educational research. His most popular books for educators include *How the Brain Learns, Fifth Edition*; *How the Special Needs Brain Learns, Third Edition*; *How the Gifted Brain Learns, Second Edition*; *How the Brain Learns to Read, Second Edition*; *How the Brain Influences Behavior: Management Strategies for Every Classroom*; *How the Brain Learns Mathematics, Second Edition*; *The Leadership Brain: How to Lead Today's Schools More Effectively*; *Engaging the Rewired Brain*; and *Mind, Brain, and Education: Neuroscience Implications for the Classroom.* His books have been published in French, Spanish, Chinese, Arabic, Korean, and several other languages.

Dr. Sousa has a bachelor's degree in chemistry from Bridgewater State University in Massachusetts, a master of arts in teaching degree in science from Harvard University, and a doctorate from Rutgers University. He makes his home in south Florida.

Carol Ann Tomlinson, EdD, is a faculty member at the University of Virginia's Curry School of Education, where she is the William Clay Parrish Jr. Professor and chair of the Department of Education Leadership, Foundations and Policy. Dr. Tomlinson codirects the university's Institutes on Academic Diversity. As a consultant and presenter, Dr. Tomlinson works with teachers throughout the United States and internationally to develop more responsive, heterogeneous classrooms. Her education experience includes twenty-one years as a public school teacher and twelve years as a program administrator of special services for struggling and advanced learners.

During her time in the public school classroom, Dr. Tomlinson was recognized by the state of Virginia as Teacher of the Year. She has focused on a number of critical issues throughout her career, including curriculum and instruction for struggling and advanced learners, effective instruction in heterogeneous settings, and encouragement of creative and critical thinking in the classroom.

She was named Outstanding Professor in the Curry School of Education in 2004 and received an All-University Teaching Award in 2008. In 2017, she ranked thirteenth in the Education Week Rick Hess Straight Up Edu-Scholar Public Influence Rankings of academics having the greatest impact on discussions about education policy.

Dr. Tomlinson is the author of more than three hundred articles, book chapters, books, and professional development materials. Among her books on differentiation are *How to Differentiate Instruction in Academically Diverse Classrooms, Third Edition*; *The Differentiated Classroom: Responding to the Needs of All Learners, Second Edition*; *Fulfilling the Promise of the Differentiated Classroom: Strategies and Tools for Responsive Teaching*; *Integrating Differentiated Instruction and Understanding by Design: Connecting Content and Kids* (with Jay McTighe); *Leading and Managing a Differentiated Classroom* (with Marcia B. Imbeau); and *Leading for Differentiation: Growing Teachers Who Grow Kids* (with Michael Murphy). Her books on differentiation are available in fourteen languages.

She has a bachelor's degree from the University of South Carolina and a master's degree and doctor of education degree from the University of Virginia.

Some resources on differentiation are available at www.differentiationcentral.com, or follow Carol on Twitter @cat3y.

To book David A. Sousa or Carol Ann Tomlinson for professional development, contact pd@SolutionTree.com.

Introduction

With so many books available on differentiation, why do we need this one? That is a fair question, and here is our answer. To our knowledge, this book is different from all the others in that it combines two imperatives facing nearly all educators.

1. Research is revealing so much about how the brain learns that educators can no longer ignore the implications of these discoveries for educational practice.
2. Teachers need to find ways to use this brain research to develop strategies that will allow students to succeed in classrooms with a diverse mix of abilities, cultures, and languages—hallmarks of contemporary schools.

The neuroscientific research discoveries that can affect educational practice have accumulated since the 1980s, leading to a whole new exciting discipline called *educational neuroscience*, which brings together related research from cognitive psychology, neuroscience, and pedagogy. This research pool offers information and insights that can help educators decide whether certain curricular, instructional, and assessment choices are likely to be more effective than others. In this book, we examine the basic components of differentiation in light of what current research reveals, and the result is surprisingly positive, indeed. We want to share those surprises with the reader.

In this book, we examine the basic components of differentiation in light of current research, and the result is surprisingly positive, indeed.

How Brain Friendly Is Differentiation?

As authors and longtime educators, we focus on somewhat different areas of educational practice. Carol has been intimately involved in developing frameworks for establishing differentiated classrooms at all grade levels and in all subject areas—and teaching in them. David has investigated how the findings from cognitive and neuroscientific research could be translated into what educators do in schools and classrooms. When we discussed the possibilities for this book, we recognized that the processes for differentiating curriculum, instruction, and assessment are supported in many ways by what researchers

in cognitive psychology and neuroscience are revealing about how the brain learns. In other words, differentiation is brain friendly and brain compatible.

The Rise, Fall, and Rise of Differentiation

Differentiation is not a new idea. Think back to the one-room schoolhouse of the late 19th and early 20th centuries, where one teacher had to educate students of varying ages and grade levels at the same time in a single classroom. That teacher had to be an expert in differentiating curriculum, instructional strategies, and assessment techniques. Using only a few resources—chalk, slates, and some books—the students learned literacy, arithmetic, penmanship, and good manners. In this environment, the students and teacher were often together for several years in a row, so they got to know each other very well. This close relationship allowed the teacher to tailor instruction for an individual student. No doubt, the seeds of cooperative learning sprouted here, too, as older students helped the younger ones. In these settings, teaching the class as a whole made little practical sense given the range of student needs in the classroom.

As the population grew, public schools got bigger. Students were separated into single grade levels, according to their age. Class size was small, and John Dewey's (1938) notion of a school as a caring community encouraged teachers to address the needs of individual students. Curriculum decisions were made locally and reflected the community's needs. Some towns wanted their students to have more academic subjects, while others focused on developing their students' vocational and agricultural skills. Differentiated classrooms were still quite common.

Although students within a grade level still demonstrated varying degrees of readiness and maturity, the prevailing and powerful industrial model began to shape educational philosophy and school operations in the 1930s. Within this organizational structure, differentiation in the classroom yielded to the seemingly more efficient middle-of-the-road approach to teaching. Academic subjects were departmentalized, class sizes grew even larger, and secondary-level teachers became content specialists. Differentiation waned as the one-size-fits-all curriculum emerged as the common basis for instruction.

While school districts were becoming more *alike* in their curriculum, instruction, and assessment practices, the school population was becoming more *diverse*.

Because of fears that local U.S. school districts still had too much autonomy and variation, in the 1960s, states began to exert more control over their operations. State departments of education generated curriculum standards and developed standardized tests that nearly all students had to take to graduate high school. Meanwhile, the immigrant population mushroomed, bringing more languages and cultures into the society, and urban flight widened the economic gap between neighboring communities. So, while school districts across the United States were becoming more *alike* in their curriculum,

instruction, and assessment practices, the school population was becoming more *diverse*.

Since 2007, nationwide and international test results, such as the Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS), show only modest—if any—gains in student achievement across the grades. Secondary students in the United States continued to score lower than students in most other developed countries. In an attempt to improve performance, policymakers called for reforms that put even more emphasis on standards and testing (for example, the No Child Left Behind Act, 2002). In the face of these pressures to standardize, educators came to realize that the one-size-fits-all approach does not succeed with many students in today's classrooms. It became evident that the broad range of abilities, languages, and cultures in U.S. schools requires teachers to incorporate different approaches to instruction within the same classroom—a return, to some degree, to the diverse strategies of the one-room school. The idea of differentiation was reborn.

About This Book

Some school districts have long sought ways to maintain differentiation in their classrooms despite the driving forces of unreasonable amounts of content to cover and the accompanying high-stakes testing. As policymakers and communities continue to recognize the growing diversity of their student population, more schools will turn to differentiation to help this broad mix of students succeed. In this book, we offer suggestions on how to establish and manage differentiated classrooms without imposing additional heavy burdens on teachers. We talk about teaching *differently* and *smarter*, not *harder*. In fact, when properly implemented, differentiation emphasizes shared responsibility between teacher and student—a desirable outcome, because the brain that does the work is the brain that learns.

Differentiation emphasizes shared responsibility between teacher and student, because the brain that does the work is the brain that learns.

Questions This Book Will Answer

This book will answer questions such as the following.

- What kind of model can teachers use as a basis for setting up a differentiated and brain-friendly classroom?
- How do the mindsets of teachers and students affect differentiation?
- What kind of learning environment is most conducive to learning and differentiation?
- What are the five major components of a brain-friendly quality curriculum?

- What are effective practices for assessing student achievement to inform teaching and learning?
- What does *student readiness* mean, and how do teachers respond to it?
- How important are student interests in the differentiated classroom, and how are they handled?
- What are the components of learning profiles, and how do teachers plan for them?
- What are some strategies for effectively leading students and managing the routines in a differentiated classroom?

In this edition, we updated references and added the findings from new educational neuroscience research that support the elements of differentiated instruction. We have included new instructional strategies and teacher-tested examples related to implementing differentiated instruction components, as well as offered new guidance on working with issues related to learning profiles.

Chapter Contents

This book contains the following eight chapters that explore differentiation and the brain.

- **Chapter 1: The Nonnegotiables of Effective Differentiation—** In this chapter, we describe differentiation and its research base. We present a model that incorporates the basic elements of a differentiated classroom and give a brief overview of the model's parts we discuss in greater detail in succeeding chapters.
- **Chapter 2: Mindset, Learning Environment, and Differentiation—**Here we explore different teacher and student mindsets and how they may affect teaching and learning. We describe the impact of the classroom and school environment on body chemistry, as well as on social needs and other factors that affect student learning.
- **Chapter 3: Curriculum and Differentiation—**This chapter deals primarily with the five important components of a brain-friendly quality curriculum. We discuss each component and suggest ways to implement it in a differentiated classroom.
- **Chapter 4: Classroom Assessment and Differentiation—** Because assessment is such an integral part of teaching and learning, we devote this chapter to examining the nature and purposes of assessment. We focus particularly on those assessment strategies more likely to be effective because they guide teachers in addressing the diversity among learners.

- **Chapter 5: Differentiating in Response to Student Readiness—** *Student readiness* is often equated with *student ability,* but they are not the same. In this chapter, we explain the differences, discuss why readiness matters, and offer suggestions for responding to student readiness through the learning environment as well as through curriculum, assessment, and management strategies.
- **Chapter 6: Differentiating in Response to Student Interest—** How much interest a person has in learning something is a key factor in that person's motivation to learn and subsequent achievement (Amabile, 1983; Bruner, 1961). Here, we state why addressing students' interests can make for challenging, rewarding, and successful learning activities. We include suggestions for taking students' interests into account when supporting an invitational learning environment and when planning curriculum, assessment, and management strategies.
- **Chapter 7: Differentiating in Response to Student Learning Profile—**Although teachers are aware that students learn in different ways, planning for these differences on a day-to-day basis may seem impractical. But that is not the case. In this chapter, we describe some components of learning profiles, variables that affect learning profiles, pitfalls of learning styles, and guidelines teachers can use to plan for differing student learning approaches.
- **Chapter 8: Managing a Differentiated Classroom—** Our suggestions in the preceding chapters may at first seem overwhelming, but with careful and thoughtful planning, teachers can implement them in productive ways. This chapter helps with that careful and thoughtful planning. It explores the differences between *classroom leadership* and *classroom management* and suggests how teachers can use their leadership skills to move students through challenging and exciting learning opportunities in a differentiated learning environment.

Other Helpful Tools

This book includes helpful tools such as vignettes, scenarios, and exercises that provide an opportunity for reflection and real-life application.

- **A Case in Point and A Better Scenario:** These vignettes appear in chapters 1 through 8. Positioned at the beginnings of these chapters, A Case in Point describes situations in a typical classroom. At the chapter conclusions, A Better Scenario describes how the classroom situations might improve if the teacher plans for the differentiation component discussed in that chapter. Our

hope is these vignettes will demonstrate how using the suggested strategies could make for a positive and productive learning environment and success for students.

- **In the Classroom:** These scenarios are intended to help educators envision how various aspects of differentiation, including specific instructional strategies, might look in action in specific, brain-friendly classroom settings.
- **Exercises:** In nearly every chapter, we offer questions for reflection along with multiple suggestions about how to design and implement strategies associated with the topic discussed in that chapter. These questions and suggestions come not only from the psychological and neuroscientific research but also from research on the best educational practices associated with differentiation and brain-compatible instruction.

As we gain a greater understanding of how the human brain learns, we may discover ways to better meet the needs of our increasingly diverse student population. Sometimes, students are attempting to learn in environments designed to help but that instead inadvertently hinder their efforts. By looking for ways to differentiate instruction and change some of our assessment approaches, we may be able to help more students achieve their full potential. We understand the considerable imperfections in many teaching environments. We know teachers long for smaller class sizes, larger rooms, more materials, more time for planning, and more relevant professional support. We are keenly aware of—and saddened by—the unremitting pressure to raise test scores that persists in many schools. We are hopeful those realities won't outlive us all. In the end, teachers enrich and enliven young lives when they say, "These are my students. This is the only time they will ever experience this grade or these subjects. I understand both the opportunity and the responsibility this presents to me. I will see these students as three-dimensional human beings. I will learn about them. I will continue to sharpen the art and science of my work so I can teach them the best possible content in the best possible ways. I will do whatever I can in this time and place to support the success of each student who comes to me."

Our hope is that this book will encourage all school professionals to learn more about how the brain learns and about approaches to differentiation so we can work together for the benefit of all students. In other words, we hope this book will help teachers sharpen their knowledge of the science that illuminates the art of effective teaching and inspire them to use that knowledge to benefit the students they teach.