

**Unleashing**  
the  
**Potential**  
of the  
**Teenage**  
**Brain**

*10 Powerful Ideas*

Barry Corbin



# Contents

---

<b>Acknowledgments</b>	<b>ix</b>
<b>About the Author</b>	<b>xi</b>
<b>PART I. DISCOVERING THE TEENAGE BRAIN</b>	<b>1</b>
<b>1. Introduction: The Creatures in the Classroom! Those Exasperating and Unfathomable Teenagers</b>	<b>2</b>
How Do We Reach and Teach Those Unpredictable Teenage Brains?	2
Wanted: A New Approach to Teaching Teenagers!	3
Why Educators Need to Learn About the Teenage Brain	5
Brain-Compatible Teaching and the New Science of Learning	6
The Emergence of a New Pedagogical Model	8
<b>2. Adolescence and The Teenage Brain—What Is Different and How Do We Know?</b>	<b>10</b>
Adolescence—Just the Quick Facts!	10
The Teenage Brain—What We Had Believed	12
How Neuroscience and Medical Technology Are Changing Our Ideas About the Teenage Brain	13
The Future of Brain Imaging	14
<b>3. Big Changes in the Teenage Brain: What We Have Learned and Are Learning</b>	<b>16</b>
The Teenage Brain—A Work in Progress	16
From Back to Front: Brain Growth, Neuron Proliferation and Pruning, Myelin Development	17
What It All Means (We Think!)	23
Looking Back at Part I—Reflection and Review	29
<b>PART II. TEN POWERFUL IDEAS ABOUT THE BRAIN AND LEARNING AND WHAT IT MEANS FOR TEACHING THE TEENAGE BRAIN</b>	<b>31</b>
<b>4. Powerful Idea #1: Constructing New Knowledge</b>	<b>32</b>
What Powerful Idea #1 Means for Teachers: Helping Teenagers Construct Personal Meaning	34

How It Might Look—A Case Study	
“Saving the Old Victoria Street School”	35
Constructivist Teaching Strategies	37
<b>5. Powerful Idea #2: Different Ways of Learning</b>	<b>40</b>
Being Smart—Human Intelligence	40
Preferred Ways of Learning—Our Learning Styles	41
What Powerful Idea #2 Means for Teachers: Teaching to	
Each Unique Brain	43
Unleashing the Potential of the Teenage Brain—Six	
Things You Ought to Do	45
How It Might Look—A Case Study	
“Ms. Taylor’s Meteorology Unit”	46
<b>6. Powerful Idea #3: Making Meaning,</b>	
<b>Connections, and Patterns</b>	<b>47</b>
What Powerful Idea #3 Means for Teachers: Developing	
Pattern Making and Detecting Abilities	49
Some Strategies for You to Consider	50
How It Might Look—A Case Study	
“Mrs. Parasiuk’s Poetry Class”	51
<b>7. Powerful Idea #4: Whole-Brain Learning</b>	<b>52</b>
Left, Right, or Both Brains?	52
What Powerful Idea #4 Means for Teachers: Effective	
Ways to Make Your Classroom Teaching Whole Brain	54
How It Might Look—A Case Study	
“Whole-Brain Assessment in Mr. Amos’s Horticulture Class”	56
<b>8. Powerful Idea #5: Multiple Memory Pathways</b>	<b>57</b>
Different Kinds of Memory—Declarative	
Versus Procedural	57
Learning and Memory	59
What Powerful Idea #5 Means for Teachers: Using Multiple	
Memory Pathways	61
How It Might Look—A Case Study	
“Mrs. Singh’s Musical Science”	64
<b>9. Powerful Idea #6: Physical Activity and Movement</b>	<b>65</b>
Exercise for the Brain	65
What Powerful Idea #6 Means for Teachers: Utilizing Physical	
Activity to Enhance Learning	67
How It Might Look—A Case Study	
“Kinesthetic Learning in High School Biology”	68
<b>10. Powerful Idea #7: Memory, Learning, and Emotion</b>	<b>70</b>
Too Much or Too Little?	70
The Impact of High Stress and Threat	71
Brain Attention and Focus	72
Motivation and Engagement	74

What Powerful Idea #7 Means for Teachers: Managing the Emotional Environment of the Classroom	75
How It Might Look—A Case Study “The ‘Affirmative’ Mr. Hawkes”	76
<b>11. Powerful Idea #8: Reflection and Self-Assessment</b>	<b>79</b>
Knowing Oneself	79
Reflection	80
Metacognition	80
What Powerful Idea #8 Means for Teachers: Developing Reflective Learners	81
How It Might Look—A Case Study “Feedback and Reflection in the Visual Arts Class”	82
<b>12. Powerful Idea #9: Social Interaction and Learning</b>	<b>83</b>
What Powerful Idea # 9 Means for Teachers: Providing for Social Interaction and Collaboration	84
How It Might Look—A Case Study “A Jigsaw Activity in High School Political History”	87
<b>13. Powerful Idea #10: Time and Timing</b>	<b>88</b>
When Is the Best Time?	88
An Optimal Time to Learn	89
An Optimal Time Pattern for Learning	90
The Optimal Times During the Learning Episode	91
The Optimal Times During the Day	92
What Powerful Idea #10 Means for Teachers: Taking Advantage of Time and Timing	93
How It Might Look—A Case Study “Mrs. Gregory’s Lesson Planning”	94
Looking Back at Part II—Reflection and Review	96
 <b>PART III. THE CLASSROOM ENVIRONMENT AND WHAT TEACHERS AND STUDENTS SHOULD BE DOING</b>	 <b>97</b>
<b>14. The Learning Environment</b>	<b>98</b>
The Physical Environment	101
The Socioemotional Environment	102
The Intellectual Environment	104
<b>15. The Brain-Compatible Teacher:     Changing and Evolving Roles</b>	<b>109</b>
A Complex and Challenging Profession!	109
The Teacher as Facilitator, Orchestrator, and Conductor	111
The Teacher as Coach and Model	111
The Teacher as Continuous Learner	113
The Teacher as Monitor, Assessor, and Evaluator	113
The Teacher as a Resource	114

<b>16. Teenage Students: Higher Expectations and New Roles</b>	<b>115</b>
What We Want and Need From Our Teenage Students	116
Looking Back at Part III—Reflection and Review	117
<b>PART IV. NOW WHAT? SO WHAT?—REFLECTING UPON WHAT WE HAVE LEARNED</b>	<b>119</b>
<b>17. What Does It All Mean?</b>	<b>120</b>
A Quick Review: The Important Things We Have Learned	122
What Do We Need to Do to Help Teenagers Reach Their Potential?	124
Some Final Thoughts: Opening Doorways to Possibilities	128
Wanted: An Epidemic for an Idea	129
<b>Glossary</b>	<b>130</b>
<b>Suggested Readings</b>	<b>140</b>
<b>Bibliography</b>	<b>142</b>
<b>Index</b>	<b>147</b>

# 1

---

## **Introduction: The Creatures in the Classroom!**

*Those Exasperating  
and Unfathomable Teenagers*

### **HOW DO WE REACH AND TEACH THOSE UNPREDICTABLE TEENAGE BRAINS?**

This book was written especially for those of us who work with, live with, teach, and otherwise associate with teenagers. Although it is primarily intended for secondary educators, it will also be extremely informative, helpful, and useful for parents of teenagers. Parents and secondary school teachers are equally familiar with those frustrating, unfathomable, exasperating, and sometimes downright bizarre individuals called teenagers: that sweet, quiet, well-dressed girl who now is noticeably outspoken and dyes her hair pink and dresses in all black; that surly young man who dozes on a desk at the back of the room and dares you to confront him; another girl who is on an emotional roller coaster from day to day; that perplexing young man who was at the top of the class in elementary school, but who now barely does enough to get by; that young lady who you always thought exercised sound judgment, but who was arrested for drunk driving this past weekend; and all those dozens of odd characters who just do not seem to care about school and what

you are teaching. It is a strange thing, the teenage brain. It is hard to figure out what they are thinking or if, indeed, they are thinking at all. Then suddenly, miraculously at about 18 or 19, they start to make some sensible decisions and show some insight and consideration for others. Adolescence is such a confused and confusing time for parents, teachers, and, most of all, for the teenagers themselves. You have always thought that there must be some strange, surprising, and unexplained things going on in their brains. It turns out that you were right! But knowing this, how does that help us unlock that tremendous potential that we know lies in the brain of every one of those unpredictable individuals?

## **WANTED: A NEW APPROACH TO TEACHING TEENAGERS!**

As recently as the 1990s, many professionals—psychologists, educators, and, indeed, neuroscientists—thought that the brain essentially stopped growing and developing by the age of five or six years and that the teenage brain was virtually the same as the adult brain and could think and function in the same way. It was only those pesky hormones that caused such erratic and irrational behavior in teenagers! However, more recent neuroscientific research suggests that the teenage brain is undergoing tremendous changes during adolescence and that the teenage years may be one of the most vital times for brain development. It appears that, more than ever, it is crucial that we find ways of effectively teaching teenagers and of maximizing the growth potential in their surprisingly different and dynamic brains.

**The teenage years may be one of the most vital times for brain development!**

Regrettably many, if not most, secondary school teachers are unaware of this research and the numerous other findings about the brain and how it learns. Or if they are, they often fail to see the implications for their classrooms and their teaching; or perhaps, they do not know how to translate this important information about teaching and learning into practical and effective classroom strategies. Even very successful teachers often are not able to make the pedagogical connections between the effective teaching strategies and activities that they are using and the possible cognitive and neurological reasons for this success. Of greater concern is that many teachers and schools continue to use approaches and methods that are decidedly incompatible with how we now know the brain actually learns; and worse, these methods are quite ineffective for most of the students they are teaching. Often

teachers persist in using methodologies that they feel more comfortable with or have gotten some good results with in the past. In many cases, teachers will admit that they know relatively little about the new ideas, theories, and approaches to teaching and learning and dismiss these new ideas as fads, bandwagons, or lacking credibility. Under the considerable pressure of getting better results with students and faced with greater and greater calls for teacher and school accountability, teachers and schools are often fearful that experimenting with other approaches and methods will further erode what successes they have experienced. Politicians and numerous other “educational experts” persist in asking teachers to administer more of the same, certain that we will be able to “cure” our students despite considerable evidence to the contrary.

What we need is a more scientific approach to teaching and learning—an approach in which teachers come to recognize the implications of the considerable research on the brain and how this enhanced understanding of the brain and the ways that it learns impacts what we should be doing in the classroom. In the past two decades, there have been many advances in our understanding of the human brain and the learning process. Within the past several years, this has been particularly true for the teenage brain. Many of the views long held by psychologists and neuroscientists about adolescence, the teen brain, and its capacity to learn are being challenged and overturned by these new research findings. Through this enhanced understanding and knowledge, a number of educators and teachers are beginning to discover and implement teaching strategies and pedagogical approaches that are more compatible with how the brain actually learns, making teaching and learning considerably more effective. However, because many secondary teachers were trained prior to these advances and have had little opportunity to research and learn about these exciting brain-compatible strategies and approaches, they continue to use the more traditional methodologies and become increasingly frustrated with the results. Daniels, Bizar, and Zemelman (2001) have observed that high schools, and indeed most middle schools and junior highs, are notoriously resistant to change, and it is often difficult to convince teachers and schools to try other approaches. Undoubtedly our understanding of the human brain will further evolve with more and more research in this area. Thus we would expect that there would be even greater understanding of the teenage brain and the learning process. This new knowledge will enable us to design teaching strategies and pedagogical approaches to take advantage of the way that the learning occurs naturally and in ways that are most compatible with the brain. This is the focus of this book, to provide an introductory look at what we presently know about the human brain—particularly, the teenage brain—and learning and how we might, as classroom teachers, extend this knowledge into effective brain-compatible teaching and learning. It is intended to be a practical hands-on, how-to book providing both a synopsis of the current research in a number of areas of brain research and learning theory and, more important,



also matching the theory with the implications for teaching and learning by providing numerous examples of practical effective in-class brain-compatible strategies.

## **WHY EDUCATORS NEED TO LEARN ABOUT THE TEENAGE BRAIN**

*“The most surprising thing (about looking at the adolescent brain) has been how much the teen brain is changing.”*

*Jay Giedd, interviewed in Frontline:  
Inside the Teenage Brain, 2002*

*“The more we understand the brain, the better we’ll be able to design instruction to match how it learns best.”*

*Patricia Wolfe, Brain Matters:  
Translating Research Into Classroom Practice, 2001, p. 2*

All teachers want to become more effective at what they do. It is only by examining their own teaching practices, strategies, and techniques and the philosophical, theoretical, and scientific basis for these practices that they can hope to improve and build upon what they know works well with students. Effective teaching practice must be grounded in sound research about learning and what constitutes effective teaching.

Since all teachers seek to become more effective at what they do, it makes good sense for them to know something about the organ that they are trying to affect—that is, the brain. Teaching, in a sense, is about changing the brain every day in the classroom. We are coming to recognize that this is dramatically most true for those who teach teenagers. In much the same way that a mechanic needs to know about the functioning of an automobile, or the computer technician about the computer, teachers can do much more effective jobs if they know something about the structure of the brain, how it is developing, how it functions, and how it learns. With this knowledge, they are more likely to be able to organize teaching and utilize methodologies in ways that are most consistent with how the brain actually learns. By using this new information and understanding how the brain learns, teachers can develop teaching strategies and learning activities that will make teaching and learning more effective, efficient, and enjoyable for both teacher and students. This is really what brain-compatible teaching is all about.