

What Could They Be Thinking?

The Science of Boy-Girl Learning Differences

Instead of thinking about a teenage mind as an empty house that still needs furnishings, educators and parents would do better to understand it as the rough framing of a house that still needs wiring, plumbing, flooring, and windows. Avoid treating teenagers like adults; they're not.

—Eric Jensen

OVER the past couple of decades, exciting research into the living brains of males and females has shown us not only that boys and girls are different at the organic level but also that how they learn includes many differences, from the day they are born. In just the past few years, cutting-edge research has begun to help us better understand the learning styles of both male and female adolescents. We are better able than ever before to answer such questions as, What goes on in a male and female brain when puberty begins flooding the system with hormones? What happens to boys and girls when their bodies begin the transformation from child to young adult? What does it all mean for teachers?

Watching students pour into the halls when the passing bell rings in any high school, it's easy to forget that we're seeing children. Many are physically mature. Some of the boys are really tall, their voices deep. Some wear a shadow of a beard by noon. Some of the girls are shapely and dressed like women. They wear makeup and designer clothing. Often students are paired up, boy and girl, heading for their next class and making plans for after school and the weekend. They seem awfully sure of themselves.

But we are seeing children—children whose brains are still moving toward a maturity they won't reach for a number of years; children whose pubescent systems egg them on to take chances, seek novelty, ignore warnings, respond to impulses they don't fully understand. They are children who need strong, caring adult mentors and role models to help them navigate until their internal directional systems are ready to take over and lead them safely into the future. They need teachers to prepare them for life.

In the early days of the Gurian Institute's work with educators, we would ask the question "How many of you took a course on how boys and girls learn differently during your teacher training in college?" Even in audiences of several hundred educators, no hands would go up. When we ask that same question today, a few hands may go up. When questioned further, those who raise their hands generally report that they covered the topic of gender and learning briefly in an education class.

At the same time, when teachers attend our seminars and trainings, they often ask, "Why isn't this being taught in college? Why aren't schools of education teaching male-female brain difference? It affects every grade level." Fortunately, many schools are beginning to catch up to the newest brain research in learning, development, and gender. This workbook is part of that effort.

The Gurian Institute has spent twenty years developing materials and working in schools, training teachers in the practical strategies we have developed from what we have come to understand about how the male and female brains learn best. In this book, we are sharing what we know. You'll meet many middle school and high school teachers who will also share strategies they have learned and developed, and your teacher's toolbox will be increased manifold.

This chapter will give you an overview of the latest information available on how boys and girls learn differently and how that difference can and should change the way you implement your curriculum. We hope to help you ensure that every adolescent you teach, male and female, will have the chance to succeed to his or her maximum potential. Many of you will read this information and think "YES! This validates intuitions I've had for a long time." We hope it will confirm that you have been on the right path as you work with your students. We hope that for many of you, this information will open the door to exciting new experiences as you implement what you learn.

You may ask, How can I effect change in middle or high school when my students have experienced years of institutional schooling that may have inadvertently had a negative impact on them? Shouldn't this science and research change the way we educate our boys and girls from the very beginning? The answer is yes, and we work with preschool and elementary programs to help them lay a foundation that you can build on when the students reach your classroom. In the meantime, there is still much you can do; remember that the adolescent years are ones of great possibility and promise. We hope that the information in this book, and the resources beyond this book that we offer, will help you make a difference for every student you teach from today on.

From the Beginning, Boys and Girls Learn Differently!

Where does gender in the brain begin? Soon after conception, boys and girls are on diverging developmental paths. If a child receives an X chromosome from each parent, a female plan goes into action. If a child receives one X chromosome and one Y chromosome, a different plan is activated, and a male system is designed. These plans result not only in different bodies but also in different brains.

Beginning at around six weeks, a male fetus triggers the mother's ovaries to provide testosterone to his fetal system. As a result, his genitals drop and begin producing the testosterone he needs. From that point until somewhere between five and six months of development, testosterone becomes the "chief engineer" of the developing male's body and brain, giving him the capacity for a higher muscle mass than a female, different iron and calcium ratios, and different brain "formatting." Developing female fetuses receive testosterone during the developmental period between six weeks and six months in utero, but not as much. They receive more estrogen-type hormones. This helps format their brains to be female. By six months in utero, boys and girls have been formatted with different brains.

This early developmental groundwork is critical for the male and female brain, as it plants the seeds that will grow and flourish when puberty again floods the brain with sex hormones. Testosterone will surge through the male system more than once during childhood and in great amounts during puberty. Female hormones—more than thirty of them—will affect girls significantly during puberty and through the child-bearing years.

Are these differences all that matter? Of course not. There are many similarities between girls and boys in utero and after they are born. There are also many differences among girls and among boys that indicate how powerfully individual personalities affect ultimate development. Furthermore, the way a child is nurtured can affect how he manifests his maleness and she her femaleness. By the time these boys and girls saunter into your middle and high school classrooms, they share many characteristics—and they are at the same time very different. During adolescence, their male and female biology and chemistry will at times trump all other influences, making both their lives and yours really interesting.

Caveats aside, gender is a big deal—especially in learning. Understanding differences in how girls and boys learn gives us a head start in meeting that challenge of instructing and guiding young minds.

What Are the Differences?

Ongoing research is still discovering new areas of difference between male and female brains, but many differences have already been identified that have implications for how boys and girls learn. We'll present some of these to you now, and please remember that we are generalizing based on the best relevant research available today. There will be exceptions to everything we say, as every child is an individual and brain differences range both between boys and girls and among boys and girls. Remember also that difference means only that—one is not *better* than the other. Both are equally capable of learning and succeeding; they will just do so in ways that we must understand if we are to create an educational environment that meets the needs of both.

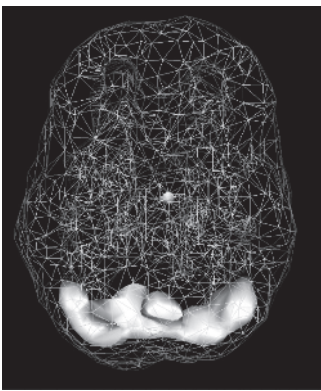
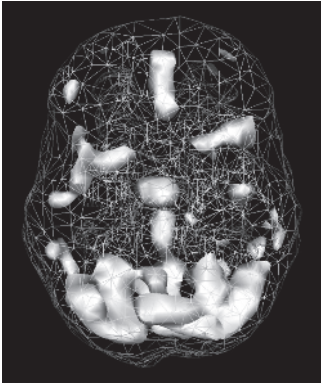
Structural Differences

Using *magnetic resonance imaging (MRI)*, *positron emission tomography (PET)*, and *single photon emission computed tomography (SPECT)* technologies, scientists can look at the living brain and watch it work. These advanced technologies let researchers watch actual blood flow in the brain, see where the brain is working, and, by looking at male and female brains in this way, see that they are working in different areas when completing the same tasks.

Over the past couple of decades, technology has helped researchers focus on some specific areas of structural difference between male and female brains. The following sections describe some of the differences and their potential impact on your classroom.

Cerebral Cortex—The cerebral cortex contains about ten thousand miles of neural connections in each square inch! From an evolutionary standpoint, the cerebral cortex is the “newest” part of our brain and significant in making humans different from all other animals. If you could spread the cerebral cortex out flat, it would be about the size of a newspaper opened up. In order to “fit” over our brain, the cerebral cortex folds into place. This area, only as thick as about three of your hairs, is where the serious intellectual functions of the brain take place. Thinking, speaking, and recalling—all things that need to happen in a classroom—are controlled in the cerebral cortex. This area also facilitates memory functions, voluntary motor behaviors, impulsivity, decision making, and planning—again, important for learning. The female brain tends to have more connections between neurons in the cerebral cortex, which also tends to mature earlier in the female brain.

And this means—the increased number and speed of the neural connections may help girls process and respond to classroom information



Scans of the Female Brain (top) and Male Brain (bottom) at rest. The areas you see that look like bubbles are areas of activity.

SPECT scans used by permission of Dr. Daniel Amen

faster than boys and help them make transitions faster, multitask, and access needed verbal resources (reading, writing, complex speech) better than the average boy as they engage in learning. Earlier maturity may result in girls' being less apt to engage in high-risk behavior, less likely to respond impulsively, and, in general, more likely to "think before they act." It might also explain why girls tend to gather and complete their college application forms earlier than boys!

Cerebellum—The cerebellum, larger in the male brain, was once believed to be mainly involved in the coordination of our muscles, making us graceful dancers and good athletes. But research has shown that it's also involved in coordination of our thinking, our "mental muscles." Adolescents might be described as going through a period of mental clumsiness (along with their obvious periods of physical clumsiness). The cerebellum seems to have the ability to smooth out the complicated social life of adolescents and help them navigate their world smoothly and gracefully instead of constantly tripping over themselves. Physical activity is believed to influence development of the cerebellum.

And this means—for healthy development of the teen brain, including the cerebellum, activity is important. Today's students are less active overall—they are sedentary while watching TV, playing video games, talking on their cell phones—and not doing as much "playing." There is less recess and fewer hours of structured physical education classes, and fewer students walk to and from school. Bringing more movement into your curriculum will help both boys and girls, whose brains, including the cerebellum, are changing a lot during this period of life.

An example: while working with a school, grades 7–12, near Minneapolis, we spent a day observing classes, including watching the students do a marching demonstration for Grandparents Day. The teacher in charge of the ROTC program shared his frustration that the middle school and freshman boys especially had a really hard time learning to march in formation. "They just can't seem to get their feet going the right ways!" He was blaming himself for not providing the right instruction to help them "get it." After gaining a better understanding of adolescent brain development, he realized that many of the boys in the middle school and lower high school grades were simply suffering from adolescent clumsiness—he could see that it was a developmental stage. He was doing his best, and the boys were doing their best, but their bodies and brains were just not quite in synch with each other yet. The teacher's increased patience helped the students be less stressed about their mistakes, which decreased as they moved through each grade and developmental stage.



Corpus Callosum—The corpus callosum is a dense bundle of nerves that connects the two hemispheres of the brain; research indicates that this area increases in size during adolescence. In females, this bundle of nerves tends to be denser and larger than in males, resulting in increased “cross-talk” between the left and right hemispheres. The anterior commissure, a tiny additional connection between the hemispheres attached to the end of the corpus callosum, is also larger in females.

And this means—girls are generally better at multitasking than boys, including watching and listening and taking notes at the same time. This gender difference may also help explain why girls tend to tune into their own and others’ feelings and move emotional content more quickly into thought and verbal processes. Girls can tell you how they feel as they are feeling, whereas boys often need time to process before they can begin to explain their feelings. Combined with the hormonal changes during adolescence, the increased connections between thinking and feeling may account for the hypersensitivity and tendency to be dramatic that girls exhibit during adolescence.

Brain Stem—This is the most primitive part of our brain. Our “fight or flight” responses come from the brain stem, and when we’re in crisis, this area of our brain takes over, telling the body how to respond. With a greater amount of spinal fluid connecting their brain and body, and increased levels of testosterone during this developmental stage, adolescent boys often respond physically and very quickly to stressors—hitting more and responding in other nonverbal, physical ways.

And this means—boys’ brains tend to be poised for fight or flight and for a physical response when they feel threatened or emotionally charged. Add to the equation the seven to ten significant daily spikes of testosterone that boys experience, and you may see volatility that can become a problem for the boys and their classrooms. Boys in your class may slam a book, kick a chair, use an expletive, or engage in some other kind of physical display when they feel threatened. And remember, a threat at this age can include being challenged by an adult in front of a boy’s peer group. Status in the group is very important during adolescence, so adults need to evaluate carefully when, where, and how to confront these kids.

Limbic System and the Prefrontal Cortex—The limbic system, a collection of structures located deep in the brain’s interior, is closely associated with emotional responses. The fear response to your car spinning out of control on the ice or the joy of getting an acceptance letter to your first-choice college can bring the same kind of biological emotional response. Emotional

responses in the limbic system try to move to the prefrontal cortex, the part of the cerebral cortex that lies just behind the forehead and acts as a sort of mental traffic cop. In adolescents, this movement is often slowed by hormones and a lack of developed brain connections between the limbic system and the prefrontal cortex. An adult, for instance, who observes a group of people looking in his or her direction and laughing might feel an emotional response in the limbic system, but probably won't respond in any way because the prefrontal cortex would say, "It's okay." An adolescent might make the assumption that the people were laughing at him or her and become upset, angry, or defensive. Adolescents just might not be as good as we think they are at interpreting facial expressions and nonverbal signals, in part because the prefrontal cortex is not yet lending the limbic system a hand.

Within the limbic system are several structures that play a key role, both on their own and as they connect to the prefrontal cortex, in how boys and girls learn and perform differently. Parts of the limbic system that process emotion and sensory memory are, in general, more active in girls than in boys, resulting in increased emotional memory for females, and better reading of emotional cues.

- *Hippocampus.* This is a key player in converting information from working memory into long-term or permanent memory. The hippocampus is crucial for learning and for retention. It tends to be larger in females, and the speed of neural transmissions is faster than in males, contributing to generally increased emotional memory storage for the female brain.
- *Amygdala.* This is a small, almond-shaped structure connected to one end of the hippocampus; it plays a very important role in the processing of emotions, especially negative emotions, such as fear and anger. The amygdala tends to be larger in males, possibly explaining the male tendency to be more aggressive. Some researchers believe that the close proximity of the amygdala to the hippocampus suggests that emotional content may be "tagged" onto many long-term memories. Consequently, recalling a memory can recall an emotion as well. Note: reducing the activity level of the amygdala brings us closer to a state of "happiness" by calming down the negative emotional response system. Performing nonemotional tasks (for example, folding laundry, doing the dishes, doing some exercises) can help this calming-down process. The calmer an adult can remain when dealing with an agitated adolescent, the better the chances of the event's not escalating. Someone has to be the most mature member of the group!

And this means—boys often display increased aggressive or impulsive responses when they feel angry or threatened—they tend to be sent to

the principal a lot more than girls! Immediately after they have been involved in an altercation, they find it much more difficult to explain how they were feeling, needing more time to process the event and understand the feelings. Girls tend to attach more emotional and sensory detail to events and remember them longer. They can hold grudges a long time. They often need mentoring in order to see what really is important about a situation and what is hyperreactivity. Defusing emotional situations will help both boys and girls calm down and get back on track. Note: playing calming music can help change the brain state in the classroom.

Blood Flow in the Brain—Blood flow is up to 20 percent greater in the female brain. In conjunction with the increased neural connectivity between hemispheres, this adds more potential for information to move quickly between areas of the brain.

And this means—again, there is generally increased speed of communication between hemispheres and between different areas of the female brain, allowing for quicker processing, especially of verbal information. Note: sometimes this increased speed of communications can be problematic for girls—they may not always “think before they speak,” tending to process *as* they are speaking. Slowing that process down is tough for adolescent girls, but slowing down could help minimize conflict in peer and adult relationships.

The male brain will tend to take a little longer to process verbal and emotional information. This can affect behavior, and it can also affect reading and writing. Girls generally read more, write more, include more sensory and emotive details in their writing—getting better grades! More graphic analysis (visual and pictorial) can help boys write better papers, as we’ll see in this book.

Processing Differences

Studying images of the working brain, researchers find that the brains of males and females differ not only in terms of structure but also in terms of how they process information. Knowing about these differences can become quite important as you develop strategies to implement your curriculum in ways that will allow both boys and girls to perform at their best.

Language Processing Areas—Whereas males’ language processing areas tend to be centralized in the left hemisphere, females have multiple language processing areas in both hemispheres. As a result, females have more access to verbal resources than males and generally develop language earlier than males.

And this means—girls tend to have significantly more access to verbal resources when they start school, and throughout life, than boys. On average, females use twice the number of words that males do (this includes writing and reading). It is easier for them to learn to read and write in kindergarten and first grade. Because literacy is the foundation of learning, this early difference often results in gender gaps that show up early in elementary school and persist throughout middle and high school.

Spatial Processing Areas—Testosterone, the primary architect of the male brain, is believed to create more and denser neural connections in the right hemisphere of the male brain, resulting in males' having increased resources for spatial reasoning—mental manipulation of objects, gross motor skills, spatial-mathematical reasoning, and abstract spatial reasoning. With less testosterone at work during fetal development, females tend to have less right hemisphere area devoted to spatial resources. (A crucial note: although boys in general test higher than girls in spatial manipulation tests, there is less of a gender gap in mathematical calculation. Girls are not worse at math, as has been the stereotype in the past. They just tend to be so good at literacy skills that they don't get enough opportunity to practice using their spatial capacities; then, when girls need those skills to be sharp, the skills are not as ready to be engaged.)

And this means—boys tend to need more space in which to function while they are learning, need to move in physical space more during learning, and are generally more interested in spatial manipulation tasks. As we'll see in this book, it is crucial to employ strategies that help girls gain parity in science and technology classes. Boys are significantly more interested in computer games than girls; they enjoy moving through the virtual space of the games, most of which offer lots of chances to win and advance to higher levels. This sense of reward can set boys up to play too many video games, at the expense of good learning. Girls spend so little time with spatial stimulants that they need our extra help and motivation to engage with technology.

Sensory System—Females tend to process more sensory data across the senses. They tend to see better (in certain kinds of light), hear better, use their sense of smell better, and take in more tactile information.

And this means—Girls' heightened sensory processing may well be another piece of the puzzle regarding why girls include more sensory detail in their writing and conversation. They will generally use more varied color in their artwork. They will generally use more sensory words to make their point than boys do. Boys are more likely than girls

to have a difficult time hearing certain ranges of sound, especially from their usual self-selected seat in the back of the room! They may seem to be listening to directions, but in fact may not be hearing them as well as we think.

Mother Nature is providential. She gives us twelve years to develop a love for our children before turning them into teenagers.

—William Galvin

Chemical Differences

There are differences in the types and amounts of hormones and neurotransmitters that affect how boys and girls learn and interact. We've mentioned some of these. Let's now look more closely at them.

Testosterone—Testosterone is the male sex and aggression hormone, responsible for the architecture of the male system before birth and for the male's increased aggression, competitiveness, self-assertion, and self-reliance throughout life. Male testosterone levels rise when males "win" and decline when males "lose." Female testosterone levels, always lower than males, remain basically constant and are not as subject to fluctuations brought about by winning or losing.

And this means—healthy competition in the classroom will help motivate boys. Research has shown that boys tend to score better on tests at times when testosterone levels are high, and levels rise during competition. Using games that provide all students a chance to succeed, even if they are competing against themselves and "beating themselves" at a task, can be very productive. And although girls' testosterone levels don't fluctuate as boys' do, research shows that girls generally gain self-confidence from active, healthy competition. Keep in mind: boys are also competing with each other in their social lives, to attain hierarchical status and to be attractive to girls. Beginning with puberty, girls are competing to attract males who will make the best partners, so as to ultimately create the best offspring. This is not a conscious process; although the boys and girls you teach are aware that they like each other and want to connect, they are generally unaware of the biological imperatives at work within them.

Estrogen—Estrogen is not one hormone but a group of hormones, often collectively identified as the female sex hormone. Although estrogens are present in both males and females, they are usually present at significantly higher levels in girls and women. They promote the development of female secondary sex characteristics. Researchers have found that estrogen levels

may affect aggressive tendencies in females, and levels may be affected by seasonal variations, such as the amount of daylight. Further, girls with greater amounts of body fat may be subject to earlier onset of puberty, as the body believes it is more prepared for reproduction because of increased hormone levels.

And this means—for girls who are overweight, puberty may come quite early, even at the age of eight or nine, bringing with it increased levels of estrogen and the potential for more volatile mood swings and more aggressive behavior. As the outward signs of puberty become noticeable, the changes to the brain that accompany puberty are also beginning. These changes have a significant impact on behavior and performance for girls, beginning as early as third or fourth grade and continuing through middle school and into high school.

Serotonin—Serotonin is a neurotransmitter known as a “feel-good” chemical. It affects mood and anxiety, and helps us relax and cool off during times of conflict. Girls’ serotonin level tend to be about 30 percent higher than that of boys, making them less apt to rely on a fight response when in a conflict, although the emotional turmoil of adolescence can cause them to become involved in more conflicts than they did as younger children or will as they get older. Once angered, boys have less access to serotonin to help them manage their anger. Dr. Bruce Perry has studied neurotransmitters and found them to be very responsive to environmental stimuli. He reports that “kindness can be physically calming,” helping increase serotonin levels.

And this means—boys will have less serotonin in their system to help them calm down and de-escalate volatile situations. Although girls generally process serotonin more efficiently, they are responding from a revved up emotional system during adolescence too. An intervention by a calm, kind, supportive adult will be more helpful than one from an adult who engages in a power struggle that can escalate a boy’s fight response or a girl’s emotional response.

Dopamine—Dopamine is a neurotransmitter that stimulates motivation and pleasure circuits in the brain of both boys and girls. It is critical to the way the brain controls our movements. Not enough dopamine? We can’t move or control our movements well. Too much dopamine? We can become subject to uncontrollable or subconscious movements (pencil tapping, leg jiggling, inability to sit still, even seriously uncontrolled involuntary motor movements). Dopamine also controls the flow of information between areas of the brain, especially when it is engaged in memory, attention, and problem-solving tasks.

And this means—in boys who are “revved up” with dopamine, accompanying lower levels of serotonin can make it harder for them to calm their impulses than it is for girls. Their increased stimulation may actually tend to stimulate them more, causing them to spiral more and more out of control. A balance must be found in the classroom to help students get a “dopamine rush” from learning, but in an environment that provides enough structure to manage enthusiasm.

Oxytocin—Oxytocin is often referred to as the “tend and befriend” hormone and is related to social recognition and bonding. Researchers have shown it to be involved in the formation of trust between people. Females have significantly higher levels of oxytocin in their systems than males throughout life. Oxytocin promotes the development and maintenance of relationships, and females are biologically driven to maintain relationships, even ones that are sometimes best let go.

And this means—girls will be motivated by their chemical system to establish and maintain relationships with teachers and peers, and will behave in ways meant to meet that need, including pleasing the teacher, their parents, and their friends. Boys are less chemically driven to establish and maintain these relationships *prima facie*, and may not see their behavior as having as much direct connection to their relationships with the teacher and their peers. During adolescence, for both boys and girls, peer connection is vitally important, and the need to establish and maintain relationships can override the need to perform well academically. Recognizing the importance of peer relationships and incorporating positive group activities into the curriculum will help students meet their needs and your expectations.

The Two Hemispheres

We each have only one brain, but that brain is divided right down the middle into right and left hemispheres. Research shows that each hemisphere appears to be specialized for some behaviors. The corpus callosum, which we discussed earlier, is a main communication link between the two hemispheres, and as with many brain functions, there are gender differences in how we use the two sides of our brain.

Left-hemisphere preference is more common in *girls*. The left brain

- Is connected to the right side of the body
- Processes information sequentially and analytically
- Generates spoken language

- Recognizes words and numbers (when the numbers are spoken as words)
- Responds more to external sensory stimuli, such as color and texture of fabric
- Constructs memories (including hyperbolic [exaggerated] memories)
- Does arithmetic functions—adding, subtracting, multiplying, dividing
- Seeks explanations for occurrence of events

Right-hemisphere preference is more common in *boys*. The right brain

- Is connected to the left side of the body
- Processes information abstractly and holistically
- Interprets language nonverbally
- Recognizes places, faces, objects, music
- Fantasizes abstractions (such as in science fiction and video game scenarios)
- Is less detailed and more concrete in recall
- Does relational and mathematical functions—for example algebra, geometry, trigonometry, calculus
- Organizes occurrences into spatial patterns

Although of course the brain functions in both hemispheres, the right and left hemisphere preference of boys and girls has important implications when we look at how our schools are designed. Most educators will admit that schools are designed to be more left-hemisphere friendly: they are structured environments with time periods and ringing bells, are organized around facts and rules, rely primarily on verbal processing, limit access to free space and movement, and require lots of multitasking.

Because this left-hemisphere-friendly environment naturally favors left-hemisphere preferences, girls are going to find school, in general, more comfortable than will many boys. Not surprisingly, schools report that 80 to 90 percent of their discipline problems are created by boys. Boys are not only biochemically more prone to “make a fuss” than girls but also quite often chafing against an environment that doesn’t fit their right-hemisphere preference as learners.

If you would like a more comprehensive overview of the differences between the male and female brain, you might want to read *Boys and Girls Learn Differently!* and *The Wonder of Girls* (by Michael Gurian) and *The Minds of Boys* (by Michael Gurian and Kathy Stevens).

Looking at the Male-Female Brain Spectrum

Although the brains of adolescent boys and girls are different, it's important to remember that one boy's brain is also different from another boy's brain. The same is true of the girl's brain. Every individual's brain architecture falls somewhere on the male-female brain spectrum, a continuum from "the most male" to "the most female." What do we mean by that?

Researchers have identified what Michael Gurian has labeled "bridge brains," brains that fall in the middle of that spectrum. Bridge brains tend to have wiring whose structure more completely overlaps the typical male and female brain architecture than might an "average" male or female. Research conducted by the Amen Clinics (which have performed thirty-five thousand brain scans) in the United States and by Professor Simon Baron-Cohen at Cambridge in the United Kingdom has confirmed the wide spectrum of male and female brains, as well as the existence of males and females in the middle of that spectrum. According to Baron-Cohen's scans, for instance, approximately one in five females and one in seven males fall within the bridge-brain range. These bridge brains are most easily seen after puberty or in late adolescence, after the years of hormonal surges have nearly completed the development of the brain.



A teenage girl wired as a bridge brain might have a brain system inclined to process more like a male brain. These girls may enjoy activities that are very competitive and highly spatial, and that require a higher degree of risk tolerance—such as competitive sports or the debate or chess team. An adolescent boy bridge brain might find that he enjoys activities involving more verbal and emotional sensitivity and processing—such as theater, writing, or visual and performing arts.

It's important to be on the lookout for children, especially adolescents, who might think just a little differently than others of their gender. Bridge-brain boys and girls may find this period particularly stressful if they don't feel that they "fit in" with the prevailing "girl culture" or "boy culture." In this workbook, you'll find many ways to help all children, wherever they fit on the male-female brain spectrum.

Gender Difference: A Path to Success

Understanding that boys' and girls' brains are wired differently is just the beginning. Focusing on how those differences affect the classroom is the next step. In the rest of this workbook, we will focus on strategies designed to help you create a classroom that will meet the developmental needs of your students to ensure their success.

In the last decade, the Gurian Institute Training Division has worked throughout the United States and Canada in more than a thousand schools, public and private, coed and single-sex. This work has been utilized in classrooms by over twenty-five thousand teachers in the United States, Canada, and Australia. By helping teachers, administrators, parents, and others working with children understand the differences in how boys and girls learn, and by providing (and gathering from wise teachers) strategies that work, we assist schools in changing the way they do the business of education. Specifically, they are succeeding in closing achievement gaps, helping at-risk students, helping students with learning disabilities, and creating classroom stability.

Roosevelt Middle School: A Success Story

Roosevelt Middle School is in a large, urban school district and is 100 percent free lunch; it is 65 percent Hispanic, 25 percent white, 8 percent black, 2 percent other. The school has approximately nine hundred students in grades 6–8. In 2005, Roosevelt had a gender gap in reading achievement of 17 percent. The boys scored 55 percent satisfactory on the eighth-grade criterion-referenced test (CRT) for reading; the girls scored 72 percent. To address this gap, Roosevelt’s principal, Marilyn Vrooman, began looking for strategies that would correct the problem and recommended piloting some gender work in classrooms. Teachers and parents agreed. Ms. Vrooman contacted the Gurian Institute Training Division and arranged for on-site training.

On the first day, trainers observed, took notes, and studied behavior. On the second day, they conducted an all-day in-service for faculty and administration. After the training, Roosevelt’s teachers were charged up again. The school purchased books (*The Minds of Boys*, *The Wonder of Girls*, and *Boys and Girls Learn Differently!*) for each teacher as resource material, and they conducted book studies. The teachers realigned their classrooms to meet the needs of the genders and changed the materials used to teach. Responding to their training and reading, teachers realized that boys do not like “touchy-feely stuff” as much as girls. They like nonfiction, cars, action. Keeping totally within the state standards for each class, the teachers used different materials, and the boys took off.

At Roosevelt, somewhat atypically, fights between girls were four times more frequent than fights between boys. In a typical year, there would be one hundred girl fights and twenty-five boy fights (mostly gang related). In the year following the training, there were fewer than thirty fighting incidents, involving girls less often than boys. At the end of the year, boys scored 71 percent satisfactory on the reading CRT, and the girls scored 80 percent, narrowing the achievement gap to 9 percent in one year and improving performance for both the girls and the boys.

Roosevelt celebrates student achievement every day. For the first time in four years, the school is off the state’s “at risk” list. Ms. Vrooman again scheduled a two-day training with her faculty and administration in 2006 and 2007, providing support and encouragement to continue the success they have initiated.

Schools and teachers who use the strategies suggested in this book have provided us with success data in these quantitative areas:

- Test scores
- Grades
- Discipline referrals

For this workbook, we've gathered field-tested strategies and best practices, Web sites, resources, and in-class projects and tools that you can begin to use today. Everything we recommend works for both boys and girls, hindering neither. Many of these strategies and practices grow from research and from teachers' wisdom of practice that target boys or girls specifically, but we haven't included (and never support) any practice that would be detrimental to either boys or girls.

The improvement at Roosevelt Middle School is one example of the success that can occur when teachers and schools understand how boys and girls learn differently, and provide training and resources to help teachers implement effective strategies consistent with that knowledge. Every teacher at Roosevelt knows that one group of strategies is not the only cause of statistical gains in test scores. Teachers are constantly testing many innovations, and many variables can improve learning. At the same time, Roosevelt teachers were happy to see rewards for their focus on gender-based learning differences. By visiting the Gurian Institute Web site (www.gurianinstitute.com), you can read more stories of success and learn more about how teachers and schools are improving performance and helping kids excel.

Now we hope you'll enjoy the remaining chapters of this book, which show you how to implement strategies like those at Roosevelt in your own secondary classroom right now. We hope, too, that what you read here will resonate with your life experience as a teacher and make you say, perhaps a little more often than you did before, "I sure love teaching these kids."