

Spring 2007

Single Sex Classrooms, How Boys and Girls Learn Differently: a Guide Book for Elementary Teachers

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SINGLE SEX CLASSROOMS, HOW BOYS AND GIRLS LEARN DIFFERENTLY:
A GUIDEBOOK FOR ELEMENTARY TEACHERS

by

Desiree Cyr

A Research Project Presented in Partial Fulfillment
of the Requirements for the Degree
Master of Education

REGIS UNIVERSITY

February, 2007

ABSTRACT

Single Sex Classrooms, How Boys and Girls Learn Differently

Gurian (2004) examined the differences between girls and boys. He reported girls and boys learn fundamentally differently. This applied project identifies these differences and provides strategies that teachers can use in the classroom. The strategies are effective for boys and girls at the elementary school level. Implementing these strategies will enable teachers to address the gender specific learning needs of both boys and girls.

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Chapter 1

INTRODUCTION

On October 24, 2006, Spellings, the United States Secretary of Education (U.S. Department of Education) announced the final regulation to Title IX which allows single sex classrooms to be offered in public schools. Since 1972, it has been considered discriminatory to separate classrooms by sex. However, recent research (Deak, 2004; Salomone, 2006; Sax, 2005) has shown that, for many children, a single sex classroom may be the best environment for them to learn. One of the major arguments that support single sex classrooms is the fact that, fundamentally, both boys and girls learn differently.

Statement of the Problem

There have been numerous studies in which researchers, like Gurian (2004) and Sax (2005), have examined the differences between boys and girls. Sax, a psychologist and family physician, claimed that a single sex education has benefits for the learning of both boys and girls in this environment. One of his major arguments in support of a single sex classroom is the fact that both boys and girls learn fundamentally differently. Boys and girls learn differently because: (a) their brains develop differently, (b) they hear and see differently, (c) they build motor skills differently, and (d) they have different personality traits (Sax).

The separation of classrooms by sex is one more way to provide individualization to students, and it may be that public school educators in Colorado need to provide more

opportunities for single sex classrooms to students. According to the National Association for Single Sex Public Education (2007), currently, “253 public schools in the United States are offering gender-separate educational opportunities” (p. 1); only 3 are located in Colorado. According to Gurian (2004), teachers who understand how boys and girls learn can educate them better.

Purpose of the Project

With the recent regulations made to Title IX (U.S. Department of Education, 2006), more single sex classrooms can and should be offered to students. However, educators in Colorado public schools have been slow to offer single sex classrooms to students. The purpose of this project will be to develop a guidebook to inform teachers of the learning differences between boys and girls. Also, it will provide teachers with strategies they can use in their classroom.

Chapter Summary

It is this researcher’s position that teachers should be aware of the brain differences between boys and girls. In Chapter 2, the Review of Literature, this researcher will provide the background knowledge to support the position that boys and girls learn differently and that different methods should be used to teach them. In Chapter 3, Method, the procedure for the project will be detailed.

Chapter 2

REVIEW OF LITERATURE

The purpose of this project will be to develop a guidebook for teachers. The guidebook is to help teachers address the different learning styles of boys and girls. Gurian (2004), Salomone (2006), and Sax (2005) found that boys and girls learn differently. Also, these findings support the major arguments for single sex classroom in United States public schools. There are few single sex classrooms offered in Colorado, only three to be exact; however, U.S. Secretary of Education, Spellings, claimed, “Research shows that some students may learn better in single-sex education environments. The Department is committed to giving communities more choices in how they go about offering varied learning environments to their students” (U.S. Department of Education, 2006, p. 1). It is difficult to develop and implement a single sex school or classroom because it requires support from the community, school, and teachers (Gurian). However, with this guidebook, teachers will be able to utilize some of the teaching strategies used in a single sex classroom with their students in a coeducational classroom.

Single Sex Classrooms in United States

Education has been an issue debated in the U.S. for many years. Cruz (2000) reported that, since the early days of the U.S., people argued about whether boys and girls should attend school together. In Colonial times, only boys were allowed to attend public school; girls were educated by their parents at home. Gradually, girls attended public schools; at first, they were smuggled in, either before the school day started or while the

boys were at lunch. Then, girls attended women's school, which was held during the summer after the regular school year for boys was over.

According to Cruz (2000), it was likely that economics influenced the decision to eventually combine boys and girls into one classroom. It would have cost too much to run separate schools. Even so, most coeducational schools had separate classrooms for boys and girls. In the 1800s, the formal education of girls began (Cruz). Finally, it was acceptable for boys and girls to be taught in the same classroom. However, there was still much debate over what boys and girls learned in school. These debates were focused around secondary education and whether boys and girls should learn the same subjects in school.

Cruz (2000) noted that, between the 1930s and the 1960s, many teachers felt that girls and boys received an equal education. However, during the 1970s, changes in society challenged that view. Members of the women's movement questioned school practices that were indicative of gender bias. Their goal was to ensure that all women were treated equally in all areas of life.

Members of the U.S. Legislature passed the Education Amendments in 1972 (as cited in Cruz, 2000). Title IX legislation, which promoted gender equality was passed, in which, it was declared that discrimination based on gender was illegal. No new single sex public schools were allowed. With the passing of Title IX, single sex classrooms in public schools were outlawed. For over 40 years, the students in public schools have been educated in mixed gender classrooms.

When single sex classrooms disappeared from public education, some people questioned and challenged this decision (Cruz, 2000). The effects of single sex

education, at that time, were still being studied. Ruhlman (1996) observed that the disappearance of single sex classrooms was somewhat of a paradox.

Beginning in the 1970s and growing steadily, research has described clear advantages of single sex education over coeducation in both cognitive and social outcomes. Indeed, the evidence grew so strong that many prominent researchers began to ask what were the benefits of coeducation? (p. 8)

Staff of the U.S. Department of Education (2007) considered the research and, as a result, Title IX of the Education Amendments of 1972 was amended, which prohibits sex discrimination in education programs that receive federal funds. According to the law, public school administrators can now offer students a single sex education.

Single Sex Classrooms in Colorado

As supporters for single sex education push for more schools to open around the U.S., staff of the National Association for Single Sex Public Education (NASSPE; 2007) reported that currently, there are three single sex classrooms in Colorado. At Arapahoe High School, in Littleton, single gender classes have been offered since the 2003-2004 school year. According to Gonzales (2004), students are provided with single gender classes in: (a) mathematics, (b) reading, (c) life skills, and (d) swimming. The principal, Booth, was quoted by Gonzales, as saying that "Boys and girls are different and they learn differently, so why shouldn't we try teaching them differently to focus on their strengths?" (p. 1).

Two years ago, at Roncalli Middle School, in Pueblo, single sex classes were initiated for sixth grade students (Wurtz, 2007). Wurtz reported that the teachers claimed catering to the different learning styles of boys and girls "helps everybody make the grade" (¶ 3). Farrell, a science teacher at the school stated (as quoted in Wurtz) "I

like it, I think it works, I think it makes me a better teacher" (¶ 3). The school administrators plan to offer single sex classrooms next year.

Also, according to Harsanyi (2006), at Sheridan Middle School, in Englewood, the staff experimented with single sex mathematics classes during the 2003-2004 school year. Scores for both boys and girls increased in comparison to those in mixed gender classes. According to reports, teachers noticed that students had a better attendance record as well. The staffs at all of these public schools have seen positive results, and they continue to offer single sex classrooms.

The Achievement Gap

One of the reasons for the recent support of single sex classrooms is the current academic achievement gap (Pollard, 1999). According to the U.S. Department of Education (2000, as cited in Gurian, 2004), on the average, boys are a year to a year and a half behind girls in both reading and writing skills, although girls fall behind boys in mathematics and science. Gurian and Sax (2005) believe that the use of single sex education will close this academic achievement gap.

Salomone (2006) reported that both girls and boys are educationally shortchanged in different ways. The gender gap that favored boys in mathematics and science has decreased; however, girls continue to lag behind them, especially in standardized tests like the SAT. Despite the increases that girls have made in school performance, they still face difficulties when they try to penetrate the glass ceiling at the highest level of academic achievement, particularly in mathematics, science, and technology. Also, boys have fallen farther behind girls in reading and verbal skills, and they are diagnosed at a

higher rate for: (a) learning disabilities (b) academic failure, and (c) emotional difficulties.

Differences between Girls and Boys

Sax (2005), a psychologist and family physician, claimed that a single sex education has benefits for both boys and girls who learn in this environment. One of his major arguments in support of a single sex classroom is the fact that the learning styles of both boys and girls are fundamentally different, and these differences should be accounted for in the classroom.

According to Sax (2005), newborn boys and girls see and hear differently, and these differences continue through life. When they draw a picture, boys and girls draw different things. When girls are asked what a drawing is, typically, they respond with nouns; however, boys respond with verbs. Tannen (2006, as cited in Sax), a linguist, claimed that boys and girls use language in different ways. The language differences are so great that “in many ways the second-grade girls were more like the twenty-five-year-old women than like the second grade boys” (p. 12).

The Brain

According to Gabriel (2001), it is obvious that boys and girls are different. Gabriel wrote:

Our bodies are obviously different; our behavior is different, and, as it turns out, our brains are different too. And if our brains are different, then we might speculate that how we learn and think about new information might be different as well. (p. 1)

The proponents for single sex education maintain that sex differences in the brain are hard wired, which affect learning styles and, therefore, justify the separation of genders in

either schools or certain classes (Salomone, 2006). Deak (2004) reported that it is very important to realize that the brains of a boy and of a girl vary greatly.

Also, the members of the NASSPE (2007) claimed, “These differences (in the brain) derive both from basic physiological differences, such as differences in the ability to hear, and from differences in higher-level cortical functions” (p. 1). Because a child’s brain develops differently, based on sex, a child learns differently as well. Sax (2005) reported:

Today we know that innate differences between girls and boys are profound. Not all girls are alike and not all boys are alike. But girls and boys do differ from one another in systematic ways that should be understood and made use of, not covered up or ignored. . . Boys and girls behave differently because their brains are wired differently. (p. 28)

These brain differences affect the way boys and girls learn because their brains are wired differently, which is why teaching to each child’s learning styles will benefit him or her.

Brain research has been conducted since the 1960s (Gabriel, 2004). First, it was found that the part of the hypothalamus, termed the preoptic area, was quite a bit larger in males than in females. Since then, it has been found that there are differences in the topographies of the male and female brain. In the last 15 years, the understanding of brain functioning has come even farther, with the use of imaging technology.

Gurian and Stevens (2004) used the new positron emission tomography (PET) and magnetic resonance imaging (MRI) technology to examine the brains of boys and girls. When they looked at the brains, they found structural and functional differences that profoundly affect human learning. Gurian and Stevens stated, “These gender differences in the brain are corroborated in males and females throughout the world and do not differ significantly across cultures” (p. 22).

Gurian (2005) claimed that, when one looks at a PET scan of a male and a female brain, when either does any task, different parts of the brain light up and the cortical sections have different levels of brain activity. The brain scan is the primary tool that has been used to conduct studies on brain difference. Forger (2004, as cited in Gurian), of the University of Massachusetts in Amherst, reported that there are at least 100 differences between a male and female brain.

Brain differences based on sex are apparent even before a child is born, according to Achiron, Lipitz, and Achiron (2001). Halfway through a woman's pregnancy, the testicles of a baby boy produce substantial amounts of testosterone, amounts comparable to that of a young male. These sex hormones attach to brain tissue and begin to change it. This transformation to the brain is permanent. Achiron et al. concluded that, at 26 weeks of pregnancy, the male or female brain can be distinguished in an ultrasound examination.

According to Rabinowicz et al. (2002), if the brain of someone who has recently passed away is examined, by means of a thin slice of the brain under a microtome, it is possible to determine whether the person was male or female. Some differences in the brain tissue are so apparent that they are visible to the naked eye. These findings support the idea that sex differences in the brain are real.

A Boy's Brain

Gurian (2005) claimed that “understanding the actual nature of our boys' minds is essential for parents, parent-led teams, teachers, and concerned citizens who want to give boys the best education and care possible” (p. 41). For example, boys tend to learn better

when they are given the opportunity to: (a) move, (b) experiment, (c) use pictures, and (d) play games.

Also, Gurian (2005) reported that there is more dopamine in a male's bloodstream, which can increase impulsive behavior. In addition, there is more blood flow in the cerebellum (i.e., the part of the brain which controls action) which is believed to contribute to boys' tendency to learn better when they are not required to sit still or be sedentary.

According to Gurian (2005), the male corpus callosum is smaller than that of a female. The smaller corpus callosum inhibits the cross talk between hemispheres in the brain, and this affects how males multitask. Boys have more cortical areas dedicated to spatial mechanical functioning. On average, a male student relies more heavily on "spatial-mechanical stimulation and thus is inherently more stimulated by diagrams, pictures, and objects moving through space than by the monotony of words" (p. 52). Therefore, boys prefer to move objects through space, like balls, blocks, or even their arms and legs.

Boys have less oxytocin, the primary bonding chemical (Gurian & Stevens, 2004). This makes it more likely that they will be physically impulsive and less likely that they will be able to neurally resist the urge to sit still and chat empathetically with friends.

The boy qualities in the brain illustrate why boys learn higher mathematics and physics more easily than girls (Gurian & Stevens, 2004). Also, this is why more boys play games that involve physical movement, and why they get in trouble when they do not sit still and act on impulsive.

A Girl's Brain

According to Gurian (2005), in general, girls have “stronger neural connections in their temporal lobes” (p. 2). These connectors enable girls to: (a) have more memory storage, (b) better listening skills, and (c) to distinguish various tones of voice. This leads to better detail in their writing. The hippocampus, a memory storage area in the brain, is larger than boys, which increases girl’s learning advantages. Also, usually, girls use more cortical areas of their brains for emotive and verbal functioning. “With more cortical areas devoted to verbal functioning, sensual memory, sitting still, listening, tonality, and mental cross talk, the complexities of reading and writing come easier, on the whole, to the female brain” (p. 22). According to Gurian, females’ brains are more suited for literacy.

In regard to literacy, girls have higher levels of estrogen and oxytocin than boys, and these chemicals directly impact word use (Gurian, 2005). Oxytocin levels rise when a girl talks with a family member or friend.

In general, the prefrontal cortex is more active in girls and develops at an earlier age (Gurian & Stevens, 2004). The prefrontal cortex helps girls make fewer impulsive decisions and, since girls have more serotonin in their bloodstream biochemically, they are less impulsive.

Knowledge of these brain differences should help teachers and parents to understand why, typically, girls outperform boys in reading and writing from early childhood throughout life (Collin, 2003, as cited in Gurian & Stevens, 2004). Because more cortical areas are devoted to verbal functioning, reading and writing come easier to

the female brain. Also, the female brain is drawn to stimulation, like reading and writing, which involves: (a) tonality, (b) mental activity, and (c) complex textures.

How Boys Learn

Boys and girls are very different, and the biological tendencies are not the only way they differ (Gurian, 2005). According to Salomone (2006), boys tend to have greater visual spatial skills. Also, Gurian noted that boys tend to be visual learners. Therefore, the use of an overhead projector in the classroom helps boys. Seeing words on the overhead is visual reinforcement for a boy's brain. Another graphic aid that can be used to assist boys is their own artwork. Gurian reported that, often, improvements in literacy activities directly follow the use of art and drawing. "Just as boys' brains respond well to connecting music to words, many boys also do better in their writing when they draw their subject, both before and after doing the written work" (p. 147). Also, boys calculate much better than girls without being able to see or touch the materials.

It is difficult for boys to memorize information because their hippocampus works differently; they need more time to memorize (Gurian, 2005). However, because the male hippocampus prefers lists, boys tend to be more successful when information is presented in lists or subsets of categories.

Gurian (2005) suggested the use of teams and competition with boys. Because most boys enjoy being on some kind of a team, competition can be the stimulus that boys need to show interest about their learning.

Gurian (2005) reported that most boys have spatial, kinesthetic, visual, or musical brains. Also, they need a large space to work; they use more space than do girls. When

boys are confined to small spaces, they tend to become frustrated, and discipline problems ensue. Boys need more space because they engage the world through the spatial centers of their brains. According to Gurian and Stevens (2004), in the teaching of elementary boys, a teacher should:

1. use bead work and other manipulations to promote fine motor development;
2. place books on shelves all around the room so boys get to use their omnipresence;
3. make lessons experiential and kinesthetic;
4. keep verbal instructions to no more than one minute;
5. personalize the student's desk, coat rack and cubby to increase his sense of achievement; and
6. let boys nurture one another through healthy aggression and direct empathy. (p. 26)

How Girls Learn

Salomone (2006) reported that, as a group, girls enter school with more advanced verbal and fine motor skills than boys, because girls' brains are more suited for literacy than boys. Gurian (2005) stated, "With more areas of the female brain devoted to verbal functioning, sensory memory, sitting still, listening tonality, and neural crosstalk, the complexities of reading and writing come easier on average, to the female brain than to the male" (p. 52).

Deak (2004) found that "girls are better at memorizing things and spitting back information" (p. 1). Girls can see or hear information and store it better than boys can. Note taking and drawing can help a girl memorize information.

According to the members of The National Coalition of Girls' Schools (1998, as cited in Cruz, 2000), girls prefer and work better in smaller, cooperative groups. Girls

can work together while they solve a problem; it is not important to them whether their group is the first to finish.

Banchero (2006) reported that girls like to work in a quiet space. They like the lessons to be orderly, and they feel more confident when they can share their ideas in an all girl environment.

Gurian and Stevens (2004) recommended that, in the teaching of elementary girls, a teacher should:

1. play physical games to promote gross motor skills;
2. have portable/digital cameras around to take pictures of girls being successful at tasks;
3. use water and sand tables to promote science in a spatial venue
4. use lots of puzzles to foster perceptual learning;
5. form working groups and teams to promote leadership roles and negotiation skills;
6. use manipulations to teach math; and
7. verbally encourage the hidden high energy of the quieter girls. (p. 26)

What the Research Says

Salomone (2003) cited Lee (1996), a Professor of Education at Michigan State and Riordan (1996), a sociology professor at Providence College in Rhode Island, who individually reported on a series of studies on single sex education. Lee found positive effects for girls, who attended single sex schools, but there were few differences attributed to school type for boys. Both Lee and Riordan found that, in all girls schools, the girls reported: (a) a more positive attitude toward academics; (b) spent more time studying; (c) watched less television; and (d) demonstrated higher achievement gains in reading, writing, and science in comparison to their coeducational counterparts.

Also, Lee and Bryk (1986, as cited in Streitmatter, 1999) studied self-esteem, which is usually linked to educational achievements. Once again, the effects seemed to favor single sex schools, in particular, all girls' schools.

Cairns (1990, as cited in Hagg, 2001) investigated the self-esteem and locus of control for students who attended schools in Northern Ireland. Cairns found positive effects for single sex schools and self-esteem. Cairns concluded that "single sex schools are associated with benefits in self-esteem and locus of control" (p. 1).

Single sex classrooms have been beneficial for boys, as well, and Gurian (2005) claimed that all boys' schools "show boys learning as boys can work well" (p. 202). Also, the boys in an all boy school continually outscored their counterparts in coed schools. Gurian cited Cook (2003) and stated:

In boys' schools we can concentrate on their learning style. In coed, boys tend to adopt a quasi-masculine attitude because girls are there. They feel they have to demonstrate their emerging masculinity by gross macho over-reactions. In boys' schools, they can participate in anything irrespective of any perceived gender bias, whereas in co-ed schools you get boys who don't even try moving into those areas, the choir or debating, because they're fearful of being labeled as gay or a sissy. (p. 202)

In an all boys' school, teachers are able to individualize as they teach boys. Here, students are more comfortable and are able to experiment with untraditional boy activities.

The positive effects from single sex classrooms carry on through college (Salomone, 2003). Lee (1992, as cited in Salomone) found it was more likely for males and females from single sex schools to attend 4 year colleges and to consider graduate school as an option. The effects on girl students carried over to attitudinal and behavioral outcomes as well in higher education.

What Students Say

Streitmatter (1999) interviewed Susan, a seventh grade student who attended a single sex classroom. Susan reported:

I like going to an all- girls school 'cause there are things I do that I probably wouldn't do if there were guys here. I don't always do my hair and like that. I can just be myself. Here you never have math with boys, which I think is good. My mom has all these books, and I read them to see what they think I was supposed to be like, and they talk about in math where the boys are always overpowering girls. I'm glad to not have had boys in class, but I'm looking forward to other classes with boys in high school. Except for math that I want to keep separate, it probably won't be any different. (p. 83)

Also, Cruz interviewed students who attended single sex schools. Eleven year old Sam Guitierrez told Cruz that, "It's better with just boys. You don't get nervous about girls pointing and saying 'ha, ha, he got it wrong'" (p. 42). Both Susan and Sam reported that they enjoy and have noticed the benefits of the single sex classroom environment.

How to Make a Single Sex Classroom Work

In order for a single gender class to be successful, teachers must be educated in how boys and girls actually learn (Gurian, 2005). "When schools and teachers receive training in how male and female brains learn differently, things get better even for coeducational classes; and very important, trained teachers are best suited for teaching separate groups of boys and girls" (p. 203). If the teachers are not trained in brain differences, things do not go as well. If there is a classroom with 28 boys and one teacher, who is unable to control the energetic boys and does not believe in the single sex classroom, the students will have little success. In every case, Gurian found that single sex classrooms must be taught by teachers who were trained in how to work with the students and who had no biases against them. A single sex classroom or school will be

successful only if the teachers and community are open to the idea. In addition, Sax (2005) observed that, if a teacher does not understand the differences and teaches to boys and girls as if they were the same, the teacher ends up with boys who think drawing is for girls, and computers are for boys.

What the Opponents Say

Cruz (2000) reported that critics believe that single gender schools are too sheltered from the real world and do not provide students with experiences that will prepare them for the future. Also, eventually, females and males will have to work together; therefore, they should receive an education together. Also, in all girls schools, the stereotype may be perpetuated that girls and women should be protected and need special treatment. The opponents maintain that single sex schools are an unequal environment; however, girls should receive the same education that boys receive, and there is no assurance of that if the students are separated. Also, Salomone (2003) reported that opponents argue single sex classrooms undermine equality. The most common argument is that the separate educational facilities are unequal, whether students are separated by race or gender. Others claim it is not the fact students are separated, but that they will receive unequal treatment.

For Cruz (2000), the disadvantage for boys in a single sex classroom is that they do not have female role models and may develop an intolerance for gender differences. Cruz cited a study conducted at Clive Elementary, in Iowa, where it was found that the separation of boys and girls seemed to be more effective for the girls than for the boys. In a single sex classroom, the boys were louder and even more competitive in comparison to boys in coeducational classrooms. Salomone (2003) wrote:

For more than a decade, the National Organization for Women and the American Civil Liberties Union have swiftly moved to stop school districts dead in their tracks at the mere suggestion of single sex schooling. Distinct differences of opinion also have surfaced within the National Association for the Advancement of Colored People, while the organization itself has officially denounced the concept. (p. 40)

Chapter Summary

As of October 2006, the administrators of U.S. public schools were able to legally offer single sex classrooms (U.S. Department of Education, 2006). “Our culture has come to understand that the act of dividing boys and girls into separate classrooms and even separate schools is not inherently bad” (Gurian, 2005, p. 196).

Also, Sax (2005) reported that the brains of a male and a female are fundamentally different and that a single sex classroom environment is essential for them to be successful. Gurian (2005) found that single sex classrooms are effective for both boys and girls and suggested that teachers should teach each brain the way it needs to learn. In the words of Gurian (2005):

Not only is there no danger in this, but in fact we’ll accomplish gender equity. And gender equity accomplished when every individual is trained according to how their brain thinks. Through this, we can help a particular brain with its deficiency. (p. 103)

It is this researcher’s opinion that teachers should be educated in the brain and learning differences of boys and girls. The establishment of single sex classrooms and schools can have positive benefits for students; however, it is difficult to start. Until then, teachers need information about the differences, so they can help both boys and girls learn better. In Chapter 3, this researcher will describe the method, target audience, goals, and procedures for the development of this project.

Chapter 3

METHOD

The purpose of this project was to develop a resource guide for teachers to use as a tool when they address the learning styles of both girls and boys. It had come to the attention of this researcher that many classroom teachers are not prepared to teach to the different learning styles of boys and girls. However, in a single sex classroom, teachers can individualize their lessons and classroom arrangement for girls or boys. Boys and girls learn differently, and they need to be taught in different ways. In most public school classrooms, students are required to sit in their seat most of the day, they are told to keep their voices low, and free choice is limited. This is effective for many students, but not all. This guidebook will provide one more tool to teachers to help each student learn.

Target Audience

This project was designed for application with students in Grades 1-3, but it can be used with primary and secondary students as well. Teachers, who want to teach to each student's learning style, who want to understand the differences in how boys and girls learn, and who have children themselves, found this project helpful.

Goals and Procedures

The goal of this project was to provide teachers with a resource to teach boys and girls based on their learning styles. The guidebook includes a brief review of the literature and research on how the brains of boys and girls develop differently, and how these differences affect how they learn. In the following sections, this author examined

best practices, how to organize a classroom, how boys learn best, and how girls learn best.

Peer Assessment

Assessment of the guide was obtained from four colleagues through informal feedback, recommendations, and suggestions for further research. Each colleague was given a copy of the document and asked to review it for timeliness, ease of use, and relevancy. Each reviewer provided comments, editing marks, and suggestions on the hard copy.

Chapter Summary

It is important for teachers to understand that the learning styles of boys and girls differ greatly. Through this project, this researcher used the information gained from an extensive review of literature and personal experiences from the classroom to provide teachers with a useful and meaningful guide to address the issue. In Chapter 4, she provided information and application for teachers who are unaware of the different learning styles. Discussion and colleague reviews are presented in Chapter 5.

Chapter 4

RESULTS

The purpose of this project was to develop a guide book that teachers could use as a tool to individualize instruction. Teachers must address multiple learning styles throughout the day of teaching, namely the different learning styles of boys and girls. The published research (Gurian, 2001, 2004; Sax 2005) on the different learning styles of boys and girls indicates a teacher must be aware of these differences in order to teach each student to the best of their ability. This guidebook will show teachers how to apply the principals of brain based findings to a classroom (Gurian, 2001). In the guidebook teachers will find strategies and innovations to use the classroom, as well as how boys and girls learn different. Therefore, teachers will be able to address the gender specific learning needs of both boys and girls.

Chapter Summary

By reviewing the strategies to use to help both boys and girls learn, teachers can ensure they are teaching to each child and they can understand why students act certain ways. With this knowledge, teachers can apply these strategies within the classroom. Additionally, with this knowledge teachers should feel confident in their ability to individualize based on sex.

In Chapter 5, the author addresses the contributions and limitations of the project. Recommendations for further study are also discussed.

Chapter 5

DISCUSSION

The purpose of this project was to develop a guidebook to inform teachers and other interested parties of the learning differences between girls and boys. This guidebook provides the teacher with the current research on brain development and the steps to take to create a learning environment for both girls and boys. Teachers learned how to plan the day, arrange the classroom, and adjust lesson plans to enhance the learning experience for both boys and girls. Most of the strategies can be used in a primary elementary school classroom.

While working in a variety of classroom settings, this researcher has observed numerous differences between boys and girls. During circle time, boys fidget and shout out, while girls listen and sit still. When students are first learning to read, girls are one step ahead of boys. Boys on the other hand have a better understanding of math concepts. After noticing these differences, this researcher was interested in researching why these differences exist and what teachers should know about the differences between boys and girls.

Contributions of the Project

It is this author's opinion that she accomplished the objectives set fourth at the onset of this project. This author provided readers with sufficient information in the Review of Literature section that represented the history and current research of single sex education, as well as the brain differences of boys and girls. Also, it is this author's

opinion that the guidebook, located in Chapter 4, provided teachers with informative research and realistic strategies that can be used daily in the classroom. The guidebook is in a bulleted format, which is easy to read and glean information quickly.

Although the brain differences between girls and boys have been researched and documented, few teachers are aware of them. However, with this knowledge, teachers will be able to further individualize instruction. This author contends that she provided the reader with evidence to support that boys and girls learn differently and that both will benefit if teachers are aware of these differences. Furthermore, Gurain (2004) and Sax (2005) reported that because children learn differently, it is imperative that teachers are aware of these differences.

Limitations of the Project

This guidebook provided teachers with current research about learning and brain differences between boys and girls. A limitation of this project was the lack of research and documentation. Gurian (2004) and Sax (2005) are the few researchers at the forefront of the research. Prior to the PET scan and the MRI, the brain could only be researched by dissection. Nowadays however, as technology progresses, more and more is being discovered about the brain. It is this author's opinion that in the future, as more brain research is conducted, more differences will be discovered. Another limitation of this project was that it focuses only on elementary school students. Gurian (2004), also reported on learning differences between boys and girls from the preschool level through the high school level.

Recommendations for Further Research and Study

As a teacher, any information that can improve instruction is useful. The brain is constantly being researched; therefore, more brain differences will be discovered each year. Research needs to stay current with the brain differences that are constantly being discovered.

Assessments

Three teachers who reviewed this guidebook found the format and visual aspect of the guidebook easy to read. They also agreed that the guidebook is a helpful tool for all elementary school teachers. One reviewer found the information so useful she implemented some of the strategies immediately. One reviewer suggested adding information from another source.

This author is looking forward to implementing these strategies in her own classroom. There is much to learn about the learning and brain differences between boys and girls; this author believes this research and guidebook have encouraged her to teach to both boys and girls. Also, with this information, this researcher feels she will be a better teacher.

Summary

A teacher's goal is to teach every student. Knowing how boys and girls learn differently will help teachers teach. This project addressed single sex education and the many differences between boys and girls, which led to the design of the guidebook in Chapter 4. Using this guidebook, teachers can quickly discover strategies to use in their classroom. The guidebook is a handy tool for anyone interested in discovering why boys and girls learn differently.

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How Boys and Girls Learn Differently



A Guide Book for Teachers
by Desiree Cyr M. Ed.

How Boys and Girls Learn Differently

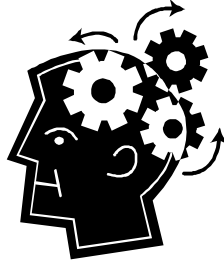
Michael Gurian is an author of fourteen books, including the book, *Boys and Girls Learn Differently*. This book explains how the fundamental differences between boys and girls affect the way they learn. Gurian holds gender differences workshops and seminars around the country; teachers and parents attend trying to gain insight into the mind of their child. Gurian provides knowledge into both how the brains work and how the male and female learn differently, think differently and talk differently. In this guidebook I summarize his findings and suggestions.

Gurian bases his findings off of brain based research and suggests that as a teacher or parent, it is important to have knowledge of how the brain works and how the male and female brains learn differently. Gurian suggests “children need us to know their minds so we can be better teachers and caregivers for them”.

As science and technology progress, researchers are able to gain more biological and neurological information about how children actually learn. As teachers, this knowledge will help strengthen our instruction. Each student is an individual, but girls have individual needs as well as boys.

According to Gurian, teachers and parents must keep in mind that brain development is best understood as a spectrum of development and at times there will be exceptions. Many children lean toward the female extreme on their brain development spectrum, many others toward the male. Most of the time, girls lean toward the female and boys toward the male, however, some boys are on the female end and some girls are at the male end of the spectrum. Some boys and girls can possess nearly equal qualities of both male and female brains.

How Boys' and Girls' Minds Are Different



There are many categories of male and female differences to consider. However, the most essential to learning strategies are discussed.

Developmental and Structural Differences

- In most cases, girls' brains mature earlier than boys' brains.
- Myelination (coating of myelin, which allows electrical impulses to travel down a nerve fast and efficiently) is completed earlier in young girls.
- Girls acquire their complex verbal skills, as much as a year earlier than boys.
- The corpus callosum (the bundle of nerves that connect the right and left hemispheres) is up to 20 percent larger than males. Giving girls better cross talk between the two hemispheres of the brain.
- The smaller corpus callosum inhibits the cross talk between hemispheres in the brain, and this effects how males multitask.
- The prefrontal lobe, where affect regulation and decision making occur, develops larger and quicker in females.
- Girls take in more sensory data than boys. They hear and smell better. They also take in more information through fingers.

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- Females tend often to be better at controlling impulse behavior.
- Females have better verbal abilities and rely heavily on verbal communication; boys tend to rely heavily on nonverbal communication.
- Males tend to have more development in certain areas of the right hemisphere, which provides them with better spatial abilities.

Chemical Differences

- Male brain secretes less serotonin than the female brain, making males impulsive and fidgety.
- The differences in amount of oxytocin and vasopressin are also substantial.
- Oxytocin is more constantly stimulated in females, making the female more capable of quick and immediate empathetic responses to others' pain and needs.

Hormonal Differences

Females and males both possess all the human hormones; however, the degree of dominance differs. Human behavior is driven by hormones. Male and female modes are dependent on the interplay of hormones and brain. Hormone levels affect mood, but also affect learning performance. Among boys and girls, their own hormone levels vary greatly.

- Females are dominated by estrogen and progesterone.
- Progesterone is a bonding hormone.
- Female estrogen and progesterone rise and fall with their hormonal cycle, causing mood swings.

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- When female estrogen is high, a girl scores better in both standardized and in class-tests than when it is low.
- Males are dominated by testosterone.
- Testosterone is the male growth hormone, and also the sex-drive and aggression hormone.
- There is more dopamine in a male's bloodstream, which can increase impulsive behavior.
- Males receive between five and seven spikes of testosterone every day. During the spike, hormonal flow can make their moods vary between aggressive and withdrawn.
- When male testosterone is high, the boys perform better on spatial exams, like math tests, but worse on verbal tests.

Differences in Processing Emotion

The emotive processes are the least understood area of the brain. However, as teachers need to give it more credence, it is an essential part to learning.

- This is an area where boys are generally more at risk for missed learning and processing opportunities.
- The female brain processes more emotive stimulants, boys can sometimes take hours to process emotively.
- This lesser ability to process emotively makes males more emotionally fragile than we think.
- If a boy has a crisis at home, he may come to school with a higher cortisol level (stress hormone) level than his sister, because he has held in, or not processed, the emotional stress of the crisis. This may affect his learning for the day.

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- Males are not as tough as we think.
- Females are more likely to process pain or suffering and get help from others or talk about it.
- Males are more likely to become physically aggressive (fight) or withdrawn (flight).
- Male's aggression-and-withdrawal response short-circuits intellectual and academic learning because his emotive processing is taking longer.

How Brain-Based Differences Affect Boys and Girls: Areas of Learning-Styles Differences

Deductive and Inductive Reasoning

- Boys tend to be deductive in their conceptualizations.
- Boys tend to do deductive reasoning faster than girls.
- This is why on average boys do better than girls on fast multiple-choice tests.
- Girls tend to be better at inductive thinking.
- Girls are better at giving examples.
- Girls tend to begin from the specific examples and then build general theory.

Abstract and Concrete Reasoning

- Boys tend to be better than girls at not seeing or touching the thing and yet still being able to calculate.
- Boys do better than girls when mathematics is taught on the blackboard.

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- Males like abstract arguments, philosophical conundrums, and moral debates about abstract principles.
- A female brain works better with concrete problems.

Use of Language

- During the learning process, girls use words and boys work silently.
- Girls tend to prefer to have things conceptualized in usable, everyday language, replete with concrete details.
- Boys find jargon and coded language more interesting.

Logic and Evidence

- Girls are generally better listeners than boys, hear more of what's said, and are more receptive to the plethora of details in a lesson or conversation.
- Boys tend to hear less and more often ask for clear evidence to support a teacher's or other's claim.
- Girls seem to feel safe with less logical sequencing and more instructional meandering.

The Likelihood of Boredom

- Boys get bored more easily than girls; this quite often requires more and varying stimulants to keep them attentive.
- Girls are better at self-managing boredom during instruction and all aspects of learning.
- Once the child has become bored, he is likely not only to give up on learning but also to act out in such a way that class is disrupted and he is labeled a behavioral problem.

Use of Space

- Boys tend to use up more space when they learn, especially at younger ages.
- When a girl and boy are put together at a table, the boy generally ends up spreading his work into the girls' space, not vice versa.
- Boys tend to learn by using more physical space than girls do.

Movement

- Girls do not generally need to move around as much while learning.
- Movement seems to help boys not only stimulate their brain but also manage and relieve impulsive behavior.
- Movement is natural to boys in a closed space, thanks to their lower serotonin and higher metabolism, which creates fidgeting behavior.
- At all ages, stretch breaks and sixty second movement breaks are very helpful.



Creating a Classroom Environment for Both Boys and Girls in Elementary School

Elementary school is a time when boys and girls have gradually become fixed in their gender identities. Girls are very much girls, and boys very much boys, especially by fourth grade. Over the elementary years, girls generally have less trouble than boys in the elementary environment. Ninety percent of teachers at these levels are female, and 99 percent of those teachers have not been trained in how boys and girls learn differently. It would stand to reason, then, that if structural mistakes in classrooms are being made, girls—learning in a female-oriented environment—can make natural adaptation more so than boys can. Here are some innovations to use in a school setting. Many of the innovations that help boys—also help girls (and vice versa).

Structural Innovations

Use of School Time

The human brain, whether male or female, seeks a certain kind of learning schedule.

Year Round Schooling

- One way to raise academic performance is year round schooling.
- In Japan and France school are taught year round. Interestingly, when politicians suggest that America's schools are failing, the comparison is often made to high schools in Japan and France, but without noting the year-round school regimen those countries follow.
- Students generally learn and retain more in a year round school.
- Summer vacations cut down on retention and thus, ultimately, on one measure of intelligence.

Changing the School Day

- The school day from 9:00 AM to 2:30 PM is becoming less effective.
- Parents worry about their children home in the latchkey hours, after school is out and before parents return from work.
- The hours of 3:00 PM to 6:00 PM are the time of most juvenile crime, delinquent behavior, and sexual activity.
- As our culture relies increasingly on schools to add character education, success theory, coaching in group dynamics, homework achievement in school hours, study hall, computer training, and more art and music curricula, an extended day is needed.
- A school day from 8:30 AM to 3:30 PM would help parents and students.

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Class Size, Numbers of Teachers and Teacher-to-Student Ratio

The ratio of teachers to students varies greatly among elementary schools by virtue of year-by-year developmental needs. A learning brain that, in second grade, experiences the presence of more than one teacher in the classroom for at least part of the day enjoys more neurological variety in learning culture and experience.

- A ratio higher than 15:1 is more difficult for both teacher and students unless a second teacher (even in the form of a parent volunteer) becomes an important presence.
- The advantages of keeping students in a daylong bonding community are much neurological as social; in particular, the students who have difficulty learning do not have the constant distraction of new communities and environments.

Smaller Schools are often Better

- Trying to educate students in huge schools with one teacher for twenty students can work, and it does. It is also a fragile way to educate the growing brain.
- More students are lost in the long run than in smaller schools with more teachers and better ratios.

Using Group Dynamics and Group Work as a Basis of Pedagogy

Education is a group process much more than an individual one. Brain development and social development during the elementary years are extremely intertwined. The brain learns because it is part of group learning. Brain-based research cries out for teachers to make group process a basic component of learning.

Revisiting Multigenerational Classrooms

- The human brain loves the stimulation not only of a teacher (who is of a different generation) but also of multigenerational peers who can help provide order, challenge, wisdom, direction and intellectual focus.

Bonding and Attachment in Elementary Learning

The brain requires one-on-one attachment to work fully. To some extent, the ultimate classroom cannot exist unless teachers and other mentors have formed these profound bonds with students. Teachers most often find that students who aren't learning are also the students the teacher just isn't able to reach.

- As American schools grow larger and larger, we are decreasing the opportunities for bonding and full teacher-student attachment.
- Bonding activities must be balanced with instruction and academics; still, quite often the track to better academic performance is not rote academic instruction but love and attention.
- Bonding is, in some ways, the most hidden, least measurable way to ensure good learning.
- RELATIONSHIPS, RELATIONSHIPS, RELATIONSHIPS!

How Boys and Girls Learn Differently

The Ultimate Classroom for Boys and Girls

This guidebook provides real and usable teacher innovations. It shows how to set up and alter learning environments, at school and at home, to fit both similar and dissimilar needs of boys and girls.

For Boys

- Use boy only groups when needed.
- Encourage close bonding between teacher and student.
- Enjoy navigating normal “Huck Finn male energy” toward academic focus and good character.
- Pay special attention to more sensitive, less competitive or aggressive males in the classroom.
- Advocate for boys’ issues in the school and community.
- Allow physical movement, as well as engaging in physical activity, from hugs and touch when appropriate to getting down and dirty at recess once in a while.
- Be sure there are men in the boys’ educational life, especially from fifth grade onward.
- Before third grade, never allow chairs to be kept in row or nailed down, and always make available as much space as possible.
- Offer lots of storytelling and myth making in the classroom to help the male brain develop its imaginative and verbal skills through story telling.
- Give boys lots of things to touch and otherwise senses, especially when reading and writing are being taught.
- Use bead work and other manipulations to promote fine motor development.

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- Place books on shelves all around the room so boys get to use their omnipresence.
- Make lessons experiential and kinesthetic.
- Personalize the student's desk, coat rack and cubby to increase his sense of achievement.
- Keep verbal instructions to no more than one minute.
- Let boys nurture one another through healthy aggression and direct empathy.

For Girls

- Teach early elementary math by manipulatives and objects; teach higher levels of math on the blackboard, which requires abstraction and favors male brains, but also through graphs, charts and written material on paper.
- Provide concrete manipulatives to touch and otherwise sense, especially when science is being taught.
- Tell stories and use images of girls and women who are competent, and who model varieties of mature female behavior.
- Offer girl-only groups when useful.
- Give special access to technology, computers and the Internet and a little encouragement to use technology, master it, and lead with it (beginning around third grade, keeping in mind that intense computer use before about age nine may be hazardous to brain development).
- Match math and science lessons with journal writing expression so that girls can use their writing strengths to help them process math calculations and science data.

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- Encourage healthy and constant feedback, so that girls get encouragement and have high expectations from teachers.
- Play physical games to promote gross motor skills.
- Have cameras to take pictures of girls being successful at tasks.
- Use water and sand tables to promote science in a spatial venue.
- Use lots of puzzles to foster perceptual learning.
- Form working groups to promote leadership roles and negotiating.
- Verbally encourage the hidden high energy of the quieter girls.



** Gurain, M. (2001) *Boys and girls learn differently! A guide for teachers and parents*. San Fransisco, CA: Jossey-Bass.

Additional Resources

Books

The Minds of Boys: Saving Our Sons from Falling Behind in School and Life. Michael Gurian

Why Gender Matters. Lenord Sax

For girls only: Making a case for single sex schooling. Jason Streitmatter

Websites

Truth about Boys and Girls.– www.webconnection.com

Single sex vs. coed: The Evidence– www.singlesexschools.com

The Gurian Institute– www.gurianinstitute.com