Gender Differences and Student Engagement

Susan J. Kovalik, Founder, The Center for Effective Learning

International Center for
Leadership in Education
Rigor, Relevance, and Relationships for ALL Students

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by Susan J. Kovalik, Founder, The Center for Effective Learning, and
Keynoter, International Center for Leadership in Education
December 2008

Brain-compatible Elements and Technology

Today's students are more thoroughly engaged in activities that appeal to their creativity, their competitiveness, and their need to socialize than at any time in our history. With their iPods, pocket PC's, handheld devices, laptops, and mobile phones, they are engaging almost continuously in the world around them. Within this vast storehouse of information, they have learned numerous software programs and 101 ways to use their iPods, thus expanding their understanding and their ability to communicate that understanding in innovative ways.

Technology has changed their lives, and in so doing, has presented educators with a dilemma as to how to use the very elements that engage them with technology to encourage them to be mentally present in the classroom

Why do some students come to school inherently eager to learn and then become disengaged inside the classroom? What makes some young students who are naturally curious, with active imaginations and eager minds "tune out" after they pass through the schoolhouse door? Why do other children consistently view school as fun and remain excited at the possibilities ahead of them?

The answer lies in the basic but often overlooked reality that students learn differently, and schools must find effective ways to tap students' inherent instinct to want to know and be able to do. Even more significantly, the harsh truth is that students are expected to learn in ways that are inconsistent (and frequently opposite) to how learning happens. Instead, they are required to learn in ways that are convenient for the institution and teacher rather than in ways that are brain-compatible, natural, and consistent with their "other" learning – learning that has taken place since birth outside of school, without teaching professional, textbook, or worksheet.

What makes a classroom and lesson brain compatible? Over the past 30 years, research in neuroscience, specifically with the brain, has contributed greatly to our understanding of the phenomena of learning. The following elements provide a brain-compatible guide for classroom instruction:

1. absence of threat
2. meaningful content
3. choices
4. enriched environment
5. movement to enhance learning
6. adequate time
7. immediate feedback
8. collaboration
9. mastery (application)

Interestingly, these brain-compatible elements are the very same elements that attract students to technology.

1. There is an **absence of threat** at some level where neither peers nor teacher is present.
2. Students make content **meaningful** using a variety of tools in a combination of ways to suit their individual needs and interests.
3. There are unlimited **choices** in the gathering and presenting of information and learning becomes interactive and multifaceted.
4. They **enrich** their skills as they research, develop, evaluate, and present their information.
5. Students engage in **physical movement**, especially with new technologies such as Wii. Students can hone skills in snowboarding, golf, tennis, and other sports or play competitive games. It is movement to enhance learning. "When we exercise, particularly if the exercise requires complex motor movement, we're also exercising the areas of the brain involved in the full suite of cognitive functions." John Ratey in *Spark: The Revolutionary New Science of Exercise and the Brain.*
6. They are in charge of their own **time** and will work at their own pace as long as their curiosity and interest are sustained.
7. As they discover and uncover information, there is immediate **feedback**, which allows them to expand their thinking, check other sources, and engage experts where possible.
8. They **collaborate/socialize** with those they have something in common with, expanding their connection worldwide and paving the way for their future.
9. They will stay with a game or project until they have achieved **mastery**.

The good news is that the emerging technology provides a wide range of opportunities for the teacher to engage students using their acquired expertise. With the vast array of available technology it is possible for every subject to have new and dynamic connections, making learning more meaningful and engaging. It is not that students will not engage, it is that they have chosen what engages them.

Gender Differences

There is another critically important aspect of classroom instruction that impacts engagement. It involves understanding the hard wiring of gender.

Girls and boys are different. They learn differently, they play differently, they fight differently, they see the world differently, they hear differently, and they express their emotions differently. Girls and boys behave differently because their brains are wired differently.

This information is vital as schools see more and more boys becoming disengaged from the classroom/school. In Dr. Leonard Sax's book, *Boys Adrift: The Five Factors Driving the Growing Epidemic of Unmotivated Boys and Underachieving Young Men*, he contends that a combination of social and biological factors is creating an environment that is literally toxic to boys.

The following are broad generalizations as all behaviors are on a continuum and each of us is a unique individual flexible enough to modify our behavior based on the situation when needed or if motivated to do so.

Information on gender differences is not new. Over the years educators have heard about it but rarely have they applied it with intention in classrooms. Actually what schools have done over the past 20 years is tried to create gender-neutral classroom/school environments, which in many cases have been a detriment of boys.

In his practice as a family physician and psychologist, Dr. Sax has seen a growing epidemic of underachieving boys. Starting in kindergarten, they are often labeled as inattentive, distracted, and having limited focus and put on medication to control their behavior. Dr. Sax's dedication to uncovering what is behind this trend taps into the question of student disengagement and uncovering the factors that are influencing this trend.

There is no right or wrong in this discussion, just the science behind the hardwiring of gender. The past 10 years have proved beyond doubt that classrooms which organize around gender-neutral strategies ignore what we have known about our differences. It is once again in the forefront of our thinking as more students (primarily boys) seem adrift from our classrooms — in some locations in epidemic proportions.

The good news is that Dr. Sax recommends alternatives to the traditional classroom approach to help dispel the notion that some students are not functioning up to par. His books are mainly about boys because their struggle is so obvious; however, he also describes girl behavior and generally sees it as more conforming at the elementary level because the majority of teachers are female and their classroom strategies are a reflection of their gender. By secondary school, more of the teachers will be male and more options are available and have a broader appeal to boys.

Hearing and Seeing

Studies have been conducted to determine if hearing differences are present at birth or develop over time. Soft music was played in the cribs of some premature babies immediately following birth and their responses were recorded. The babies were matched in age and weight with other babies without music. Girl babies who received music therapy grew faster, had fewer complications, and were able to leave the hospital nine and a half days earlier than girl babies who had no music. But boy babies who received music therapy did not leave the hospital any earlier than boys who did not hear the music.

Another study involved humming to the premature babies, which allowed the girl babies to leave the hospital, on average, 12 days earlier than babies who weren't. It made no difference to premature boy babies.

Hearing is a brain function, and scientists can measure acoustic brain response in newborns and over time. Girl babies hear a 1,500 Hz tone about 80 percent greater than the average baby boy does. This is especially important because this range of sound is critical for understanding what others say. Other studies have demonstrated that the female/male differences increase as children get older.

The following are some implications for the classroom, keeping in mind that not all boys and girls can be easily categorized by this information; situations and teacher styles vary. The important point is to consider the implications that would benefit both boys and girls.

It has been demonstrated that noise levels that distract 11-year-old girls are 10 times softer than noise levels that boys find distracting. Girls won't learn as well in a loud, noisy classroom. If a male teacher speaks in a tone of voice normal to him, the girl in the front row may feel he is yelling. This is the same when a father is speaking to his daughter.

Conversely, males need a loud voice to get their attention. How often have women found themselves asking their sons or husbands, “Do you hear me? I’m talking to you!” Maybe they don’t.

Boys will do better if they are in the front of the classroom where their ability to pay attention increases as they can clearly hear what the teacher is saying. For some boys diagnosed with ADHD, they may be distracted when sitting in the back of the room because they can’t hear clearly enough to do what was asked of them. In classrooms today, especially with youngsters who haven’t mastered English yet, some teachers are using headsets to enhance the clarity of speech, and this may assist boys as well. Seating arrangements where boys sit in the front and in rows may assist them in listening with intention — and without distraction from peers.

Girls and boys see the world differently — not just figuratively, but literally. Regarding vision, a girl’s retina is built differently from a boy’s. When a girl and a boy look at the same landscape, they see different images.

How did we arrive at this critical piece of information? A study was done immediately after the children were born, while still in the hospital. Babies were given a choice between looking at a simple dangling mobile or at the face of a woman who smiled but didn’t say anything. All 102 babies were videotaped. The researchers, who didn’t know the sex of the babies, analyzed their eye motions. The differences were significant: The boys were more than twice as likely to prefer the moving mobile, while the girls were drawn to the living face.

The rods and cones within the retina are structurally different in the male and female eyes. Rods are color blind. Cones are sensitive to color. They both send their signals to the ganglion cells, some of which are large while others are small. They have different jobs. The large cells are wired to rods and are sensitive to motion. Think of them answering the questions, "Where is it now, and where is it going?" They are essentially a motion detector. The male retina has mostly these larger, thicker M (magnocellular) cells, and can track objects anywhere in the field of vision.

The smaller cells answer the questions, "What is it, and what are the colors and textures?" The female retina has predominantly the smaller, thinner P (parvocellular) cells that are concentrated in and around the fovea, the center of the field of vision.

If the male eye structure is geared to motion, then looking out the window or out the classroom door, watching the classroom action, and anything moving will catch boys’ attention — they are wired for that. Looking at a worksheet, in the center field of vision, is better suited for girls’ retinas.

When giving kindergarten students crayons and a blank sheet of paper to draw anything they want, girls will use multiple colors — red, orange, green, and brown — to draw detailed pictures, usually of people, plants, and animals. In the same kindergarten class, Matthew is frantically scribbling with a black crayon. "What’s that?" asks his teacher. “It’s a rocket about to smash into the Earth," he says.

Girls draw nouns, and boys draw verbs.

Kindergarten used to be a time of play, building structures with blocks, riding tricycles, and otherwise moving for the better part of the day. Today, seatwork is front and center, where girls

see better, and boys are labeled as having an attention deficit for not wanting to finish their worksheets.

Is Risk-Taking Behavior Hard Wired?

Many boys enjoy taking risks and are impressed by other boys who do as well. They enjoy the immediate thrill of the risk itself; usually the consequences are not a consideration. Boys are more likely to be seriously injured in a variety of accidents, whether on a bike or skateboard, misusing a gun, or becoming lost in the wilderness. A ranger at a National Park reported that 9 out of 10 boys who get lost end up seriously hurt, and 9 out of 10 girls will be found without serious injury, usually very near where they were lost. Girls are willing to take risks but are less likely to seek out risk-taking behavior. Boys overestimate their abilities. Girls underestimate their abilities and will be less likely to engage in an activity where they have no experience. It may be that for boys in choosing risk-taking behavior, the danger itself is exhilarating.

A boy is more likely to take a risk that is dangerous if there are other boys present. If a boy takes his skateboard over a dangerous jump, other boys think it is awesome. Girls are more likely to ask, “Why would he want to do that?” If a girl did the same thing, other girls would react, “That’s crazy! Why would she want to do that?”

Dangerous behavior gives boys a “charge” that is irresistible. Climb the mountain because it is there, ride the bull at the rodeo, become a motocross racer, snowboard down the steepest hill, use alcohol while underage, experiment with drugs — all elements that have a risk to them and are an emotional high. (Girls participate in these activities as well, but it is not the norm, and some boys do not participate at all, because we are all unique, of course.)

Emotions, both positive and negative, are processed differently in the brains of boys and girls. Prior to adolescence there are limited connections between feelings and language in both boys and girls. They may feel mad or sad or disconnected, but they may not be able to describe the feeling or explain it to themselves or others.

During adolescence, the connections between the amygdala (the emotional center) and the cerebral cortex begin to develop. These connections empower reasoning, reflection, and language. But this change occurs only in girls. Boys’ negative emotions stay rooted in the amygdala. And how do these negative emotions get expressed? One way is through violent video games.

A comprehensive review of the research on the effect of violent video games reveals that these games lead to “aggressive behavior, aggressive cognition, aggressive affect, and cardiovascular arousal.” A video game has a more toxic effect than watching violent television because on television the viewer is watching someone else do the violence; in video games the person playing is inflicting the violence. Girls do not consider aggression or violence “fun.” Girls who act aggressively may lower their standing in the eyes of other girls.

Precautions that parents and teachers can utilize when dealing with risk-taking behaviors include three points:

1. Boys in groups increase their risk taking without considering the consequences, so try to arrange organized risk-taking opportunities, such as snowboarding or whitewater rafting.
2. Supervised is better than unsupervised. Joining a team — football, soccer, motocross racing — is a supervised risk.

3. Assert your authority. Don't argue. Don't negotiate. Just do what you have to do; remove the video game, take away the skateboard, and eliminate access to violence and sexual content on the Internet.

Gender Differences in Classroom Behavior

In the classroom, girls are more likely to do their homework even if the assignment doesn't interest them because they want the teacher to like them. Boys need to find the homework assignment meaningful to them; having the teacher like them is not a necessity. A boy who works well with his teacher may have his status lowered with other boys or may be considered a geek.

Girls are responsive to voice, tone, and intention when asking for help. Boys tend to be more responsive when focusing on the problem only – with little or no eye contact.

Small group learning tends to work for girls because they are more comfortable asking the teacher for help if they need it. If a boy gets stuck, chances are he won't ask for help and may even become rowdy to get attention. His status in the eyes of the other boys in the classroom is raised if he disrupts the teacher.

Competition and time-constrained tasks draw boys' attention. When they have to work as a team to answer a question, they collaborate and work hard not to let the rest of the team down.

Girls tend to regard shouting out answers as silly and complain that the "right answer" focuses on small details instead of the big picture. Moderate stress improves boys' performance on tests and degrades girls' performance.

What does all this mean? According to Dr Sax, "ignoring gender differences does not break down gender stereotypes; ironically, neglecting hardwired gender differences more often results in a reinforcement of gender stereotypes."

The solution is not necessarily to have gender-specific classes, although in some situations that has been shown to work very well and is a growing trend in some states. However, knowing about these hardwired differences can inform and direct what we do in the classroom, which will help ensure that students of both sexes are engaged and eager to participate in learning.

Selected Resources

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Related resources available from the International Center for Leadership in Education, visit http://www.leadered.com/resources.html for more information.

Resource Kits:

How Brain Research Impacts Instruction in Grades K-6
How Brain Research Impacts Instruction in Grades 7-12
Student Engagement — Creating a Culture of Academic Achievement

Book:

What Brain Research Teaches about Rigor, Relevance, and Relationships and What It Teaches about Keeping Your Own Brain Healthy

Handbook:

Student Engagement — Teacher Handbook (available January 2009)

DVD:

Rigor, Relevance, and Relationships and the Human Brain

International Center for Leadership in Education
1587 Route 146 ● Rexford, NY 12148
(518) 399-2776 ● fax 399-7607
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