## Contents

Synopsis .................................................................................................................................................. 3

Understanding Digital Children (DKs) ................................................................................................. 3

Growing Up In A Different World ......................................................................................................... 5

So What About Today? ......................................................................................................................... 7

Contrast Our Experiences with Theirs ............................................................................................... 9

So What’s The Point? ............................................................................................................................ 11

Digital Natives ..................................................................................................................................... 11

The New Digital Divide ....................................................................................................................... 12

Digital Immigrants ............................................................................................................................... 13

The Brain That Changes Itself ............................................................................................................ 16

Digital Readers ................................................................................................................................... 22

The Gap Between Digital Learners & Traditional Teachers ............................................................... 25

What does this mean for schools? ....................................................................................................... 30

21st Century Fluencies are the Foundation ......................................................................................... 39

Standardized Tests For Non-Standardized Brains ............................................................................. 42

We Need to Let Students Access Information Natively .................................................................. 44

So How Do We Bridge This Digital Divide? ...................................................................................... 49

SOME BOOKS YOU SHOULD READ ................................................................................................. 51
Synopsis

Children today are different! But not just because they mature years earlier than children did even a couple of generations ago. Not just because of the clothes they wear or don’t wear. Not just because they dye their hair and style it differently than we did when we were that age. Not just because they seem to have more body parts than we did – which they seem to want to pierce, tattoo, and/or expose.

No, today’s YouTube Generation has grown up in a new digital landscape. For most of them, there’s never been a time in their lives when computers, digital video, cell phones, video games, the Internet and all the other digital wonders that increasingly define their (and our) world haven’t surrounded them. Constant exposure to digital media has changed the way these Digital Natives process, interact and use information. As a result, DNs communicate in fundamentally different ways than any previous generation.

Meanwhile, many of us, the Digital Immigrants, struggle as we try to come to terms with the rapid change, powerful new technologies and change in thinking that are native to their world - a fundamentally different world than the one we grew up in.

This paper examines the new digital landscape and the profound implications that it holds for the future of education. What does the latest neuroscience and psychological research tell us about how the Instant Messenger Generation’s brains are being re-wired? What are the implication of this new digital landscape for teaching, learning and assessment of that learning? What will it mean to be educated in the light of this modern, changed, and continually changing world?

How can we reconcile these new developments with current instructional practices in an Age of Standards, Accountability and High Stakes Testing for all? What strategies can we use to appeal to the learning preferences and communication needs of digital learners? Prepare to have your assumptions about children and how they learn severely challenged.

Understanding Digital Children (DKs)
Teaching & Learning in the New Digital Landscape

How many of you have children of your own? Don’t be ashamed, you can put your hand up. Now how many of you have teenagers? Be assured that each and every one of you has our DEEPEST sympathies.

Do you ever catch yourself watching children in performance mode and just shaking your head? Do you ever find yourself saying, “What’s going on here? What’s up with children today? I wasn’t like that when I was that age. I wouldn’t have DARED say or do that. Why are they so different? What could possibly be going on in that head? What could they possibly be thinking? What’s wrong with this younger generation?”

Hold On!
At the same time others might say “Hold on, you’re wrong. You’re being much too harsh! You need to relax a little. Children are children. They make look different. They may sound different. They may act different. But underneath it all children are just children. They have the same issues, the same insecurities, the same hurt feelings, the same immature ways of looking and thinking about things that we did. They’re basically the same way we were when we were that age.” And if you believe this second statement, we want you to know that we totally respect your opinion even if you are completely wrong!

Children Today Are Different

Children today really ARE different! Really different! But not just because children today mature years earlier than children did even a couple of generations ago. Not just different in terms of the clothes they wear or don’t wear; not just because they dye their hair and style it differently than we did; not just because their music is incredibly profane, has no rhythm, and is utterly incomprehensible (oops sorry for that editorial comment); not just because of the way they talk or what they say, or how they act; not just because children today seem to have far more body parts than we ever did growing up – body parts that they seem to want to pierce, tattoo and expose.

Different Wiring

No, what I’m talking about here is that evidence is quickly mounting from clinical research that our children’s brains are quickly adapting to accommodate all the new technologies with which they spend so much time – and that because of digital bombardment, because of the pervasive nature of digital experiences in children’s lives today, children today are also different neurologically.

They have become screenagers. This is the first generation that has actually grown up with a mouse in their hands along with an assumption that that the images on the screen are supposed to be manipulated and interacted with - that screens aren’t just for passive consumption. As a result of this, they’re different in the way their brains are wired.

How do we know this? A great deal of research, in what is called the neurosciences, has been undertaken in the past few years. This research is validating much of what we suspected from the psychological research, particularly the psychological sciences.

The bottom line is that children today are FUNDAMENTALLY different from previous generations in the way they think, in the way they access, absorb, interpret, process and use information and above all, in the way they view, interact and communicate in and with the modern world. And this holds profound implications for us both personally as parents and professionally as educators.

Let’s examine why this has happened and what it means for us as parents, educators and citizens.
Growing Up In A Different World

Most of the people reading this article grew up in a different time. We can only speak for ourselves, but for us, it was a time of relative stability. For example see how many of Ian’s experiences apply to you?

I had TWO parents! And here’s a radical concept. They were my original parents. My father worked at the same job for the same company more than 30 years. My mother stayed home to take care of the family and manage the house so she was home when we got back from school. These were very different times because just thirty years ago in North America, only one in five families had both parents working outside the home.

For me – for most of my generation, life was relatively stable and predictable. I can remember literally being able to set my watch by the time my father turned the corner and came home from work each evening – it was exactly 5:45 PM every night. We all sat down together for dinner – imagine this – for an actual home-cooked meal – with the entire family (including my original mother and father) - at the same time every night – 6:15 PM every night.

And Sundays were special. It started with church in the morning, followed by brunch, then playing outside in the afternoon, Sunday dinner with my family and grandparents, followed by Disney, Ed Sullivan and then a bath, whether I wanted it or not.

There Was an Amazing Rhythm

For many of the people of this time and our generation, there was an amazing rhythm, and predictability to life. Change was something that happened, but it seemed to happen slowly. And it wasn’t just that life was predictable - our lives were also much simpler. When we came home after school, on weekends, and during holidays, we played with our friends outside on the street, in the backyard or at the park, often until it got dark. We could do this because our world was relatively safe. Most parents didn’t have to worry that something horrible was going to happen to us. Danger didn’t seem to be lurking around every corner. This was due, in part, to the fact that there was a sense of community. Everyone looked out for everyone else and everyone seemed to know everyone else’s business.

And it was outside, on the street, in the back yard, and in the park where we learned many of our social skills. We worked in groups to solve problems. By turns we lead, we followed, we fought, we reconciled, we negotiated, we planned, we built teams and we learned to get along. And if we fought, it was with our fists not weapons. And this all happened face-to-face, if not in-your-face.

A Low-Tech World

Our world was decidedly low-tech. Do you remember Etch-A-Sketch, Mr. Potato Head or Slinkies? For me, the ultimate in modern technology was my 3-speed Schwinn Phantom bike and a transistor radio I hid under my pillow at night when I went to bed.
Like most other families, we only had one TV. (Why would anyone ever need two?) It was located in the living room. And it was there in the living room where we sat together, as a family, watching our shows on the five available channels discussing what we saw. And if we wanted to see the latest movie, we had to go to a theater or a drive-in.

Imagination

Back then imagination was essential. We created our own monsters and villains. Our stick became a sword. The rock was our horse. We rode our bikes with chunks of cardboard clothes-pinned to the frame so we could sound like a motorcycle. And we drove our parents parked cars by turning the steering wheel while creating our own sound effects. And because our lives were decidedly low-tech, probably one of the very worst things that could ever happen to us back then was to be sent to our room because there was ABSOLUTELY nothing to do in there other than to reflect on our crimes. Do you remember those days?

Basic Communications

Back then communications were basic. Many of us lived on a telephone party line we had to share with several other families. Long distance phone calls were expensive and often of poor quality. Letters took days from the time they were sent to when they were received and even longer to be responded to. Telegrams were only used for important events. As a result, whether it was information, goods or communications, we had to learn to wait. We had to learn to be patient.

Limited Information

Information was limited. We only had a few radio stations and even fewer TV channels. World events were something we read or heard about, often long after they had taken place. Information was finite because we lived in a largely single source world. This was a world that was primarily made up of text and paper. Most of our information came from newspapers, magazines, books, encyclopedias, and the library. High tech was an 8 mm film, a slide projector, or a hi-fi stereo. Multimedia meant it had a diagram or photo. And almost nothing happened right away. We had to wait for everything, from information, to decoder rings, Mickey Mouse Club memberships, and mail order purchases.

Doing Research

Back then doing research was a physical act. We went to the library and used the Dewey Decimal system to search the card catalog. Then we walked through the stacks, hoping we’d find what we were looking for. If we were lucky enough to locate the right book, we flipped through it trying to find the information we were looking for. Our primary sources for that information were Funk and Wagnall’s, the Webster Dictionary, the Encyclopedia Britannica, the Book of Knowledge, or a textbook. This was information that could be committed to paper because our world and the information in it didn’t really change very quickly.
The Schools of Our Youth

The schools of our youth reflected the times we lived in. They were predictable and safe. They were orderly and punctual. Having a weapon at school meant being caught with a slingshot, cork popgun, or peashooter. What’s more, schools had authority. Teachers and administrators were respected. Some students weren't as smart as others, so they failed a grade and were held back to repeat the grade over again. Tests were not adjusted for any reason.

School Discipline

Children who misbehaved were dealt with swiftly. Some got detentions while others got the strap, the cane or a ruler. Our actions were our own responsibility. Consequences were expected. And the vast majority of parents supported the actions of the school. The idea that our parents would rescue us if we got in trouble in school or broke a law was unheard of. But being sent to the principal's office was nothing compared to the fate that awaited us when we got home. Parents and grandparents were a much bigger threat!

We sat in rows. The teacher talked. We were expected to listen. Most information came directly from the teacher or a textbook. The focus was primarily on content recall that was tested with fill-in-the-blanks or multiple choices. And as we progressed through the system, teachers became content specialists.

Communications came through the PA system. Most classrooms didn’t have a phone. In many classrooms, the most powerful technology was a piece of chalk and a blackboard. It was a big deal to have a film or filmstrip; and it was absolutely high-tech for a teacher to have an overhead projector and multi-colored pens.

We could go on, but you get the idea. But that was the way it was back then, and in describing the way things were when we were children, we’ve literally examined the tip of a very large and growing the iceberg.

So What About Today?

In more ways than many of us can remember or measure, the world of today is a VERY different place than the one we grew up in. It’s a world constantly on the move. It’s no longer the stable place we grew up in. In a few short years the concept of family has moved from Father Knows Best and Happy Days to the Simpsons – from Beaver Cleaver to Beavis & Butthead and the Family Guy.

The Changing Nature Of Families

For example, in North America, during the past 30 years we’ve gone from 10% to 28% of families being led by a single parent. Beyond that, we now have blended families, inter-racial families, gay and lesbian families, separated by divorce, multiplied by divorce or just about any possible combination you can imagine.
The Changing World Of Living And Working

And the everyday world is different. Our rhythm of life is now dictated as much by work schedules as by family needs. In the 1950’s both parents worked in only one of five families. And this was typically a five-day workweek. Sundays were sacred. Today it’s one in two families where both parents work, and it’s a 24 hours a day, 7 days a week, 365 days a year world of work.

In a 24/7/365 world, routines are harder to maintain. Family meals, family time, one-on-one time, quiet time, down time, and Sundays are more difficult to schedule than ever. As a result, life today has developed a fast food mentality both literally and figuratively.

In 68% of American homes, the only parent or both parents work in order to make ends meet. According to David Walsh from Media Family, in a week in the life of an average school-age child they spend 1/2 hour with dad, 2 1/2 hours with Mom, 2.2 hours doing homework, 1/2 hour reading for pleasure and more than 25 hours – the equivalent every 7 days of a full time job or week of school - watching TV, playing video games, and interacting with digital devices.

As a result of this changing world, parents today spend 40% less time with their children than parents did just 30 years ago, and much of that time is spent watching TV and movies. The scarcest resource for many families today is not time but attention. Consequently, there’s a growing void in children’ lives that needs to be filled.

These Are Subtle Changes

This isn’t an over-night trend. There’s been a steady progression as parents have had less time to spend with their children. Technology has filled the growing void. It started years ago with the telephone, radio, and TV. It then progressed to videos and video games. Now it’s on-line gaming, email, surfing, on-line chatting, cell phones, blogging, texting, and a growing host of other digital experiences.

Today, a growing percentage of children come home from school to no one, because either both parents or their only parent are at work. Consequently, many children are literally left to their own devices. But for a number reasons, including safety concerns, instead of playing on the street or at the park, many children now stay inside watching TV or videos, listening to music, playing videogames, chatting on Instant Messenger, blogging, talking on the phone and surfing the Web.

Gadgets a s Babysitter

In this 24/7 world, these new digital gizmos have become the babysitter, the constant companions, and best friends for many of this generation’s children. These devices are increasingly where today’s digital generation finds their role models and learn their social skills. Their rooms are filled with people, relationships, interactions and adventures that come through their computers, phones, and video games. As a result, this generation is equally as comfortable with virtual, screen-to-screen relationships as they are with face-to-face relationships.
Contrast Our Experiences with Theirs

So while for our generation, the worst thing that could have happened was to be sent to our rooms, many children today are completely comfortable nesting in their digital cocoons.

Today’s High-Tech World

And today’s world is decidedly more high-tech than our world was. According to a Pew Internet study, eighty-two percent of American children play video games on a regular basis - an average of 8.2 hours a week - and over 70% of dollars spent by children and teenagers on toys are spent on electronic games. Today’s children have access to and take for granted having access to computers, remote controls, the Internet, email, pagers, cell phones, MP3 players, CDs, DVDs, video games, Palm Pilots and digital cameras. These are tools and toys with capabilities that would have been unimaginable when we were children and even 10 years ago for that matter. And for the Millennium generation, there’s never been a time where these digital wonders haven’t existed - they haven’t just adopted digital media – increasingly they’ve internalized them and take it completely for granted.

A Different World

Let’s be clear that this is a fundamentally different environment than the one that our generations grew up in. It’s a 600-channel TV universe. It’s a 10,000 station radio universe accessible online. It’s a 100,000,000,000 plus page Internet. Children today take for granted that they can view world events as they occur – as TV mini-series that unfolds before their very eyes. They see history in the making. They watch the collapse of the World Trade Center building, the war in Iraq, the Sumatran tsunami, the eruption of an Indonesian volcano, or a hurricane in the American south, in real time even when many of these events are happening halfway around the world. Consequently, for them the notion of time and distance, which meant so much to us, means very little.

Twitch Speed

This generation operates at what Marc Prensky describes as twitch speed. Children accept as normal that they should have instantaneous access to information, goods and services at the click of a mouse. They expect to be able to communicate with anyone or anything at anytime, anywhere day or night.

Such everyday expectations have led to the death of patience and the emergence of a society increasingly expecting, wanting and demanding instant gratification. This is one of the reasons why it’s harder and harder to get children to read today. Reading is a delayed gratification medium while TV, video games and the Web are immediate gratification media. For example, Ian recently heard his son Kyler bitterly complain that it had taken him 20 minutes to register for his Spring courses at college, which he was doing ONLINE from his bedroom!!!!
Anyone remember the good old days? Anyone remember the huge lineups and hours long wait to register for university courses? Remember finally getting to the front of the line only to find that the courses you wanted were closed!

The Emergence Of The Web

Such assumptions and expectations about instantaneous access are the result of a massive shift of information and services to the Web. Today, from a desktop, from a laptop, from a handheld device, or a cell phone, children have instantaneous access to literally every library, every art gallery, and every museum in the world. And more relevant for these children, they also have access to friends, games, music, movies, shopping, cheat sheets, and tens of thousands of online sites specifically design to attract the Instant Messenger generation.

An MTV Mindset

Because they’ve grown up with not just text-based information, but also images, sounds, color and video presented as a single entity, this generation has developed an MTV mindset. For them, this isn’t multimedia. For them, as David Thornburg suggests, it’s monomedia – it’s all just digital 0’s and 1’s and delivered by a single device. How they’re assembled and viewed is entirely up to the viewer/user. And is you think that Sesame Street had an effect on how kids thought, you can imagine what different effect exposure to MTV, the Internet and video games is having.

A Visual World

This digital generation is completely comfortable with the visual bombardment of simultaneous images, text and sounds because for them, such experiences provide relevant and compelling experiences that can convey more information in a few seconds than can be communicated by reading an entire book. Moreover, these new media are not just designed for passive viewing because increasingly, passive viewing just doesn’t cut it. This generation no longer wants just to be the audience; they want to be the actors. They expect, want, and need interactive information, interactive resources, interactive communications, and relevant, real life experiences – which helps explain at least in part the rise in popularity of reality-based shows like Survivor and Fear Factor.

A Global Trend

It’s absolutely critical to stress that this trend does not just apply to those who have access to the latest digital media or the Internet. It even applies to the technological have-nots, the disadvantaged children on the other side of the so-called digital divide, who still have access to video games, cell phones, pagers, MP3 players and a multitude of other digital gadgets. In fact, this trend isn’t just unique to North American children, but pervasive around the world, for most children, regardless of socio-economics, culture, race or religion.
For example, Ian recently took the picture below in the 300-year old Arab market in Singapore. For someone who has never experienced the Arab market, it’s hard to describe the overwhelming sensory experience – the sights, the sounds, and the smells of the street are absolutely overwhelming. According to the locals, other than electricity and automobiles, the scene is very little different than it would have been three centuries ago. This picture is of an 11-year-old girl, who is sitting on a bolt of cloth patiently waiting while her mother barters for fabric. In her hand is a palm-sized wireless device she’s using to surf the Web.

So What’s The Point?

What’s becoming abundantly clear is that this new digital generation is very different from our generation when we were growing up. Not just a little different but FUNDAMENTALLY different. They crave access to tools that let them network with their peers or anyone or anything else they choose to interact with. And for them, it’s second nature to multitask. They expect, want, and need tools that provide hyperlinks and instantaneous random access that allow them to connect everyone and everything to everyone and everything else simultaneously for instant gratification.

They can be doing their homework, talking on the phone, listening to music, downloading movies, surfing the Web, and maintaining multiple simultaneous conversations on a chat line. And they’re still bored. Comparing these experiences to our experiences growing up, these activities have increasingly become their replacement for what we did on the street, the park, and back yard.

Where Do They Get Their Values?

Increasingly, today’s children’s values are not and will not be inculcated by the family, the church or other institutions in either the present or the future. They are and will continue to be developed by the electronic and visual media that they are exposed to. This is where they will learn many of their social skills as they’ve become increasingly immersed in the new digital landscape.

Going Back In Time

Make no mistake about it. If we could use a time machine to bring children and teenagers forward from the 60’s, 70’s or even 80’s and immerse them in the world of today, they would find it to be a dizzying if not overwhelming experience. The digital environment in which they are now growing up has shaped today’s children.

They use digital technology transparently, without thinking about it, without marveling at it, without wondering about how it works.

Digital Natives

This is the first generation that has ever mastered a multitude of tools essential to society before the older generations have. Because of constant exposure to digital devices – because of chronic digital bombardment – this generation has grown up in a new digital landscape – digital is their language of choice – their native tongue.
They are DFL. The speak Digital as a First Language. It’s the language they were born into and feel most comfortable speaking. They are, as Marc Prensky describes them, Digital Natives who have grown up in the new digital landscape. For this generation, there’s never been a time when computers, the Web, cell phones, and all of the other digital wonders haven’t existed.

What About Us?

But most of the people reading this article and most educators grew up in the 60s, 70s and 80s. In much the same way that children today have been shaped by their world, we were shaped by the predominantly text-based, simpler, predictable, relatively stable, low-tech world we grew up in.

The New Digital Divide

As Prensky points out, most people from our generation and our parents’ generations are not Digital Natives. We don’t speak digital as a first language. We were not born into the new digital landscape. As Prensky writes, we’re Digital Immigrants - don’t consider this to be a negative term. We’re Digital Immigrants because we come from the old country. We come from the non-digital world. We come from a time and place before digital technology changed just about everything. And as a result of our experiences, we have old country traditions & assumptions about the world.

We speak DSL. We speak digital as a second language. We speak, hear and think digital with varying degrees of an accent. Like all immigrants some of us are better than others at adapting to the ways of the new country, but like all immigrants, we retain some degree of our accent from the old country. The thicker the accent, the harder it is to understand and adapt to the new digital landscape. We struggle as we apply old thinking to new ways of doing things, new technologies, new software and new mindsets. And the thicker our accent, the harder it is to be understood by the Digital Natives.

You know you’re DSL when you talk about dialing a number; when you need a manual or course to learn new software; when you use the Internet for information second rather than first; when you phone people to tell them about a Web site; when you print out your email to read it; or print out a report to edit it.

Living and Working In A Digital World

You couldn’t live or work in another country unless you resided there and learned the language, customs, and culture. In much the same way, to operate today in the new digital landscape, to live, work and communicate effectively, we need more than superficial understanding of this digital landscape. We need a deep understanding of the language, customs, culture and learning styles of our children. If we don’t, when students walk into class at and listen their teachers speaking to them, they instantly hear their teachers’ digital accent, and for many of them, there’s an immediate disconnect. Consciously or unconsciously, they sense that many of their teachers aren’t a part of, not in synch with, and probably don’t understand the world the Digital Natives live in.
**Digital Immigrants**

As Digital Immigrants, many of our generation, particularly in the over-30’s group, are distracted and disoriented by multiple, simultaneous, information sources and random access. We try to use old mindsets to do new things. We need to read a manual, take a course, watch a video, or talk face-to-face like we did in the park so many years ago. And while we may use the digital tools, they’re not always intuitive and their use does not always come naturally.

Digital Natives Learn Differently

Digital natives on the other hand, pick up new devices and start experimenting with them right away. They assume the inherent design of the device will teach them how to use a new gadget intuitively. This is because the digital native has adopted a mindset of rapid-fire trial and error learning. They’re not afraid of making mistakes because they learn more quickly that way. They use devices experientially, and have no problems getting help online.

Digital Immigrants don’t understand this

But many Digital Immigrants just can’t conceive how anyone can learn like this. So by the time a digital immigrant has read the table of contents of a manual, the digital native has already figured out 15 things that will work and 15 things that won’t. While the digital immigrant is afraid they’ll break the device, the digital native knows they can just hit the reset button and do it all over again. In fact, for many Digital Natives, they see the world as one great big reset button.

Digital immigrants focus on and try to apply the skills learned in another time. And as Steven Johnson points out in “Everything Bad is Good For You”, we often don’t appreciate the skill development of Digital Natives skills that children have honed to perfection with years of trial and error practice. For example, how many of you have ever played a video game with a teenager and got absolutely beaten?

What some Digital Immigrants can’t appreciate is that the reason children don’t have the same skills and literacies as we do is that there has been a profound shift in the kind of skills used and needed to operate in the digital world. The reason their skill development is different is because their focus is different. They’re developing skills in OTHER areas than we did - skills like game playing, on-line searching, and on-line messaging - and they do all of this simultaneously.

We just don’t get it

We fail to understand, let alone esteem or value the skill development Digital Natives do have. Instead we complain about the skill development they don’t have. Because digital isn’t our native language and because we’re immigrants to their world, we unconsciously look down our noses at children who act differently. Digital children have a completely new and different set of skills than the ones we have and value. We tend to unconsciously assume that their skills not as good and they’re not as literate as we are because they don’t seem to value or prioritize our literacies. So, instead of embracing the new, instead of recognizing that the world has changed, that it’s a new digital
world, many Digital Immigrants complain and remain attached to the old and talk about how much better it was in the old country.

What We’ve Learned in the Past Few Years

Because of this constant digital bombardment, because of the emergence of the new digital landscape, and the pervasive nature of digital experiences, children today are growing up digital. And because they have grown up digital, new research is inferring that because of this pervasive digital bombardment - because of the emergence of the new digital landscape the brains of the digital generation have and continue to change physically and chemically – that our children and our students are actually neurologically wired differently than our generation is. They have developed a cultural brain. They have developed what we call hypertext minds. That their cognitive structures process information in a parallel or simultaneous manner, not sequential like ours. And even though we don’t yet fully understand the incredibly complex processes involved in thinking and learning, it’s important that we take a closer look at what we have recently learned.

First, consider that even today, we know more about outer space than we do about inner space. For example, even though the human brain is only 2% body weight, it uses 20 percent of the energy consumed, For what this energy is used, we’re still not sure. Further, research tells us that we come into the world with about 50% of the brain wiring in place to handle critical initial functions, the other 50% happens after birth.

Growing Up a Digital Immigrant

We know from both from the research and from personal experience that learning a first language or even a second language comes easiest to us during our first five years of life. However, for most of us, as we get older, learning a second language becomes increasingly difficult. It’s not that we can’t learn other languages, but when we do, we tend to have more of an accent and often have problems learning one or more aspects of the new language. Learning a language later in life is just not as easy as learning one early on. Let’s use this observation as an analogy for what’s going on with our children in the new digital landscape from the perspective of their internalization of the digital language.

Children Really Are Different

Recently, these were two recent cover stories in Time Magazine: Their conclusion was that children today are different. In fact, based on what we now know from the neurosciences and psychological sciences, what we’re now beginning to understand is that children today are FUNDAMENTALLY different than we are in the way they think, in the way they access, absorb, interpret, process and use information, and in the way they view, interact, and communicate in the modern world because of their experiences with digital technologies. If this is the case, it holds profound implications for all of us personally and professionally. Let’s examine what we know.

Conventional Wisdom
For the longest time, most neuroscientists believed that different areas of the brain were “hard-wired” and stable shortly after birth to handle different aspects of brain function. Conventional thinking was that by the age of 3, the brain was stable. That from that point on, our brains really did not change. That by the age of 3 we had a fixed number of brain cells, which then started to die off one by one with no appreciable new cell growth. As a result, the longstanding assumption has been that we all had fixed memory, fixed processing power, fixed intelligence. That the brain you had developed by the age of 3 was essentially the same brain you would die with. And this was believed to be the case for all brains regardless of race, culture, or experiences. The assumption was that we all thought in basically the same way because we all used the same neural pathways or neural electronic circuitry to take in, process and utilize information.

What We Have Learned

But certain cognitive changes, such as recovery from brain injury or stroke, demonstrate that the brain has the capability to change itself given the right conditions. Over the past 20 years, because of a number of major scientific and technological breakthroughs many of these long standing assumptions have been shown to be completely wrong. New scanning techniques combined with neuroscience and neurobiological research have demonstrated in one brain area after another and in system after system, that on the contrary, the brain is actually highly adaptive (or “plastic”) and remains malleable throughout – and that the old idea that we all have a fixed number of brain cells has been replaced by research showing that our supply of brain cells is continually being replenished - that the brain is constantly reorganizing itself structurally throughout life based on two critical factors. First is the input or experiences we have – and secondly, the intensity and duration of those experiences. We know this happens because the research tells us that neural circuits are constantly being strengthened or weakened based on the intensity and duration of the inputs. Brain cells and their circuits operate on a use-it-or-lose-it, survival-of the-fittest principle.

What This Means

What it means in laymen’s terms is that you can change memory capacity; that you can change neural processing power; and that you can re-grow neurons and change neural circuitry throughout your life. And as a result, that the intelligence we’re born with isn’t fixed. That measurable intelligence actually rises and falls depending on the type and duration of stimulation to which our brains are exposed, which in itself holds enormous implications ranging from, at one end, being able to enhance cognitive performance, to at the other end being able to arresting or reverse neural disorders.

Neuroplasticity

This process of ongoing reorganization and restructuring of the brain in response to intensive inputs and constant stimulation where the neurons are constantly rearranging themselves, making new connections, and pruning unnecessary neurons to speed and reroute the flow of thought is called is called neuroplasticity - literally that the brain is plastic.
So contrary to longstanding assumptions, the brain literally restructures neural pathways on an ongoing basis throughout our lives. It makes new cells, creates new connections, sets up new circuitry, and, as a result, constantly creates new thinking patterns.

Some Recommended Books

There have been a number of new books written on neuroplasticity and digital children. We’ve included an extensive bibliography in this handout, but in particular we would highly recommend four.

The Brain That Changes Itself

The first is Norman Doidge’s book The Brain That Changes Itself: Stories of Personal Triumph From the Frontiers of Brain Science. This book explains in clear and simple language exactly what neuroplasticity is and what it implies for learning. It also has a lengthy examination of the cultural brain - what prevailing culture does to neural processes and in particular what digital culture and digital bombardment is doing to the digital generation.

Everything Bad is Good For You

A second excellent book is Everything Bad is Good For You by Steven Johnson. Johnson says that complex games and new technologies are already educating our kids before and after school. Below our radar they are having a powerful effect in their thinking processes. As a result of digital bombardment, Johnson says that our children today arrive in the classroom with a completely different set of cognitive skills and habits than past generations had and that their devices have become extensions of themselves, indispensable social and learning accessories. Johnson argues that contrary to what Digital Immigrants might believe, gaming isn’t just for slackers. That gaming and much of today’s TV offerings can be mentally enriching - that they sharpen thinking, hone social skills, and fine tunes perception. Further, he asserts that the plots of today's video games, movies & TV challenge young viewers to think like grown-ups, follow intricate narratives & analyze complex social network - far more complex plots and stories than the narratives we experienced when we were growing up – and that these activities are an exercise for the mind the way physical activity exercises the body.

As a result Johnson suggests that the way gamers explore virtual worlds mirrors the way the brain processes multiple but interconnected streams of information in the real world and he suggests that this generation of learners has become very sophisticated thinkers who amongst other things, have learned to take risks without being reckless, have learned to deal with failure, are confident, motivated, and expect a lot of themselves—in areas they care about. These are the minds of children growing up in non-linear, light and sound-based culture.

The problem is that the many skills that digital bombardment has enhanced such as parallel processing, graphics awareness, and random access, which are sophisticated and valuable thinking skills that have profound implications for learning, are almost totally ignored by
educators and are not generally measured by the current school system, No Child Left Untested, or the tests that we use to measure achievement.

As a result, Digital Natives, who are accustomed to the twitch-speed, multitasking, random-access, graphics-first, active, connected, fun, fantasy, quick-payoff world of their video games, MTV, and Internet are incredibly bored by most of today’s education. In the past few years there has been increasing concern expressed about Digital Natives fascination with multitasking - attending to several things at once. Digital Natives are completely comfortable with the sense of “highway hypnosis”—the ability to drive or multitask with little memory of the process of getting there.

Human beings have always had a capacity to multitask. Mothers have done it since the hunter-gatherer era - picking berries while suckling an infant, stirring the pot with one eye on the toddler. Nor is electronic multitasking entirely new: we’ve been driving while listening to car radios since they became popular in the 1930s. But there is no doubt that the phenomenon has reached a kind of warp speed in the era of Web-enabled computers, when it has become routine to conduct six Instant Messenger conversations, watch American Idol on TV and Google the names of last season’s finalists all at once.

That level of multiprocessing and interpersonal connectivity is now so commonplace that it's easy to forget how quickly it came about. Fifteen years ago, most home computers weren’t even linked to the Internet. Any number of dire predictions has been made about the long-term effect of multitasking on Digital Natives neural processes.

This is not surprising. Ever since the time of Socrates, parents have had trouble dealing with their children – it’s not that they’re deficient, it’s that they’re different. Every generation of adults sees new technology, the new thinking behind it, and the social changes it stirs - as a threat to the rightful order of things:

Plato warned (correctly) that reading would be the downfall of oral tradition and memory. And ever since then, every generation of teenagers has embraced the freedoms and possibilities wrought by new technologies in ways that shock the elders and break away from the way that things have traditionally done. Because most adults (including the critics) can’t play the modern complex games themselves (and discount the opinions of the kids who do play them) they rely on secondhand sources of information, most of which are sadly misinformed about both the putative harm and the true benefits of game-playing because how kids now communicate, how kids read, how kids choose to interact with information and others doesn’t conform with our traditional definition of literacy.

A Whole New Mind

Another related book is Daniel Pink’s “A Whole New Mind”. Pink says that we live in a predominantly linear logical left to right top to bottom beginning to end left brain society. The left side of the brain specializes in recognizing serial events like talking, reading, writing and numeracy. It is particularly good at decoding things that march in single file. It handles logic.
It deals in the literalness of meaning - schools have traditionally focused on left-brain thinking and with good reason.

Left-brain thinking was the basis of the incredible success of the Industrial Age. And this left-brained mindset is and long has been the mindset behind education and testing. Pink notes this emphasis is increasingly educating creativity out of children and that given the state and rate of change in our society today if all kids learn to do is read, write and be numerate by 20th Century standards, they will not be literate by the standards of the 21st Century. Pink states that the role of the right side of the brain, which primarily handles pattern analysis, problem solving, big picture thinking, intuition, creativity, connecting the dots, synthesis, emotional expression, context and putting the big picture together to create meaning by resolving contradiction in order to make sense of situations and to determine significance has long been undervalued, underappreciated & misunderstood in our predominantly left-brained society. Pink then says is that almost anything that involves predominantly left-brained thinking will or already has been automated, turned into hardware or software or outsourced - of course we know that the brain’s two halves work together as an integrated whole. But what Pink says is that if our children are going to survive let alone thrive in the culture and workplace of the 21st C they are going to have to go from being linear logical left brained thinkers to whole brain thinkers. That creativity and problem solving are as important as traditional literacy and memorization; and that we should treat creativity and problem solving with the same status we do traditional literacy. But if we’re going to do this, education is going to have to provide experiences that require students to use both hemispheres together - that we’re going to have to educate the Whole New Mind.

Brain Rules

The final book is Brain Rules by John Medina. Most of us have no idea what's really going on inside our heads. Yet brain scientists have uncovered details every business leader, parent, and teacher should know--such as the brain's need for physical activity to work at its best. How do we learn? What exactly do sleep and stress do to our brains? Why is multitasking as myth? Why is it so easy to forget--and so important to repeat new information? Is it true that men and women have different brains? In Brain Rules, molecular biologist Medina shares his lifelong interest in how the brain sciences might influence the way we teach our children and the way we work. In each chapter, he describes a brain rule - what scientists know for sure about how our brains work--and then offers transformative ideas for our daily lives.

Medina's fascinating stories and sense of humor breathe life into brain science. You'll learn why Michael Jordan was no good at baseball. You'll peer over a surgeon's shoulder as he finds, to his surprise, that we have a Jennifer Aniston neuron. You'll meet a boy who has an amazing memory for music but can't tie his own shoes.

You will discover how:

- Every brain is wired differently
- Exercise improves cognition
- We are designed to never stop learning and exploring
- Memories are volatile
• Sleep is powerfully linked with the ability to learn
• Vision trumps all of the other senses
• Stress changes the way we learn

In the end, you'll understand how your brain really works--and how to get the most out of it.

Qualifying This
The caution here is brains don't just change spontaneously. Our neural circuits may fit a common cerebral architecture but are molded by our life and learning experiences so for the brain to become neuroplastic requires that there be intensive, sustained, progressively challenging stimulation and focus that happens over extended periods of time. What we're talking about here is several hours a day, 7 days a week.

For example, learning to read and write requires our brains to be reprogrammed over extended periods of time. What we're talking about here is several hours a day, 7 days a week. In the same way, watching TV for extended periods of time reprograms our brains. But again, this requires several hours a day, 7 days a week. Does several hours a day, 7 days a week remind you of anything else happening in our children's lives today?

The Impact of Videogames and Digital Devices
This is increasingly what's been happening to digital children' brains several hours a day, seven days a week since the arrival of Pong in 1974, followed quickly thereafter by SuperPong, Donkey Kong, PacMan, SimCity, Space Invaders. And now it's Madden Football, Grand Theft Auto, Tony Hawk, SimCity, and arcade games. and now solo games, which were the norm in the period before computers became networked, have mostly been supplanted by And now solo games, which were the norm in the period before computers became networked, have mostly been supplanted by Massively Multiplayer Online Role Playing Games (MMORPG) like EverQuest, World of Warcraft, Runescape, Maple Story & all the rest. Millions people globally pay to play in three dimensional game worlds - and it's not unusual for several MILLION people to be online at the same time playing the same game simultaneously working collaboratively or competing against one another. These experiences are digital bombardment

Digital Bombardment
And this is exactly what's been happening to digital kids brains, several hours a day, several days a week. Many children have spent their entire lives surrounded by and using computers, videogames, DVD players, cell phones, iPods and a never ending list of inexpensive digital wonders. In a recent study undertaken by Jupiter Research, it was estimated that half of all 4- to 6-year-old children and ¾ of teenagers play video games - on hand-held devices, computers or consoles several hours a day, several times a week. What we need to do is stop here and consider the implications of this constant exposure to digital devices and digital experiences.

The Brain As A Tree

Understanding Digital Kids
The brain is like a tree. First there’s a flurry of growth - the tree grows extra branches, twigs and roots. Then the unused branches or pathways are pruned away. And it’s this pruning that gives the tree its shape for the future. This is what exactly what is meant by "Use it or lose it" - the cells and connections that are redundant or seldom used are pruned away - they wither and die. And by the way, it’s this pruning and NOT hormones that make teens act strangely as new.

Myelin

As new neuronal connections form during the early part of childhood, heavily used pathways become coated or insulated by myelin, a fatty insulating sheath that speeds signal transmission. Myelin boosts signal transmission speeds in the brain more than 13 times. This is a jump in speed analogous to switching your Internet connection from dial-up to broadband. Myelinated circuits also transmit 30 times more information per second, giving them not only greater speed but also greater bandwidth. So if a student is only doing music or sports or academics, those are the cells and neural pathways that will become hard-wired and insulated. However, if that same student is lying on the couch or playing video games or watching TV, those are the cells and connections that are going to flourish. The most useful connections develop into a neural network as a result of regular exposure, or if the connections are not useful they're pruned away.

How Has This Affected DNs?

As a result, today even amongst our youngest children, a multitude of inexpensive digital devices and gadgets that facilitate hypertext, interactivity, networking, random access & multitasking – this digital bombardment is literally wiring and then rewiring kids’ brains on an ongoing basis, and particularly enhancing visual memory and visual processing skills. And as a result of these digital experiences what researchers are now beginning to conclude is that our students, our children are processing the very same information we process differently than we do. How do we know this? We know this because of the Human Brain Project.

The Human Brain Project

Which has been ongoing for several years now at universities around the world. During that time, a new field of study called neuroinformatics has emerged. Neuroinformatics involves the digital analysis of brain processes by means of neural scanning and imaging using the incredible number-crunching power of computers and our growing understanding of the chemistry and biology of the brain.

For the first time, using powerful brain scanners and imaging techniques, including functional Magnetic Resonance Imaging (fMRIs), Positron Emission Tomography (PET) scans, and OT (Optical Topography), we can now get inside the black box and examine the functions of normal and impaired living brains non-invasively while they are involved in various cognitive tasks.
With these technologies, researchers can digitally view and analyze a living brain’s processing patterns at the molecular level in real time and 3D to determine what parts of the brain and what specific neural circuitry are being used during specific mental processes. These technologies allow researchers to be able to pinpoint to within a few millimeters the parts of the brain that “light up” or turn on when people view vivid colors, or react to pictures of calorie-rich desserts, stare at pictures of fearful faces – even something as simple as move a finger, feel sad, add 2 plus 2, or do specific tasks.

The Brainbow

And just recently another huge leap forward was revealed. Scientists announced the development of a new imaging technology called the Brainbow. The Brainbow allows researchers to color code different neural pathways the same way we color code house wiring to trace electrical pathways back to their source. The Brainbow will allow researchers to determine the specific neural pathways that are used during specific thought processes. These and many more developments are and will help researchers understand how different areas of the brain interact to handle even the simplest of tasks. And as a result of these developments, we’ve learned more about how the brain operates in the last few years than we did in the previous 100 years.

Looking Inside the Brains of DNIs

The cover article of a recent issue of Scientific American Mind is titled “The Teen Brain.” In this article there are some photographs of people of different generations doing specific mental tasks. What the article and the research say is that if you were to take a digital electronic scan of our parents’ brains doing a specific mental process and compare it to a digital electronic scan of ours doing the same mental process, we would quickly see that we use SLIGHTLY different neural pathways to process, retain and use the same information than our parents. But in the same way, if we were to take a digital electronic scan of our brains doing a specific mental process and compare them to those of digital children’ brains doing the same process, we would find that they use significantly different neural pathways to take in, process and store the same information we do. We see this particularly in the area at the back of the brain known as the visual cortex.

The Effect Of Digital Bombardment

Let’s consider the effect of digital bombardment on the visual cortex. Consider that the average video game takes about 40 hours to play, the complexity of the puzzles and objectives growing steadily over time as the game progresses. A study by the University of Rochester found that visual processing dramatically increases with as little of 10 hours of game play.

According to a recent 3M study, if you were to present 100 photographs to people of different generations, Digital Natives, those who have grown up in this new digital landscape, would be able to recall about 90% of the images. People of our generations, the Digital Immigrants, would be able to recall only about 60% of those same images. And people from our parents’ generations, the ones affectionately known as the Digital
Dinosaurs who grew up in a primarily audio and text-based world would only be able to recall about 10% of those same images.

Further, research from 3M says that the eye processes and interprets images 60,000 times faster than it does words. This is because the brain is much more suited to processing visual information than anything else. The reason is because nerve cells devoted to visual processing account for about 30% of the brain’s cortex, compared to only 8% for touch and 3% for hearing. It’s completely natural that today’s students might be far more inclined toward visual processing than text processing. Do you think that this might hold any implications for the way they learn most effectively? Further this study says that because Digital Natives think graphically, the eyes of Digital Natives move differently than the eyes of Digital Immigrants when they reading materials.

**Digital Readers**

The eyes of older generations unconsciously find intersection about 1/3 of the way down the page and 1/3 of the way in from the left side - the Greeks called this intersection the Golden Mean - and then we read in what’s called a Z curve. A complex Z curve if there’s lots of information, and a simple Z curve if there’s only a small amount of information.

But research tells us that the eyes of Digital Natives first skim the bottom and edges before they read the page in what’s called an F-pattern. This is a series of thermographic prints developed at Kent State University for a company called SirsiDynix from Toronto. A heat map tracks eye movement of students in different reading configurations and then sums the records. The brighter the color the more the reader has focused on the information in that area.

As you can see here, digital natives read in what’s called an F-Pattern. Typically they will unconsciously ignore the right side and bottom half of the page. **Unless they are highly motivated Digital Natives typically tend to unconsciously ignore the right side and bottom half of the page and will only read content on the right side and bottom of the page if they are highly motivated to do so.** Do you think this holds any implications for designing engaging reading materials?

**Color of Text**

And while Digital Immigrants typically find it distracting to read text of different colors, specific colors attract and repel Digital Natives when they’re reading. **Blood red or pink (depending on gender) draws their attention first, followed by neon green and burnt orange are skimmed - and unless highly motivated, black is ignored completely.** Do you think this finding might have any implications for strategies we might want to develop to teaching of reading?

Both of these findings become even more significant because according to respected writer Eric Jensen and others, at least 87% of students in any given classroom are NOT auditory or text-based learners. Increasingly, because of digital bombardment, because they think graphically, because they’ve grown up in the new digital landscape, they’re either visual or visual kinesthetic learners.
They’re visual kinesthetic not because they’re trying to drive us crazy, but because they’ve grown up that way in the new digital landscape. They’re Digital Natives wired for multimedia.

Yet as Jensen points out, despite this knowledge, at least 85% of the questions on test and state exams continue to be based primarily on text.

How Much Digital Bombardment?

According to Prensky, by the time they’re 21, digital kids will have played more than 10,000 hours of video games, sent and received 250,000 emails and text/instant messages, spent 10,000 hours talking on phones, watched more than 20,000 hours TV and 500,000 commercials. Almost none of these are experiences our parents or we had while we were growing up.

Because, as Prensky also points out, at the same time these digital kids will have spent less than 9,000 hours attending school - less than 4000 hours reading books - and much of that time is spent unengaged or under-engaged.

Do you think these experiences, do you think this digital bombardment might have any impact on the way they think - on the way they learn – on the way the view the world –on what engages them?

Many of the recent findings from the neurosciences validate what we already knew from psychological sciences. Things such as social learning theories, the need for context and relevance, the need to make connections to older learning, high challenge, low – threat environments and so on.

However, some of the research has also exposed some widely held assumptions, myths, and simplistic beliefs about learning that can impede learning or that are just plain wrong – things such as gender stereotyping, left-and right-brain learning, enriched environments in early childhood, fixed intelligence, IQ as the measure of all intelligence, that all learner learn in the same way and or that memory fades as we age.

What We Can Conclude

And it doesn’t stop there. We all process information in slightly different ways, but with the experiences and stimulation our children have been exposed to, the research is telling us that Digital Natives are using different parts of the brain to process information differently than Digital Immigrants. And by the way, we’re beginning to see an accelerated gap between the younger generations – between teenagers, tweenagers, and younger children. Understanding this research helps explain, at least in part, why children are different – why they act the way they do – why they view the world the way they do. And it also helps to explain some of the fundamental differences between their generations and ours.
Despite the fact that there are more than 40 years of solid research on how learners learn best, of how the brain function, of what instructional models are most effective, this research has not been widely accepted or integrated into most classrooms to better help today’s learners and their learning and communication preferences. Nor is it reflected in many of the assumptions that are the foundations of public education today. Let’s examine these statements in a little more depth.

Beware of Snake-Oil Salesmen Selling “Mind-Based Education”

These days there’s considerable hype being generated around recent neuroscientific findings. Interpretation of these findings have led to the emergence of so-called “brain-based education” models which have become fashionable in many schools and districts throughout North America.

The reason for the hype is in part due to the fact that neuroscience is viewed in some quarters as being far more exciting and sexier than the considerable body of well-established, long-term psychological research. Brain-based education is held up in some quarters as a research-based panacea to many of the ills that beset education.

Excuse me while we rant for a moment, but talking about brain-based education makes just about as much sense as talking about leg-based walking or mouth-based eating! What else should education be, if not brain-based? How about shoulder-based learning? How else do we become educated, if not by using our brains?

It’s important to carefully examine the research base of the many so-called “brain based” educational packages and training being offered to educators. A number of these packages are built on hype, myths and misconceptions that reinforce deeply held erroneous educational beliefs and assumptions about learning. Others are simply psychological research-based sheep seductively dressed up in neuroscientific wolves’ clothing.

Gullible, solution-seeking educators and policy-makers desperate for immediate, measurable results buy into such products because research can be twisted around to explain, justify and conversely discredit just about anything. This despite the fact that the hype often is based on isolated or limited research findings that have been glamorized misinterpreted or misrepresented by overzealous publishers and the media.

There’s no need for you become a psychological or neurological-expert complete with all the jargon and details of the brain and mind at your fingertips. However, it is important that you have a basic understanding of how learning actually does occur in order to ensure that instructional practices are based on well researched solid theories of learning. You may feel overwhelmed by the research and worry that you’re being sold a bill of goods? If you keep the following advice in mind, you won’t go far wrong:

By itself, brain research cannot be used to support particular instructional practices. It can, however, be used to support particular psychological theories of learning, which in turn can be used to design more effective forms of instruction. James Byrnes, 2000, p. 185
What’s The Point?

Because of this constant digital bombardment what we know as educators must begin to acknowledge is that digital kids process information differently using different parts of the brain differently than people of our generations do.

And by the way, we’re also beginning to see an accelerated gap between the brains of the younger generations - between the brains of teenagers, tweens and younger children. Because Digital Natives look pretty much the same on the outside, it’s really hard for us to comprehend how much change is really taking place.

Now if you understand even a little bit what we’ve just written, this might help explain at least in part why kids act differently, why they respond the way they do, why they view the world the way they do - and this might help at least in part to explain some of the fundamental differences between their generations & ours.

Yet sadly - and this is what makes me mad as hell - almost nothing of what we’ve learned about how our brains and minds function is being applied in the classroom today.

The Definition Of Insanity

Doing the same things you’ve always done, but expecting or wanting or needing completely different results. And if we continue to do what we’ve always done, we’ll continue to get what we’ve always got. And if we continue to do what we’ve always done, maybe we need to stop for a moment and ask the question who here really has the learning problem? We have a hint - it certainly isn’t the students

The Gap Between Digital Learners & Traditional Teachers

Let’s try to summarize what digital bombardment has done to the digital generation. Let’s summarize once more what writers like Steven Johnson, Marc Prensky, Daniel Pink, and others say about the learning styles of digital learners:
<table>
<thead>
<tr>
<th>Digital Learners prefer:</th>
<th>Many educators prefer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>receiving info quickly from multiple multimedia sources</td>
<td>slow &amp; controlled release of info from limited sources.</td>
</tr>
<tr>
<td>parallel processing &amp; multi-tasking</td>
<td>singular processing &amp; single or limited tasking.</td>
</tr>
<tr>
<td>processing pictures, sounds color, &amp; video before text</td>
<td>to provide text before pictures, sounds &amp; video</td>
</tr>
<tr>
<td>random access to hyper-linked multimedia information</td>
<td>to provide info linearly, logically &amp; sequentially.</td>
</tr>
<tr>
<td>to network simultaneously with many others</td>
<td>students to work independently before they network &amp; interact</td>
</tr>
<tr>
<td>to learn “just-in-time” to teach “just-in-case” instant gratification &amp; immediate rewards</td>
<td>deferred gratification &amp; delayed rewards</td>
</tr>
<tr>
<td>learning that’s relevant, active, instantly useful &amp; fun</td>
<td>feel compelled to teach to the curriculum guide &amp; tests</td>
</tr>
</tbody>
</table>

1. Digital Learners prefer receiving information quickly from multiple multimedia sources. Many educators prefer slow and controlled release of information from limited sources.

Today’s generations operate at twitch speed due to constant exposure to video games, hypertext, and all of the other experiences that reflect an increasingly digital world together with an expectation that they will have access to this world. As a result, Digital Learners have had far more experience at processing information quickly than we do, and they’re better at dealing with high-speed information. To coin a phrase from the movie Top Gun, Digital Learners have “a need for speed,” but many teachers only feel comfortable processing information at conventional speed. As a result, after spending hours of their lives playing video games, using digital devices and wandering around in virtual worlds, many Digital Learners literally run into a wall when they come to school and are forced to slow it down or dumb it down in order to function.
Educators can foster negotiation skills when they bring together groups from diverse backgrounds and provide them with resources and processes that insure careful listening and deeper communication.

2. Digital Learners prefer parallel processing and multi-tasking. Many educators prefer singular processing and single or limited tasking.

From the earliest times we’ve always been able to multitask. This is called continuous partial attention and involves randomly toggling between tasks deciding which one to do next. For example, we can be driving in the car, listening to music, checking the rearview mirror, talking on a cell phone and thinking about things you have to do. But now in our increasingly digital world, this stuff happens faster.

Ian can personally remember his parents coming into his bedroom and telling me to turn off the radio because he was supposed to be studying. He remembers being told by teachers that the best way to study was to isolate himself from the television, the tape player, and the busy sidewalks outside the window. He was told to clear a nice study corner, with a comfy chair, good lighting, and ample workspace.

Contrast that with the ways things are today. Just walk into a Digital Native’s bedroom today. They will be sitting at a computer, doing their homework, watching American Idol, listening to music, burning a CD, searching for something online, while simultaneously managing 14 instant messenger conversations…and they’re still bored. In fact, many students will tell you that doing this all at the same time helps them concentrate.

3. Digital Learners prefer processing pictures, sounds color, and video before text. Many educators prefer to provide text before pictures, sounds, color and video.

For generations, graphics were generally illustrations, accompanying the text and providing some kind of clarification to a concept. For Digital Natives, the relationship is almost completely reversed. The role of text is to provide more detail to something that was first experienced as an image.

Since childhood, the digital generation has been continuously exposed to television, videos, and computer games that put colorful, high-quality, highly expressive graphics in front of them with little or no accompanying text. The result of this experience has been to considerably sharpen their visual abilities.

They find it much more natural than our generation to begin with visuals, and to mix text and graphics in richly meaningful and personal ways. Digital learners need to be able to communicate as effectively graphically as we were educated to communicate with text. And visual fluency – needs to be embedded into every subject and every grade level. And be the responsibility of every teacher from Kindergarten to Post Secondary.
4. Digital Learners prefer random access to hyper-linked multimedia information. Many teachers prefer to provide info linearly, logically and sequentially.

Buckminster Fuller once wrote “How often I saw where I should be going by setting out for somewhere else.” The under-30 generation is the first to experience hypertext and "clicking around" in children's computer applications, in CD-ROMs, and on the Web. This new information structure has increased their awareness and ability to make connections, and has freed them from the constraint of a single path of thought, and in our humble opinion is generally an extremely positive development.

At the same time, it can be argued with some justification that unlimited hyperlinking may make it more difficult for students to follow a linear train of thought and to do some types of deep or logical thinking.

For Digital Learners, their mindset goes something like "Why should I read something from beginning to end, or follow someone else's logic, when I can just 'explore the links' and create my own?" While following one's own path often leads to interesting results, understanding someone else's logic is also very important. While the Internet may be far superior for quickly finding related bits of information, for understanding a topic deeply, it still requires the ability for extended focus and reflection.

5. Digital Learners prefer to network simultaneously with many others. Many educators prefer students to work independently before they network and interact.

When we were students, we were expected, at least in the beginning when new information was being introduced, to work independently. When we were out of school, the only ways we communicated with others was face to face or by phone.

Digital natives have grown up with literally dozens of ways to communicate. From cell phones, to MySpace, Friendster, Facebook, YouTube, blogs, Instant Messaging and so on they need, want and expect to be able to instantly and seamlessly communicate with others using tools of personal and mass collaboration – and they take for granted that this kind of access to others will be available 24-7.

6. Digital Learners prefer to learn “just-in-time.” Many educators prefer to teach “just-in-case.”

Schools are organized around just-in-case. Just in case it’s on the exam. Just in case you need to know something to pass the course. Just in case you want to become a scientist or an astronaut. Digital Learners prefer to learn just in time.

They want to gain an understanding of the things that they need to know to allow them to acquire the necessary skills and knowledge just in time to play a game or how to do
something they don’t know how to do. Just-in-time learning is about having the skills, knowledge and habits of mind that will allow them to learn just in time when that next window of opportunity or area of interest opens to them. A classic example of just-in-time learners happens when a Digital Learner purchases or receives a new game or digital device.

Do they read the manual from cover to cover like many of us do? Of course not! They pick it up and start messing around with it, pushing buttons and exploring the interface. By the time we’ve read the table of contents, they’ve figured out ten things that work and ten things that don’t work. Then they immediately go out online searching for blogs, user groups, cheat sheets and message boards to figure out what else they can do; or the text or Skype their friends to get the information they need.

7. Digital Learners prefer instant gratification and immediate rewards. Many educators prefer deferred gratification and delayed rewards.

The digital culture provides exactly what kids need most - constant affirmation, lots of attention and the ability to distinguish themselves. Games and digital technology tell the user that if they put in the time and master the game or device, they will be rewarded with access to the next level, with a win, or a place on the all time high scorers’ list. What they do determines what they get, and what they get is obviously intrinsically worth the effort they put in.

New technologies excel at giving instant feedback, and the payoff for any action is typically very clear. Compare how often Digital Natives are expected to make decision while gaming (every ½ to 1 second) and how often they are rewarded for those efforts (every 7 to 10 seconds) with how often students are asked to make a decision or positively rewarded in schools. This may be one of the reasons that many students are waiting for a video game or Internet version of school to come out so they won’t have to attend any more.

8. Digital Learners prefer learning that’s relevant, active, instantly useful and fun. Many educators prefer feel compelled to teach to the curriculum guide and tests.

While often derided in the press as being intellectual slackers, in reality Digital Natives are very much an intellectual problem-solving generation. Many types of logic, challenging puzzles, spatial relationships, and other complex thinking tasks are built into the computer and video games they enjoy. While some have argued that play and games are simply preparation for work, for today’s younger generation, play is work, and work is increasingly seen in terms of games and game play. They want their learning to be relevant and instantly useful. They want to know what possible connections this has to them and their world? And more than anything else, they don’t see why this can’t be fun most of the time.
What does this mean for schools?

What should be clear from the research and what we have said and shown you is that there is a growing disconnect between the learning preferences of digital kids and the teaching and assessment preferences of traditional teachers.

Ask yourself this question – why are kids in our classrooms? Would kids be in your classrooms if they didn’t have to be there? Are they there because they want to be there or are they there because they have no other choice? 
And if they’re there only because they HAVE to be there, what can we begin to do differently starting right now to help more students want to be in our classes more of the time?

As Mike Josiah says, anyone who knows anything about learning knows that the secret to success in the classroom is not about being a good disciplinarian and has everything to do with engagement and motivation. It’s not just about GETTING them to learn, it’s about getting them to WANT to learn - without motivation there is no learning.

But because of the huge gap between their digital learning styles and digital learning preferences and education’s non digital perspectives about teaching, learning and assessment, despite our best of intentions to do what is right for kids we are failing mainly because our instruction is targeted at kids from another age.

Digital kids are increasingly experiencing a digital world that is increasingly – some say completely - out of synch with traditional approaches and assumptions about teaching, learning and assessment.
And we believe that this is an absolute recipe for disaster. Kids are increasingly voting with their feet and their mind.

According to a recent NCES study 60% of minorities in America do not successfully complete grade 12. Shame on us! If we were a business and 60% of our product was defective, we wouldn’t stay in business very long.
Beyond this a mere 39% believe that school work will have any bearing on their success in later life; only 28% of 12th-grade high school students believe that school work is meaningful; 21% believe that their courses are interesting; and.

And what makes these statistics even more shocking is when one realizes that these are only the opinions of those students who have remained in high school for four years. Students who have found the high school experience the least relevant have already exited the system in huge numbers.
We say shame on us. If we ran a business and 30 or 40 or 50% of our product was defective,

So with this in mind we want to outline seven major changes we believe educators and education must immediately make if we ever hope to effectively re-connect and communicate with the digital generation and in doing so, to leverage their digital preferences and learning styles and adequately prepare them for the fundamentally different world of the 21st century.
It is Time for Educators and Education To Catch Up

Educators must become learners and discover the digital world. But once again we want to stress that we’re not suggesting that you throw out everything you believe in or have been teaching for years.

YES it’s essential for kids to learn the traditional curriculum and YES it’s essential for them to have traditional literacies. The traditional curriculum is how we transmit culture from one generation to the next. But traditional literacy is no longer enough.

We can’t close our minds to other possibilities – to other research driven approaches for teaching, learning and assessment because they are not the way we’ve always done it. And it’s not as some educators, parents and politicians believe a matter of either/or, us or them, our generation or theirs, our priorities or theirs, our way of learning or theirs, our way or the highway.

Kids are different – neurologically different, and as a result they see the world differently than we do. But many educators only pay lip service to this notion. When told that kids are different, educators knowingly nod their heads – uh huh -yup - but then they shut the door to the classroom and go back to business as usual - and it could just as easily be 1960 all over again.

The bottom line is that many people of our generations really don’t understand their digital world and we never will until we take the time to honor and respect where they are coming from.

But to do this requires that teachers have a REAL understanding of 21st Century digital culture. And more than just understanding, we need to be able to use the very 21st century tools and skills that educators and Friedman and

Pink tell students they’ll need to have in the culture of the 21st Century.

And knowing about the digital culture is about more than just rhetoric - this is about more than just talking about change and flapping our lips. This is about the application of the 21st century skills by educators. To actually going from talking change to walking it. Let’s be clear that we will never have the level of technical skills Digital Kids have, but there are many other things that we can do that they can’t - we have our wisdom to share with them - but this requires us to be walking change not just talking it.

As an aside, we’ll help you. You can commit yourself to a 25 Week Digital Diet where every week you’re asked to learn and do some new and different digital tool. Each week the challenges become larger, but you do it by taking baby steps. First you learn a new tool. Then you learn how to use the tool. Then learn to use the tool to create your own digital resources and content. You can download the 25 Week Digital Diet from the handout section of Ian’s web site at http://www.ianjukes.com.

So what kinds of learning activities, what kinds of tools are we talking about here?
First go out on line and read the adventures of teenager Jeremy and his longsuffering digital immigrant parents in the cartoon strip Zits. We don’t know who the writers are but they absolutely nail it every day.

To gain an appreciation of the amazing visual skills, lightning quick reflexes, and rapid-fire decision-making ability that digital kids have, try playing video games with them even if they will inevitably kick your butt.

And to really get a feel for their remarkable ability to handle the simultaneous bombardment of multiple forms of information play those video games while music is playing at bone jarring levels and a movie is running in the corner of the screen. Take the time to explore their online worlds. Try to familiarize yourself with what they’re doing and how they’re doing it. Take a close look at what Digital Natives are doing with video at YouTube. Go download some photos from Flickr.

Take a look at MTV’s “The N” and learn about the latest trends - vomenting and video mash ups - visual commenting where they add commentary to video via text blurbs or audio clips. Go out to Wikipedia and search for something of personal interest that’s really obscure. Then head write a wiki of your own on some area you’re knowledgeable in.

- Go out to Technorati or the iTunes store to find, download, and listen to podcast. Then create a podcast of your own Read and respond to a blog then create a blog of your own. Learn how to use Instant Messenger.
- Make a phone call or videophone call using Skype or iChat.
- Play a massively multiplayer on line role-playing game like Everquest, World of Warcraft, or Maplestory.
- Create a personal avatar and attend a course virtually at Second Life, Club Penguin or WebKinz.
- Become a thumbster on your cell phone.
- Open a MySpace or a Facebook account.
- Log on to Craigslist or eBay and spend some time exploring the amazing range of goods available for purchase.

Beyond this, it’s also important that you appreciate the learning potential of the online world, so pick a skill that your students would like to master like playing the guitar or learning how to fix a mountain bike. Search the Internet for sites that will help you develop that skill.

- Go to Del.icio.us and create a Tag Cloud.
- Go out to TeacherTube and watch a Physics or Chemistry experiment or learn how to write Haikus.

The list goes on and on. Every day there are more tools and resources appearing. And remember, this is just the tip of a very large and growing iceberg of tools and resources. But, on the other hand, if you have no idea what we’ve been talking about for the past few minutes - if we appear to have been speaking in tongues - then you have just caught a glimpse of the gap between you and them and you have confirmed your digital immigrant status.
You are beginning to see the breadth and depth of your personal digital divide. This divide is much less about have and have nots or the know and the know nots - and more about the generational divide between the way their generation and our generations look at the world - so catching up to them is really important.

Teachers Must Teach to the Whole Mind

As Daniel Pink writes, it's about the whole new mind - not just to the traditional linear logical, left to right, top to bottom beginning to end left side of the brain which is the hallmark of education today.

But this is a great challenge in the age of high stakes testing and No Child Left Untested. Consider typical classroom instruction today. The primary focus is on typically memorization. The products are mainly traditional reports and tests. As students progress through the system it’s ASSUMED they will pick up critical thinking skills.

The problem is that everyone thinks it is someone else’s job. Elementary teachers assume that kids will be taught the critical thinking skills at the high school level. But secondary teachers think that this should have already happened at the elementary level - and besides, second teachers don’t think they have time to teach critical thinking skills because they have the curriculum to cover.

Most teachers judge their success as teachers on how the top third of kids in their classes do. But many of the top third really don’t need to be taught. They tend to learn things on their own, they know things intuitively, they’re on the honor roll. And if we’re really honest we’ll admit that many of them learn in spite of teachers and school, not because of them.

The REAL test for teachers is not our top 1/3rd of our students; it’s what we’re able to do with the kids in the bottom 2/3rd. They’re ones that need to be taught.

But instead of seeing them as an exciting challenge some teachers view the bottom 2/3rd as a problem – as the kids that need to be fixed. These students require time, they require energy, they require new strategies, and they require special attention.

They’re the ones that get shipped off to special ed. and learning assistance, because they don’t respond to the traditional one-size-fits-all teaching strategies. That’s why there are kids who absolutely fail in our system as they fly below the radar - then they go out and are hugely successfully.

Think about tests. They’re primarily fill-in-the-blank, multiple choice, and short answer questions, simple answers that are easier to mark. Then consider the language of the questions on the test. What kinds of verbs do we see? Verbs like identify, name, list, define, explain, describe - verbs that primarily reflect low level left-brained recall and regurgitation of facts. Verbs that reflect the lower end of Bloom’s Taxonomy – not verbs such as analyze, synthesize, apply, infer, interpolate.
The primary sources are textbooks, black and white handouts, worksheets, test prep material. Materials that are decidedly non-technological, slow paced, twentieth century tools and environments. Cell phones, iPods and social networking tools that are an everyday part of digital natives’ lives outside of school aren’t used - in fact in many cases they’re heavily restricted or banned.

**In banning access to their personal tools we are absolutely missing a huge opportunity to connect with the digital culture - we’re whiffing the ball. In the digital culture this kind of learning is SO boring and SO irrelevant for most kids that they have to power down when dealing with teachers.** Digital kids spend hours before and after school playing games and wandering around in virtual worlds and networked environment and using social networking tools; and then come to school where they are often confronted by the awesome power of an overhead projector or dry erase pen and a whiteboard

Beyond that it’s also ABSOLUTELY not preparing kids for the world they will graduate into. In the age of No Child Left Untested, and No Teacher Left Standing, getting students to demonstrate competency with reading, writing, sciences and numeracy is a big challenge in itself. But then there’s all this extra talk about 21st century skills – critical thinking, problem solving, individual and group skills, civic literacy, financial literacy, critical literacy, health moral & ethical literacy and all the rest And, all of this is not to be taught in isolation. It’s supposed to be integrated into the curricula. How can we possibly keep up with everything? We call this implementation model PhD – piled higher and deeper – the kitchen sink approach – there are literally dozens of essential skills discussed in books, on websites, and Wikipedia. We want to add to the pile.

What are the skills kids need today? What are the dynamics of the working world?
First, as Friedman writes, there has been a shift in emphasis away from rote memorization to the higher level thinking, creativity and the problem solving that happen primarily in the right side of the brain. A shift to a skill set that was exclusively for the subset of management in the 20th Century. In the 21st century everyone needs to have the higher-level thinking, creativity and problem solving skill set.

As Daniel Pink writes in a Whole New Mind, it’s about moving beyond 20th Century literacies like reading, writing and numeracy. In an age of multimedia, hypertext, blogs, wikis, and much more, reading is no longer a passive, linear activity that simply deals with text. And writing is no longer just about being able to communicate effectively with written or spoken text.

Rather it’s about having a wide range of different skills needed to function within a rapidly changing society. For a long time our schools have placed a great deal of emphasis on training our students to be good consumers of traditional content by becoming good readers, writers and learners.

In the age of digital content, success is about teaching our children to also become good and responsible producers of content - writers, artists, composers, etc - to be prosumers - simultaneous producers and consumers of content.
In the information age, citizens will need to work with information in all forms to fashion content products that have value, that entertain and teach. But if all learners do is read, write and calculate, they may be literate by 20th Century standards but certainly not by 21st Century standards. And as Friedman and Pink write, if they leave school with only 20th Century skills they will absolutely not be prepared for what awaits them after they finish school as a citizen, a family member or a worker.

To prepare them for their future, we need to move beyond literacy to an expanded list of 21st century fluencies. Let me distinguish between literacy and fluency. When you are literate you still have to think about what you have to do next. Fluencies are unconscious skills. You don’t even have to think about them.

You just intuitively know what to do. 
It’s like riding a bike - you don’t have to think about it – you just get on and ride.

The 21st Century fluencies our students must have and our teachers must understand and be able to teach include:

Technological Fluency

Technological fluency involves the transparent use of digital tools to perform a wide range of tasks. It’s like using a pen. You don’t think about the pen, you just use it. With a pen, it’s about being directly engaged between the tool and the task – between your brain and the paper. With digital technology, it’s not about learning Excel – it’s about using Excel to solve a problem. It’s not about using Word – it’s about using Word to write. It’s not about PowerPointlessness – it’s about using PowerPoint to communicate effectively.

In each case, the primary focus is not on the cards and cables, not about RAM and ROM, not about hardware and software, not about the tool but the task that needs to be accomplished. The primary focus is on head ware not hardware – critical thinking, problem solving, and decision-making. A focus on head ware rather than hardware means learning about the technology is nothing but an incidental but essential byproduct of that process.

For example if you’re in the magazine industry you might need a specific photograph. You’re not thinking, “I need to learn to use a digital camera”. Rather, you’re thinking, “how can I use the digital camera to take the photographs I need?” You learn to use the camera – that’s the means to the end - to take the needed photographs – which is the end.

The task drives the use of the technology. Learning about the technology is nothing but an incidental but essential byproduct of that process.

Next there’s:

Media Fluency
Media fluency is not just about the ability to operate a digital camera, create a podcast, or build a PowerPoint presentation, or write a document. It’s about being able to look critically at the content of a website, a PowerPoint presentation, a podcast, a video, a blog, a wiki, a TV show, a newscast, or a video game - and be able to understand how that particular medium is being used to communicate with the users. It’s about how the media is used to shape our thinking.

And it’s not just that a particular medium is being used or about how it’s being used, it’s about how well the medium is being used to communicate the message. But media fluency is not just for passive viewing. We live in an interactive visual world. It’s also about digital natives creating and publishing original digital products that help them communicate as effectively with visual & auditory elements as we were taught to communicate with text.

The problem is that many digital natives outwardly appear to have exceptional technical and media skills which belie the fact that they have large holes in their understanding of the tools and techniques for effective communication

The Internet is a wasteland of digital products created by people who have little or no understanding of how to construct digital documents that communicate their messages effectively.

At the same time, it’s critical for educators to understand that excellent writing skills are not enough to be good communicators in a multimedia world.

Effective communication is about more than just traditional products like a handwritten or typed report on the symbolism in the Lord of Flies.

That’s why we need to challenge students to create digital products as outcomes that not only reflect an understanding of the necessary content. Not only to develop technical skills such as using a video camera, designing a website or making a presentations – but also provides them with the empowering principles of graphical design, color theory, video editing, and the use of apparent motion to help them to do things better and to fill in those holes in their Swiss cheese understanding of media.

We have to note that most of these skills are either not taught in school or considered secondary, optional or elective if they are taught at all. In the 21st Century those skills need to get a promotion - and they can’t be considered optional. In the 21st Century they need to be every bit as important if not MORE important as history, mathematics, and English literature.

The difference here is that instead of submitting an essay written by hand, students will use a word processor, film, blog, podcast, wiki, or any other of a wide range of other digital products. Teachers need to understand that these new products we’re describing are not just fads - they’re essential building blocks of communications and understanding for the 21st Century. In the culture of the 21st Century all students need to have these media fluency skills.
Then there’s:

**Information Fluency**

Information fluency is the ability to unconsciously and intuitively interpret information in all forms and formats in order to extract the essential knowledge and perceive its meaning and significance. There are 5 distinct steps to the process – what we call the 5 A’s. First the researcher needs to be able to Ask good questions. If the researcher can’t ask good questions, they will not get good answer.

Once you have good questions, then based on those questions you have to be able to Access and Acquire raw material from the most appropriate high tech, low tech and no tech sources. This is not just about going to the card catalog and getting a book – this is about YouTube, Wikipedia, music, or interactive web sites.

Digital resources are more and more the raw materials of the 21st C. More and more of these raw materials are graphical and audiovisual in nature. It’s no longer just the traditional paper based resources of our youth.

Then to be able to Analyze and Authenticate the acquired data to distinguish between the good, the bad and the ugly of information - to distinguish between fact and opinion - to understand bias – and in the process to turn the data into usable knowledge.

Then to be able to Apply the knowledge within the context of a real life, real world problem or a simulation of that problem - to build a bridge, write an essay, complete a science experiment, or perform in a debate. At this stage the researcher is asked to move from theory into practice.

And finally the researcher is asked to Assess both the product and the process. What was learned, how was it learned, how could we make this process, how could we make this product better the next time around? And understanding that Assess is not just a teacher task, it’s also a learner task. Finally, the fourth critically important, and emerging fluency for the digital age that ties everything together is:

**Online Social Fluency**

Let us make our case. Many social networking sites, including Facebook and MySpace limit their to people over the age of 14. They aggressively remove people for being underage not to mention having removed many thousands of people for inappropriate or illegal behavior.

These sites are serious about trying to make these safe places. But despite all their best intentions, these sites are only as safe as the user has the ability, and skills to make appropriate online judgments.

But because it’s assumed that social networking sites are only for teens on up, some people think that online social networking fluency is only needed for teens and adults.
But take a look at Webkinz, which is hosted by Ganz® - the plush animal people. Webkinz pets are cute little plush pets. Each pet comes with a special and unique secret code kids use to enter Webkinz World where they can take care of their virtual pet, play great kids games, answer trivia, and earn KinzCash. Webkinz pets are the digital version of Tickle Me Elmo or Beanie Babies were for earlier generations.

Then there’s Club Penguin, which is owned by Disney. Club Penguin is promoted as a safe virtual world for kids to play, interact with friends and have fun letting their imaginations soar.” Whether you realize it or not, Club Penguin, is already one of the top ten social networking sites online. Club Penguin is in the top 5 for market share, traffic from new and returning visitors, and time spent per user. It’s clear that Club Penguin provides experiences that kids enjoy.

The problem is that well-intentioned parents cave in to kid pressure to get their children online and into these spaces. As Stephen Abram writes, what these two sites are doing is the Colombian strategy - intentionally or otherwise, they have become playground pushers of social networking digital crack. They promote consumerism brand loyalty and return visits because unlike MySpace or Facebook they have pay as you go subscription models or kids are required to buy something to enter the virtual learning environment and peer pressure is used as part of their word-of-mouth marketing. On one hand, education and educators could learn a lot by carefully examining this model.

The problem is that in creating safe places where you require permission from your parents, or permission from your teacher to access online resources; or protecting kids by setting out long lists of do’s and don’ts, installing filters, or banning online access outright, how can kids ever develop the fundamental awareness about their identity and an understanding of privacy issues that will be critical for them in their digital future?

As the National School Board Association noted in a recent paper, schools and districts that choose to block social sites rather than taking advantage of the opportunity to create a teachable moment are absolutely blowing it.

Instead they bring in experts who cultivate stories that profile the Web as a seething cesspool of online predation. According to this same NSBA paper, while nasty stuff does exist out there, it is VASTLY overstated.

Meanwhile under the radar, kids are still accessing the sites – they’re just not doing it at school. Education needs to offer a more balanced perspective. In fact, this is essential for our students’ futures.

While ethical companies like Club Penguin publish their privacy policies and have parent sections and make it easy to access questions, there are lots of sites out there now collecting behavioral and personal information on kids and beyond. Believe us, e-mail and phishing scams are just the a small fraction of what a thriving new industry is doing in targeting everyone for corporate profit.

It’s essential that kids AND their parents learn how to make good choices.
How are they supposed to learn to safely navigate the digital world. By osmosis? Sending kids out to the Web without helping them become socially online fluent is like giving the keys to the car to your kid without first teaching them how to drive safely. There’s no point in criticizing for kids for skills they don’t have if we’re not willing to help them develop those skills. It’s like blaming a 7-11 for getting robbed.

In the digital age this particularly applies to how kids manage their own personal information and their online digital footprint. We believe we need to start helping students to learn the necessary skills much earlier by teaching them the essential and appropriate how to handle privacy and information issues.

Here’s one suggestion. We already teach about ourselves, and awareness of our communities and our world in building blocks at the primary, intermediate and middle school levels. At the earliest primary level kids learn about themselves – their name, their height, their weight and other personal information. Then we start talking about the nuclear family and start family tree projects as we expand it to include the extended family in the next grade. They learn about the neighborhood. We use maps and models of their homes in relation to the structure of communities. Then we moves on to states/provinces and countries and global dynamics until they have a perspective of their own place in the world and how they interact with that world.

So here’s a suggestion. At each level, we define what kind of awareness students need to have online. What information would we tell others about ourselves in our family? What information would you e-mail grandma vs. a stranger.

Do you share more or different things when you’re out in your own neighborhood? What about strange neighborhoods?

When do you tell people your whole name and address? What about when you’re interacting with the whole country or potentially the world, like on the web?

See what we mean? We think it’s possible to retrofit learners with the skills they need to be aware of their personal identity information and the risks out there without scaring them but providing age and stage sensitive context for success in these emerging and important new electronic environments.

21st Century Fluencies are the Foundation

As you can see we don’t hold strong opinions about these things. We believe that these 21st Century fluencies are the absolute backbone of education and needs to be taught in the same structured manner that Math, science, social studies and language is taught. Taught at every grade and every subject area by every teacher from Kindergarten through to senility.

Two related resources of interest can be downloaded from the handout section of http://www.ianjukes.com - they are:

1. 21st Century Fluency Skills: Attributes of Digital Learners; and
2. 21st Century Fluency Audit Tool.

But we have to be clear that if all we do is add another layer of curriculum nothing will change. In order to help students learn these 21st Century fluency skills the next thing that needs to be done is:

Educators Need to Shift Their Instructional Approach

There has to be a shift away from the predominant left-brained traditional stand and deliver, full frontal lecture approach of the 20th Century. We must resist the temptation to tell the whole story and must stop giving them the end product of our thinking.

The problem with telling is that it takes the excitement of discovery out of learning. Telling someone something removes the first hand experience just like when someone tells you the ending to a suspenseful movie you’re about to watch.

Telling also eliminates the motivation for learning. When we tell the whole story, there’s no necessity to go out and get the skills and information because someone is going to tell you what you need to know.

Now let’s be clear, there absolutely IS a place for telling - it can be very useful when you have to deliver a lot of content. **But we need to shift our instruction from predominantly full frontal lecturing to more of an emphasis on discovery learning.**

In essence, we need to learn to teach lazy. Our job as educators should not be to stand up in front of students and show them how smart we are. Our job as educators is to empower them to become independent thinkers. To be men & women who are capable of thinking outside the lines - of doing new & creative things, not simply repeating what other generations have done before them.

We need to invoke a fundamental policy of progressive withdrawal into their lives. Let me explain why.

When children come to us in kindergarten there are completely dependent on us to tell them what they need to do - and if we continue to focus primarily on content, and memorization and value that as being more important than thinking for themselves, they are still completely dependent on us in Grade 12 to tell them what they need to do to pass the test, pass the course, pass the grade and graduate.

And then when they leave us after 13 years of schooling and they fall flat on their faces as many of them do, we can’t understand why it happened. It’s our fault. Because from kindergarten on we’ve focused on, we’ve maintained, a culture of dependency – a dependency on the teacher, the textbook, the test.

Our job is to make sure they don’t need us by the time they graduate from our schools. Our job is the same as being a parent. Think about a child’s very confident steps. What does it look like…Wobble, Wobble, Lurch…
What’s inevitably going to happen? CRASH!

So when they do fall over, do we rush over to them and say C-, 36 percent, I’m sorry you’ve had three chances, you don’t get any more…?

Of course not! What do we do? CLAP, CLAP, CLAP. We help them up we brush them off, we encourage them to try again. Why? Because our job, as difficult as it may be, particularly during their teenage years, is to help them to become independent and self-reliant.

So why do we know that intuitively as parents, but in schools we continue to hang on tight - to cultivate and maintain our culture of dependency - dependency on the teacher, the textbook, the test.

We need to teach lazy. We need to use progressive withdrawal. **We need to move from being the sage on the stage to being the guide on the side – the facilitator of learning.**

Why? Because today we live in an age of InfoWhelm where accessible data is growing at exponential rates. As a result, it’s just not possible for teachers to be the experts they once were or to keep students engaged.

It was increasingly difficult to be an expert during the 20th Century. With the emergence of digital media, the Internet and InfoWhelm being an expert has become impossible in the 21st C. But despite the fact that we now live in an age of InfoWhelm, students continue to spend the vast majority of class time being lectured to. The primary focus is on LOTS - lower order thinking skills, simple data information recall, memorization and lots of information.

Dale’s Learning Cone

This is Edgar Dale’s Learning Cone, first developed in the 60’s but reaffirmed by the research and adapted again and again - other derivatives of it are also known as the learning pyramid, or learning triangle.

What their research tells us is that on average after two weeks we recall:

- less than 10% of the content of what we read,
- about 20% of what we hear, like from a lecture,
- 20 to 30% of content simultaneously using two or more media, like looking at pictures or watching a movie,
- about 30% of lessons involving demonstration,
- about 50% of content that we hear and see like while watching a demonstration that uses two or more media simultaneously,
- 65-80% of content that involves practice by doing like participating in a discussion or giving a talk, and
- about 90% that involves the teaching of a concept to others as well as the immediate application of the learning within the context of a real time, real world task or a simulation of that task.
All of this operates on a continuum from passive receiving of information and traditional learning with a primary focus on LOTS (lower order thinking skills) to active participation and engagement with information, and a focus on HOTS (higher order thinking skills).

**Standardized Tests For Non-Standardized Brains**

In the face of this research, we need to acknowledge that we’re continuing to use standardized, traditional tests to measure increasingly non-standardized brains. We’re literally trying to fit round pegs into square holes, and square pegs into round holes.

It’s not that students have ADD or ADHD. Outside of the US, Canada, Britain, Australia and New Zealand we have almost no cases of ADD or ADHD – which here has become the official overmedicated brain syndrome of the information age.

The real problem is that they’re just not interested, not listening and increasingly tuning us out.
We hear teachers complain all the time that kids have short attention spans - that students just can’t focus - that they can’t even remember the names of the state or the capitals when asked.

Meanwhile that same student is thinking, “Why do I have to know this when I can Google the answer in 2 seconds.”

And the same kid who can’t remember can instantly and enthusiastically remember the lyrics to 1000 songs or the characteristics of 100 video game characters. Their attention spans aren’t short for games or music, or anything else that actually interests them. They just have short attention spans for old ways of teaching, learning and assessment of that learning.

The problem is that as educators we just don’t understand how different digital natives are. They’re not just a little different they’re completely different. The problem is that today’s learners are not the learners our schools were originally designed for. And today’s learners are certainly not the students that teachers were trained to teach.

The bottom line is that if we want understanding, if we want retention, if we want success on school exams, state exams, AP or ACT exams, if we want to address and exceed the mandates of NCLB, if we want children to demonstrate proficiency beyond content recall, we can’t just lecture to them. The emphasis in the classroom can’t just be exclusively on LOTS - lower order thinking skills - simple data information recall - and LOTS and LOTS of information.

If we want our kids to be successful on the test - if we want them to be successful in life beyond being able to successfully complete a written exam – if we want them to graduate as more than just highly educated useless people - people who are good at school but not adequately prepared for life - then our emphasis as professional educators has to be on much more than just content recall - it has to be on much more than LOTS - we must give them assignments that require higher level thought.

A Focus on HOTS

Our focus has to include HOTS - higher order thinking skills, on Howard Gardner, on Bloom’s Taxonomy, de Bono, on critical thinking, problem solving and the 21st Century fluencies and metacognitive skills that move beyond the theory to the application of what is learned by making a fundamental shift to giving problems first and teaching second. The starting point is to remind you about how truly different their students are and adjust your assumptions about teaching, learning and assessment accordingly.

The biggest gift teachers can give their children is their wisdom. What are the implications? What’s the big picture? Where are the connections? How does this relate?

It’s important to acknowledge that while many students are technically adept, most of them haven’t yet gained the life experiences necessary to understand the broader implications – at least to do this on their own.
In an age of InfoWhelm teachers can’t no longer be the content expert but they can be the problem solving expert. And as Edgar Dale’s Learning Cone demonstrates context is king, relevance is needed for retention - and it has to be relevant to the learner not just the teacher.

Effective learners make a series of attachments or relationships between their existing knowledge & new information. Richard Wurman calls this Velcro learning.

You see novice learners often just try to remember facts in lists, which we all know is the common strategy for students preparing for quizzes & tests. The problem is that information that doesn’t have a context, interest, or relevance or reinforcement is like having only one side of a piece of Velcro – things just don’t stick.

True learning can only occur when the brain can make meaning through a series of relevant connections between past experiences and new information. When the two are combined, long-term learning sticks permanently and powerfully to the student - just like Velcro.

**We Need to Let Students Access Information Natively**

Throughout history, education has always struggled trying to come to terms with new innovations and tools that are central to society only to relent later when the educational value of the new innovations and tools became clear.

As examples, Father Stanley Bezuska once noted: At a teacher’s conference in 1703, it was reported that students could no longer prepare bark to calculate problems. They depended instead on expensive slates. What would students do when the slate was dropped and breaks?

In 1815, it was reported at a principal’s meeting that students depended too much on paper. They no longer knew how to write on a slate without getting dust all over themselves. What would happen when they ran out of paper? (And did they think that paper grew on trees? – our comment)

The National Association of Teachers reported in 1907 that students depended too much on ink and no longer knew how to use a knife to sharpen a pencil.

According to the Rural American Teacher in 1928, students depended too much on store bought ink. They did not know how to make their own. What would happen when they ran out? They wouldn’t be able to write until their next trip to the settlement.

In 1950, it was observed that ballpoint pens would be the ruin of education. Students were using these devices and then just throwing them away. The values of thrift and frugality were being discarded. Businesses and banks would never allow such expensive luxuries.

In 1966 it was noted that electronic calculators would never be able to compete with the computational ability of the human brain.
In 1988 in an article written for the National Association of Secondary School Principals it was declared that there was no good evidence that most uses of computers significantly improved teaching & learning and that most schools would be better off if they just threw their computers into dumpsters. Cell phones, iPods, and social networking tools are just the latest trends to be thrown under the bus by education.

Social networks are communities of people who share interests and activities. Social networking is primarily web based and provides a variety of ways for users to interact, such as chat rooms, instant messaging, video, voice chat, file sharing, blogging, or discussion groups and so on.

A new National School Board Association study has concluded that digital devices and social networking are now so deeply embedded in the lifestyles of 9 to 17 years olds that it rivals TV for their time and attention.

While these devices and social networking appears to be an everyday part of lives of tweeneragers and teenagers outside of school, most school districts have created rules against, or banned outright the use cell phones, iPods and other digital devices, and online activities such as chatting, tagging, instant messaging, bulletin boards, blogging, wikis, sending and receiving email at school, RSS readers, educational video games, or the use of social networks.

In many cases this has been done without efforts being made to first thoroughly understand these devices and tools or considering the enormous potential they have to provide enhanced learning opportunities and improved academic performance.

This widespread blocking of these tools and activities is happening at the same time that in businesses and higher education, social networking and digital devices are commonly being used as the communications and collaboration tools of choice. The report suggests that schools may be missing a HUGE opportunity to leverage digital tools and social networking tools at powerful learning resources and that we need to examine the remarkable educational potential of social networking, chat rooms, instant messaging, blogs, wikis, cell phones, digital tools, streaming video, tagging tools, RSS readers and much more for after-school homework help, review sessions and collaborative projects to enhance learning, teaching and assessment. Next:

We Must Let Students Collaborate

Understanding 21st Century collaboration goes WAY beyond traditional working in groups. It also means allowing them to collaborate using the digital tools that are an everyday part of their culture. We’re not talking about using whiteboards, dry erase colored pen, overhead projector, or even a smartboard.

We shouldn’t be banning digital devices; we should be encouraging them to use them. Why? Because we live in a network culture that is the new reality of both business and life.
As Donald Tapscott writes in his new book Wikinomics, we live in a network age that has fundamentally changed the nature of business. Companies today are using mass collaboration, open source and social networking tools such as wikis, blogs, podcasts and virtual learning environments to be successful.

By coming together and cooperating with competitors to improve a given operation or solve problems. Wikinomics is a radical concept by traditional 20th Century thinking. Wikinomics is working and it’s FUNDAMENTALLY reshaping the face of business.

Digital kids do the very same thing in their personal lives with their digital technology, their social networking software and their digital mindsets. They work together in virtual digital mobs to get things done in creative and occasionally unimaginable ways (Ted calls this spontaneous ad hocism). Plans are fluid, so in the course of an evening digital mobs can do 5 things with 5 different groups that Digital Immigrants might not have imagined being able to do in 5 weeks. This happens because they see the world differently than we do and they use their tools differently than we might to create unique digital products.

In the new digital landscape these tools aren’t just optional. They are a cultural necessity and a fundamental foundation of 21st Century life. Digital Natives could just as easily be texting with a kid in Afghanistan, Iraq or Venezuela about civil war as someone across town. They could just as easily be videoconferencing on a project with someone from Denmark as someone from somewhere else in the state or province. They can share cultural information with a student in Japan as easily as they can with someone in the next seat. The possibilities are literally unlimited.

We Need to Let Students Create Real World Digital Products

We need them to create real world, real time digital products that allow them to reflect their understanding of both content and process. Learning is not just about the content learned; it’s also about the context in which the content is used. Learning is not just about end product of the learning but also the process that took place to gain that understanding. Learning is not just about the tool that was used; it’s also about how it was used to solve the task.

Digital tools can help with the process of learning and producing the product of learning. And it’s not just about using digital tools because kids will like them. The digital tools enhance traditional learning – they’re better.

For example, think about producing a magazine. What would be the primary tool you would choose to use – pen and paper or a word processor? Obviously most people would choose a word processor, not because word processing is cool but because it’s a better tool for writing.

Think of the 5 steps of the writing process - plan, draft, revise, proof, publish – the word processor is far more effective for each of these steps. This is why modern publishers use word processing exclusively for the writing process.
Consider the tools that are used for creating the end product of publishing – photo manipulation, desktop publishing, web design, and video. These are the tools being used in the workplace, not because they’re cool to use but because they are the most powerful tools for producing the end product given to consumers.

These are digital natives. We need to let them use their digital tools to demonstrate their knowledge of the subject while understanding that they will probably use these technologies differently than we would and also that they will use it in unexpected ways to create unexpected products. This is how vomenting and mashups became instantly popular in digital culture.

By letting them access information natively we acknowledge their culture. Our job is to show them how to be more effective with what they do, even when they take their products further than we can visualize or imagine. They can take it further than we can imagine because they live in different culture – a visual multimedia hyperlinked culture.

So instead of traditional products like a handwritten or typed report on the symbolism in the Lord of Flies, we need to challenge them to create digital products as outcomes that not only cover the necessary content, not only to develop technical skills such as using a video camera, designing a web site or making a presentation; but also provide them with the empowering principles of graphical design, color theory, video and sound editing to help them do things better and to fill in those holes in their thinking. These are digital natives raised in the new digital landscape.

Because they view the world fundamentally differently than we do they will produce different products than we would; and they will produce products that reflect both the product and the process of their thinking; and that result in the creation of digital products that reflect more of a focus on HOTS, critical thinking, problem solving and 21st Century fluencies rather than just on the traditional LOTS. And finally:

**We Must Re-evaluate Assessment and Evaluation**

While there is still a place for traditional testing, true assessment is about much more than just memorization or content recall or the results of paper based, fill-in-the-blanks, short answer or bubble tests.

We don’t need a pilot who just did well on the bubble test or the written exam because written tests do not generally measure things related to success in life.

What we need is a pilot who not only got 100% on the written exam, but can also land the plane perfectly 1000% of the time despite the fact that they may be dealing with mechanical failure, electrical failure, hydraulic failure or the fact that some idiot is trying to kick down the door.

Assessment and evaluation have to be used as more than tools of measurement – they have to be tools of change and learning. They have to be tools of change for both student
and teachers. Evaluation has to help both students AND teachers get better at what they do. Assessment and evaluation are not just tools of accountability for external bodies that have little if any understanding of what real learning is about.

Learners need clear and realistic standards, expectations, and criteria to work toward. They need appropriate tools, technologies, and resources to work with; they need lots of modeling, coaching, and mentoring to establish a sense of what quality and success look like.

They need lots of guided and independent practice. They need timely, targeted, non-judgmental feedback on their performance. They need opportunities to make mistakes as they learn and not be penalized for them. And they need authentic audiences in a variety of settings and contexts in which to demonstrate what they can do.

But most of all they need the encouragement to try and to do things in all kinds of performance areas with all kinds of tools, technologies and techniques to create all kinds of products that reflect their understanding of concepts. But for this to happen, we need to rethink assessment and evaluation and go beyond the traditional quantitative summative assessment of learning that doesn’t really help the students get better and really doesn’t help the teachers other than to scare the heck out them.

Knowing content doesn’t make you competent. Competence is the ability to apply content in some useful way. But if we want our students to be competent, we need to rethink assessment and evaluation and go beyond the traditional quantitative summative assessment of learning that doesn’t really help students get better and really doesn’t help the teachers other than to scare the heck out them.

Eventually we’ll start learning about these new digital tools but in the short run, we need help from people who understand how new media is put together, can evaluate the technical parts, and assess the effectiveness of the product created.

It’s not that they are going to mark the projects. Rather, they are there to help teachers learn how to evaluate a movie, the script, the lighting, the green screens, the pacing – skills above and the traditional writing of the script. It is important that we just create another specialist job like learning disabled so I don’t have to learn that job.

Knowing content doesn’t make you competent. Competence is the ability to apply content in some useful way. But if we want our students to be competent, we need to rethink assessment and evaluation. This is about designing learning opportunities for qualitative formative assessment - self assessment – team assessment - culminating assessment - assessment of what has been learned within the context of a real time, real world problem.

Our task is not to do a better job of teaching a curriculum designed for preparing students for life and work the 19th or 20th century. Rather our task to design a different way of teaching designed for preparing students for life, mlearning and work in the 21st Century.
So How Do We Bridge This Digital Divide?

First we need to roll up our sleeves and acknowledge that there’s lots of work to be done. And if we are willing to acknowledge this - if we are willing to meet the digital generation half way - if we are willing to acknowledge and embrace their world, as we expect them to embrace ours, we will set them free. And in doing so, we will be able to leverage their digital lifestyle and help each and every one of them become better, more engaged, more independent learners.

If we want to truly unfold the full intellectual & creative genius of all of our students more of the time - if we want to prepare them for the world that awaits them - if we want to help them prepare for their future, not our past - for their future, not our comfort zone – if our nations are going to march through the 21st Century & maintain its longstanding tradition of success – if we want our children to have the relevant 21st century skills - we must create a bridge between their digital world and ours.

We live in amazing times, remarkable times, overwhelming times this was beautifully summarized by philosopher Alfred North Whitehead 100 year ago when he wrote:

> It is the business of the future to be dangerous. The major advances in civilization are processes that all but wreck the societies in which they occur.
> Alfred North Whitehead

And remember that today the long term is measured not in terms of centuries, or decades but in years and sometimes months, weeks, days and hours. We live in a moment in history where change has become so speeded up that we begin to see the present only when it’s already disappearing into the past.

Our biggest challenge is and will continue to be comprehending and accepting the scale of change. We’re talking about change changing so rapidly that very nature of change is changing

But when changes are happening quickly we tend to want to hang on to old ideas and assumptions about the world. And when we do this, we run the risk of ending up crashing headlong into the future. This is perfectly summarized by the great philosopher Erik Hoffer when he wrote:

> In times of radical change the learners inherit the earth while the learned find themselves perfectly equipped for a world that no longer exists.  
> Erik Hoffer

Our greatest fear is that at this moment, despite our very best efforts, we are doing a terrific job of preparing our children for year 1960 and we may be being optimistic in saying that.

So what have we been trying to do to you with this handout. At the end of our presentations, we take a large rubber band and we stretch it out and hold it there. After
awhile, when our arms get tired, we release the pressure on the rubber band and it snaps right back to where it was before.

Why? Because a rubber band has a mindset, a paradigm, a comfort zone, a place it’s been for a long period of time – a place that it likes to be.

So how do you get a rubber band to stretch and stay stretched? There are several things you can do. You can wrap it around something, you can heat it, you can freeze it, you can rub it with a solvent to change the chemical composition.

The interesting thing is that even after all that effort, when you release the pressure the rubber band still tries to go back to where it was in the beginning.

You see, intellectually we all understand that the world has changed. We nod our heads, and agree that things are different. But, as the old saying goes, “when the going gets tough, the tough get traditional.” At an unconscious level without even being aware that we are doing it we can revert back to our old habits and beliefs.

The rubber band effect occurs when your mind recoils from the discomfort of new ideas that are outside your past experience. We tend to unconsciously revert to the status quo and go back to doing things the way we always have. It is a predictable phase that all people go through when dealing with change. You will experience it today, tomorrow or sometime in the near future when you realize the true implications of the new ideas that have been discussed.

And remember, staff development without follow-up is malpractice.

Do you want to read more about this? If so, head out to http://www.ianjukes.com and check out the Committed Sardine web site.

Slide show of presentation by Ian Jukes is at: http://web.mac.com/iajukes/thecommittedsardine/Handouts_files/NMCCS.pdf

Handouts, articles, funny photos, reading list, great links and the Committed Sardine Blog which is read by more than 75,000 people around the planet. http://web.mac.com/iajukes/thecommittedsardine/Handouts.html

FOR MORE DETAILS CONTACT:

Ian Jukes
Cell: 250-462-0767
Fax: 250-490-4969
E-mail: iajukes@mac.com
Check out the Committed Sardine Blog at: http://ianjukes.com

Web sites
http://www.infosavvygroup.com
http://www.ianjukes.com
http://www.thecommittedsardine.net
SOME BOOKS YOU SHOULD READ

WE WILL UPDATE THIS WHEN WE RECOVER FROM REWRITING THE HANDOUT
THE BRAIN, MIND, & LEARNING

Everything Bad Is Good for You: How Today's Popular Culture Is Actually Making Us Smarter

By Steven Johnson
In his new book Everything Bad Is Good for You: How Today's Popular Culture is Actually Making Us Smarter, social critic & technologist Steven Johnson argues the plots of today's video games, movies & TV challenge young viewers to think like grown-ups, follow intricate narratives & analyze complex social networks. Johnson, a regular contributor to Wired magazine, points out despite popular belief that electronic media is "dumbing down" society, IQs in the developed world have risen three points a decade for the past 100 years.

For Johnson, pop culture is like algebra class. Whether you remember the quadratic equation as an adult is less important than whether you learned the analytic thought processes that solving equations teaches. Likewise, for Johnson, what matters about pop culture is not its message but whether it forces you to engage in complex thought, analysis & reasoning.

His conclusion: it does, & shockingly well. Today's pop culture, he writes, builds on rules established by earlier pop culture (as, say, The Simpsons complicated the sitcom genre).

And new formats such as DVDs make audiences more receptive to complex creations that reward repeat viewing or playing. A traditionalist could say that new media are simply good at teaching children to use new media, but Johnson argues persuasively that they also force children "to think like grownups: analyzing complex social networks, managing resources, tracking subtle narrative intertwining, recognizing long-term patterns." If you are struggling to understand Digital Children, this is a great read!

A Whole New Mind: Moving from the Information Age to the Conceptual Age
We live in left brain society - a society that has long honored linear, logical, left to right, top to bottom beginning to end, piecemeal content recall-based knowledge and thinking. This is the world and the mindset of No Child Left Untested.

The role of the right side of the brain, which handles pattern analysis, big picture thinking, intuition and the like, has long been undervalued and misunderstood in our right-brained society. In fact, at one time the right brain was considered to be the 2nd rate side of the brain.

But as Pink points out, just about anything that requires right brain thinking can be automated, turned into software, or outsourced to the third world. Pink talks about our emerging world where critical thinking, problem solving, and a deep level of information fluency - in other words using the whole new mind - is increasingly more highly valued than simple content recall. Just as information workers surpassed physical laborers in economic importance, Pink claims, the workplace terrain is changing yet again, and power will inevitably shift to people who possess strong right brain qualities. His advocacy of "R-directed thinking" begins with a bit of neuroscience tourism to a brain lab that will be extremely familiar to those who have read Steven Johnson's Everything Bad is Good For You, but while Johnson was fascinated by the brain's internal processes, Pink is more concerned with how certain skill sets can be harnessed effectively in the dawning "Conceptual Age." The second half of the book details the six "senses" Pink identifies as crucial to success in the new economy-design, story, symphony, empathy, play and meaning—while "portfolio" sections offer practical advice on how to cultivate these skills within oneself.

Secrets of the Teenage Brain: Research-Based Strategies for Reaching & Teaching Today's Adolescents

by Sheryl Feinstein

Let's face it—the weather is more predictable than the average teen. Suddenly, even the brightest and most cooperative students become argumentative and distracted. The good news is there are ways you can navigate these abrupt shifts and still be an effective teacher. Recent neuroscience findings have revealed that the teenage brain is actually undergoing developmental changes that can cause extremely erratic behavior. Although you can't change these behaviors, this book demonstrates ways you can adapt your teaching style to effectively reach and teach teens.

The first chapter of this lighthearted but informative book explores the biology of the teenager's brain. Then, chapters two through six answer questions about specific characteristics of the teenage brain that seem most puzzling to teachers and parents—changes in cognition, the need to socialize, difficulty communicating ideas and feelings, building a self-identity and why some teens engage in risky behavior. You'll be entertained
by the accounts of real-life experiences (you might recognize these teens from your classroom!) and then enlightened by the research based teaching strategies for managing their everyday difficulties, conflicts and crises. With the proper tools, teaching teens has never been more rewarding!

Joystick Nation: How Videogames Ate Our Quarters, Won Our Hearts, and Rewired Our Minds

By J. C. Herz

Here is a look at an essential part of American youth that goes beyond a mere chronicle to engage all of the political, social, and cultural implications of video games. Herz (Surfing the Internet, 1995) eschews a historical point of view for a free-associating meditation on the video game culture that, by her calculations, has engulfed one-fifth of our population. Of course, not being able to dispense with the historical aspects of her subject entirely, Herz offers up ``A Natural History of Videogames'' timeline: The first video game was actually created in 1962 by some MIT graduate students; thus, Herz notes, ``If the history of videogames were a twenty-four-hour day, Pong would arise at 6:37 a.m.'' And in tracing the trajectory from Pong to Doom, she evokes such ``classics'' as Q*Bert, Space Invaders, and Pole Position. Equally clever is her sardonic suggestion to right-wing critics of video game violence that they turn it to their advantage with an ``Operation Rescue level of Doom, where you gun down abortion doctors'' or even a video game version of an all-out military operation. ``But, then,'' she remarks, ``been there, played that. Gulf War.'' (Anyway, she observes that in most video games, teenage boys and girls playing, not criminals, but law-enforcement officers perpetrate violence.)

Herz adroitly examines the gender gap in video game development, citing political feminists' scholarly critiques of Ms. Pac Man and Frogger, and her research shines in her strong study of characterization in video games, as she traces the connections between Japanese comic-book anime and the popularity of a certain Italian-American plumber named Mario. This otherwise smart and entertaining read ends a bit too abruptly during a discussion of how computer simulation approximates reality. Nevertheless, Joystick Nation will please its citizenry.

The New Brain: How the Modern Age Is Rewiring Your Mind

By Richard Restak

Pity the poor neurologists of yesteryear, saddled as they were with their conviction that our brains are hardwired after childhood. Then celebrate today's scientists, who are exploiting brain-imaging technologies to show that our brains are capable of profound and permanent alterations throughout our lives.

Neurologist Richard Restak does just that in The New Brain: How the Modern Age Is Rewiring Your Mind, even as he argues that we are being negatively altered by the sound-bite, techno environment in which we live. Technology such as functional magnetic resonance imaging, Restak begins, can now demonstrate that as a musician practices for
many hours, certain neural pathways are strengthened. He then moves to a profound implication, namely that all kinds of technological stimuli are forging brain circuits that may hurt us instead of helping us. For instance, he cites correlations between positron emission tomography scans of violent people and normal experimental subjects who are simply thinking about fighting, then asserts that repeated viewing of violence on television and in video games can set up brain circuits that make us more likely to initiate real world fisticuffs.

Unfortunately, such brain imaging may leave more questions than answers. As Restak himself points out, the technology does not provide "neurological explanations," just "important correlations." Yet he is whipped up enough to diagnose all of modern society with attention-deficit hyperactivity disorder, the probable result of brain changes we are initiating in our media-saturated world. He reminds us of the antidote, though: we are still in control of what we allow ourselves to see and hear.

In the end, Restak fails to create a sense that scientists have revealed a new way of understanding the brain. And the images that inspire speculation in the book still await research that may finally reveal the mechanisms of such phenomena as memory and aggression.

What Video Games Have to Teach Us About Learning and Literacy

By James Paul Gee

James Paul Gee begins his new book with "I want to talk about video games--yes, even violent video games--and say some positive things about them." With this simple but explosive beginning, one of America's most well respected professors of education looks seriously at the good that can come from playing video games. Gee is interested in the cognitive development that can occur when someone is trying to escape a maze, find a hidden treasure and, even, blasting away an enemy with a high-powered rifle. Talking about his own video-gaming experience learning and using games as diverse as Lara Croft and Arcanum, Gee looks at major specific cognitive activities:

* How individuals develop a sense of identity
* How one grasps meaning
* How one evaluates and follows a command
* How one picks a role model
* How one perceives the world

This is a groundbreaking book that takes up a new electronic method of education and shows the positive upside it has for learning.

Mind Wide Open: Your Brain and the Neuroscience of Everyday Life

By Steven Johnson

Using a mix of experiential reportage, personal storytelling, and fresh scientific discovery, Steven Johnson describes how the brain works -- its chemicals, structures, and subroutines -- and how these systems connect to the day-to-day realities of individual lives. For a
hundred years, he says, many of us have assumed that the most powerful route to self-knowledge took the form of lying on a couch, talking about our childhoods. The possibility entertained in this book is that you can follow another path, in which learning about the brain's mechanics can widen one's self-awareness as powerfully as any therapy or meditation or drug.

In *Mind Wide Open*, Johnson embarks on this path as his own test subject, participating in a battery of attention tests, learning to control video games by altering his brain waves, scanning his own brain with a $2 million fMRI machine, all in search of a modern answer to the oldest of questions: who am I?

Along the way, Johnson explores how we "read" other people, how the brain processes frightening events (and how we might rid ourselves of the scars those memories leave), what the neurochemistry is behind love and sex, what it means that our brains are teeming with powerful chemicals closely related to recreational drugs, why music moves us to tears, and where our breakthrough ideas come from.

Johnson's clear, engaging explanation of the physical functions of the brain reveals not only the broad strokes of our aptitudes and fears, our skills and weaknesses and desires, but also the momentary brain phenomena that a whole human life comprises. Why, when hearing a tale of woe, do we sometimes smile inappropriately, even if we don't want to? Why are some of us so bad at remembering phone numbers but brilliant at recognizing faces? Why does depression make us feel stupid?

To read *Mind Wide Open* is to rethink family histories, individual fates, and the very nature of the self, and to see that brain science is now personally transformative -- a valuable tool for better relationships and better living.

Playing the Future: What We Can Learn from Digital Children

By Douglas Rushkoff

Three years after the original publication of *Playing the Future: What We Can Learn from Digital Children* in 1996, this breathlessly polemical defense of the techno-savvy youth culture of the '90s already reads like a document from another era. Back then the Internet was still a strange new force, instinctively embraced by children who'd grown up playing video games, instinctively distrusted by the grownups who ran the mainstream media. Standing up for the emergent digital culture--loosely associated with suspicious activities like raves, role-playing games, & piercing--took nerve & optimism.

And Douglas Rushkoff here supplies both in abundance. His argument: contemporary "screenagers," as he calls them, aren't being warped by new technologies, they're adapting to them. Their relationship to play, work, spirituality, & politics all reflect the contours of a new world shaped by the liberating logic of digital networks & chaos theory. It's a better world, Rushkoff assures us, & if the grownups know what's good for them, they will stop looking askance at the ways of digital youth & start trying to learn from them instead.
Ultimately, Rushkoff seems a lot more interested in making his argument than in making it stick. He flies from one loose logical connection to another—the secret link between fractal math & snowboarding, the parallel between Web browser interfaces & Federal Reserve notes—and he alternates between near-brilliance & utter implausibility as he goes.

But even nowadays, when the heated rhetoric that met the first wave of digital culture is generally giving way to more nuanced analysis, there's something contagious about Rushkoff's passionate faith that the children are all right. He may not convince you, but after this intellectual joy ride is over, that may not matter. Like any good child of the '90s, you'll want to believe.

How People Learn: Brain, Mind, Experience, & School

By National Research Council (Corporate Author), John Bransford (Editor), Ann L. Brown (Editor), Rodney R. Cocking (Editor)

Learning is such a natural thing for humans. In a matter of months, the typical human baby goes from being unable to make a sound to being able to understand & use language. After a few years, the neurological connections in their brains are largely completed & all of their senses become active. Many if not most of the basic sensations have been experienced & recorded. However, beyond the universal aspects of human learning, it becomes a very individual experience. The kind of learning that is done in school appears to be beyond what humans are genetically & physiologically designed to do, which means that it cannot be applied en mass.

Unfortunately, that is what the public education strategy has been since it was implemented. The development of the factory, where workers had to be punctual, reliable & able to follow detailed instructions, meant that workers had to be interchangeable. Therefore, a public education was designed to be one that tried to mold everyone into the same final product using a standard approach to learning.

That strategy was actually very successful for almost a century, where the United States & other developed countries went from limited to almost universal literacy. However, in the last several decades, with the rapid development of new knowledge & specialties, that approach has proven inadequate. It is time to consider new ways of learning, & that begins with learning the different ways that humans learn.

The first step, described in detail in the book, is to understand that a newborn baby possesses more ability to learn that was ever realized before. Once experiments were developed that made it possible to measure feedback from infants, it was learned that they were far more aware of their world than previously thought. This is important, in that it demonstrates an important aspect of fundamental patterns of learning.

From much of the research cited in the book, it is clear that in our modern society, the standardized curriculum is counterproductive & standardized tests to measure the value of that curriculum are invalid. When the goal is to pass a standardized test, especially when there are penalties for failure, students & teachers alike naturally fall into a basic mindset to prepare for the test. This tends to create an emphasis on rote memorization, stifles learning,
& prevents the development of an agile mindset. There is an enormous amount of research, much of which is cited in this book that strongly suggests that the best education is one where people are forced to resolve situations & problems that present a bit of uniqueness.

Environments that are varied & present new situations on a regular basis lead to a greater amount of intellectual stimulation & smarter creatures. This holds for all animals, from rats to humans.

While technology can be a tremendous aid, it is not a cure-all. Like all strong medicine it must be administered in intelligent doses. That point is also covered very well in the book. One other very interesting point dealt with cultural differences. A speech-language pathologist was working in an Inuit school & onethird of the class was considered to be in need of assistance by a non-Intuit principal, "because they did not talk in class." However, the "problem" was resolved when the pathologist consulted an Inuit teacher, who cleared it up by saying, "Well-raised Inuit children should not talk in class. They should be learning by looking & listening."

This is a very important book for all people involved in education. The educational tactics that served us well in the past are no longer appropriate. By reading & studying the research findings summarized in this book, all stakeholders in education can learn how to more efficiently transfer knowledge into those who want it & need it.

How Students Learn: History, Mathematics, & Science in the Classroom

By Suzanne Donovan & John Bransford

This book has its roots in the report of the Committee on Developments in the Science of Learning, How People Learn: Brain, Mind, Experience & School (National Research Council, 1999, National Academy Press). That report presented an illuminating review of research in a variety of fields that has advanced understanding of human learning. The report also made an important attempt to draw from that body of knowledge implications for teaching. A follow-on study by a second committee explored what research & development would need to be done, & how it would need to be communicated, to be especially useful to teachers, principals, superintendents, & policy makers: How People Learn: Bridging Research & Practice (National Research Council, 1999).

These two individual reports were combined to produce an expanded edition of How People Learn (National Research Council, 2000). We refer to this volume as HPL.

In the present book, the goal is to take the HPL work to the next step: to provide examples of how the principles & findings on learning can be used to guide the teaching of a set of topics that commonly appear in the K-12 curriculum. As was the case in the original work (1999), the book focuses on three subject areas: history, mathematics, & science. Each area is treated at three levels: elementary, middle, & high school. Distinguished researchers who have extensive experience in teaching or in partnering with teachers were invited to contribute the chapters.
The committee shaped the goals for the volume, & commented-sometimes extensively on the draft chapters as they were written & revised. The principles of HPL are embedded in each chapter, though there are differences from one chapter to the next in how explicitly they are discussed.

Taking this next step to elaborate the HPL principles in context poses a potential problem that we wish to address at the outset. The meaning & relevance of the principles for classroom teaching can be made clearer with specific examples. At the same time, however, many of the specifics of a particular example could be replaced with others that are also consistent with the HPL principles. In looking at a single example, it can be difficult to distinguish what is necessary to effective teaching from what is effective but easily replaced. With this in mind, it is critical that the teaching & learning examples in each chapter be seen as illustrative, not as blueprints for the "right" way to teach.

We can imagine, by analogy, that engineering students will better grasp the relationship between the laws of physics & the construction of effective supports for a bridge if they see some examples of well-designed bridges, accompanied by explanations for the choices of the critical design features. The challenging engineering task of crossing the entrance of the San Francisco Bay, for example, may bring the relationship between physical laws, physical constraints, & engineering solutions into clear & meaningful focus. But there are some design elements of the Golden Gate Bridge that could be replaced with others that serve the same end, & people may well differ on which among a set of good designs creates the most appealing bridge.

To say that the Golden Gate Bridge is a good example of a suspension bridge does not mean it is the only, or the best possible, design for a suspension bridge. If one has many successful suspension bridges to compare, the design features that are required for success, & those that are replaceable become more apparent & the requirements that are uniform across contexts, & the requirements that change with context, are more easily revealed.

The chapters in this volume highlight different approaches to addressing the same fundamental principles of learning. It would be ideal to be able to provide two or more "HPL compatible" approaches to teaching the same topic (for example, the study of light in elementary school). However, we cannot provide that level of specific variability in this already lengthy volume. Nevertheless, we hope that common features across chapters, & the variation in approach among the chapters, are sufficient to provide instructive insights into the principles laid out in How People Learn. Substantial parts of the books can be downloaded from http://lab.nap.edu/napcgi/discover.cgi?term=how+students+learn&GO.x=18&GO.y=5&restric=NAP

How the Brain Learns, 2nd Edition (Text & Manual)

by David A. Sousa

Understanding Digital Kids
David Sousa’s practical and powerful bestseller on brain research and education enters the 21st century with a valuable updated edition, incorporating the previously published main text, the companion manual, and the latest discoveries in neuroscience and learning. How the Brain Learns has always focused on the information that can help teachers turn research on brain function into practical classroom activities and lessons. The second edition still includes basic brain facts that can help students learn, insights on how the brain processes information, and tips on maximizing retention using “down time.” And now Sousa takes it further, building on the latest information available to provide:

An updated Information Processing Model that reflects new terminology regarding the memory system Exciting new research on how the brain learns motor skills A whole new chapter on the implications of the arts in learning An expanded list of primary sources for those who wish to review the core research

All the newest information and insights are included. It’s a vital tool for school leaders, staff developers, teacher educators, and administration education faculty—as well as any educator who wants to help students learn.

How the Brain Learns to Read

by David A. Sousa

How the Brain Learns to Read presents what scientists have uncovered about how children develop spoken language and use spoken language abilities when learning to read. Best-selling author David Sousa explores source material on brain research and provides scores of practical reading strategies for the K-12 classroom.

Complete with relevant brain diagrams and informative tables, this exciting new book examines critical concepts including:

• Understanding language acquisition and its relationship to reading
• Incorporating modern research findings in your classroom
• Overcoming reading problems, including early intervention programs
• Content area reading with strategies to improve vocabulary and comprehension
• Developing successful reading programs that encourages teachers to be researchers

Reading is essential for success in our society. With this guide to cutting-edge reading research, you’ll find the keys to unlocking reading success in your students!

How the Special Needs Brain Learns

by David A. Sousa

Now from the author of the best-selling How the Brain Learns comes a new book dealing with special needs students. How the Special Needs Brain Learns helps you turn research on the brain function of students with various learning challenges into practical classroom activities and strategies.
David Sousa shows how the brain processes information and examines both simple and complex learning strategies that can be adapted and taught to your students.

The first step for students with learning disabilities is helping them to build self esteem by teaching them how to work in groups and giving them strategies for engagement and retention. This book focuses on the most common challenges to learning for many students, especially for those who are often the first candidates for special education referral, and emphasizes lifelong independent learning, increased retention, and cognitive flexibility for all. Sousa builds on the latest brain research to discuss teaching strategies for students challenged by:

- ADHD/ADD
- Speech disabilities
- Reading disabilities
- Writing disabilities
- Math disabilities
- Sleep disorders
- Emotional and behavioral disorders
- Autism
- Asperger’s Syndrome

Today’s classrooms embrace students of all abilities, and Sousa’s latest work provides the most up-to-date information and insight on how to work effectively with each one of them. Offering real strategies for real classrooms, How the Special Needs Brain Learns is an indispensable tool for all educators, school administrators and teachers, staff developers, pre-service educators, and even parents who want to better understand the way their children process and retain information.

Becoming a "Wiz" at Brain-Based Teaching

by Marilee Sprenger

Through the clever analogy of The Wizard of Oz, Marilee Sprenger provides invaluable information about cognitive research and shares simple tactics for implementing these ideas in the classroom. Learn proven tools for coping with "The Lion’s stress, the Tin Woodsman’s need for emotional intelligence, and the Scarecrow’s desire for higher level thinking."

This user-friendly guide effectively discusses expert findings about brain growth, structure, and functions to help teachers and administrators foster a love of learning in all students. By creating an enriched, brain-compatible environment as outlined in this book, educators can effectively counter such existing negative influences as stress, sleep deprivation, poor nutrition, and a genetic predisposition to disorders in order to cultivate successful lifelong learning.

Key features include:

1. Straightforward discussion about memory pathways, learning styles, and
Understanding Digital Kids

multiple intelligences
2. Extensive examples from real school situations where brain research has been applied
3. Tactics for immediately putting brain-based information to work in the classroom
4. Concrete techniques for using music, teams, rapport building, and brain-state changes to stimulate student learning

TRENDS The World Is Flat: A Brief History of the Twenty-first Century

by Thomas L. Friedman

Thomas Friedman is not so much a futurist, which he is sometimes called, as a presentist. His aim, in his new book, *The World Is Flat*, as in his earlier, influential *Lexus and the Olive Tree*, is not to give you a speculative preview of the wonders that are sure to come in your lifetime, but rather to get you caught up on the wonders that are already here. The world isn’t going to be flat, it is flat, which gives Friedman’s breathless narrative much of its urgency, and which also saves it from the Epcot-style polyester sheen that futurists—like the optimistic ones at least—are inevitably prey to.

What Friedman means by “flat” is "connected": the lowering of trade and political barriers and the exponential technical advances of the digital revolution have made it possible to do business, or almost anything else, instantaneously with billions of other people across the planet. This in itself should not be news to anyone. But the news that Friedman has to deliver is that just when we stopped paying attention to these developments—when the dot-com bust turned interest away from the business and technology pages and when 9/11 and the Iraq War turned all eyes toward the Middle East—is when they actually began to accelerate. Globalization 3.0, as he calls it, is driven not by major corporations or giant trade organizations like the World Bank, but by individuals: desktop freelancers and innovative startups all over the world (but especially in India and China) who can compete—and win—not just for low-wage manufacturing and information labor but, increasingly, for the highest-end research and design work as well. (He doesn't forget the "mutant supply chains" like Al-Qaeda that let the small act big in more destructive ways.) Friedman tells his eye-opening story with the catchy slogans and globehopping anecdotes that readers of his earlier books and his New York Times columns will know well, and also with a stern sort of optimism. He wants to tell you how exciting this new world is, but he also wants you to know you're going to be trampled if you don't keep up with it. His book is an excellent place to begin.

The Singularity Is Near: When Humans Transcend Biology

by Ray Kurzweil

In our presentations we frequently refer to an amazing book entitled *The Age of Spiritual Machines*, by the great inventor & futurist Ray Kurzweil. Kurzweil is one of the best-known & controversial advocates for the role of machines in the future of humanity. In his latest, thrilling foray into the future, he envisions an event - the "singularity" - in which
technological change becomes so rapid & so profound that our bodies & brains will merge with our machines.


The Singularity Is Near portrays what life will be like after this event - a human machine civilization where our experiences shift from real reality to virtual reality & where our intelligence becomes non-biological & trillions of times more powerful than unaided human intelligence. In practical terms, this means that human aging & pollution will be reversed, world hunger will be solved, & our bodies & environment transformed by nanotechnology to overcome the limitations of biology, including death.

We will be able to create virtually any physical product just from information, resulting in radical wealth creation. In addition to outlining these fantastic changes, Kurzweil also considers their social & philosophical ramifications. With its radical but optimistic view of the course of human development, The Singularity Is Near is certain to be one of the most widely discussed & provocative books of 2005.

Information Anxiety 2
by Richard Saul Wurman, David Sume, Loring Leifer

Information might want to be free; but why should we free it? We've got enough trouble keeping track of all the petabits that already run around untethered, & risk a computer counterrevolution if we let the situation get much crazier. Information architect Richard Saul Wurman swept the field clear in 1989 with his groundbreaking book that foresaw the problems of data clutter & proposed a radical new means of organizing & presenting knowledge humanistically; for the new century, he has revised it substantially as Information Anxiety 2. This book is sparklingly clear & readable--it'd better be, after all--and offers insight not only to designers, educators, & content developers, but also to anyone who needs to communicate effectively through dense clouds of facts. If Wurman occasionally indulges in New Age-y pop psychology, his analysis is never muddy, & the more hardheaded reader will forgive him soon enough. The discussion alternates between describing the deeply stressful task of absorbing poorly organized data & exploring solutions that require a bit of rethinking, but that reward such an investment with improved understanding and, maybe, a state change from information to wisdom.

We could do worse--if we don't pay attention to Wurman & his colleagues, we almost certainly will.

The Tipping Point: How Little Things Can Make a Big Difference
by Malcolm Gladwell

"The best way to understand the dramatic transformation of unknown books into bestsellers, or the rise of teenage smoking, or the phenomena of word of mouth or any number of the other mysterious changes that mark everyday life," writes Malcolm Gladwell, "is to think of them as epidemics. Ideas and products and messages and behaviors spread
just like viruses do." Although anyone familiar with the theory of memetics will recognize this concept, Gladwell's *The Tipping Point* has quite a few interesting twists on the subject. For example, Paul Revere was able to galvanize the forces of resistance so effectively in part because he was what Gladwell calls a "Connector": he knew just about everybody, particularly the revolutionary leaders in each of the towns that he rode through. But Revere "wasn't just the man with the biggest Rolodex in colonial Boston," he was also a "Maven" who gathered extensive information about the British. He knew what was going on and he knew exactly whom to tell. The phenomenon continues to this day--think of how often you've received information in an e-mail message that had been forwarded at least half a dozen times before reaching you.

Gladwell develops these and other concepts (such as the "stickiness" of ideas or the effect of population size on information dispersal) through simple, clear explanations and entertainingly illustrative anecdotes, such as comparing the pedagogical methods of Sesame Street and Blue's Clues, or explaining why it would be even easier to play Six Degrees of Kevin Bacon with the actor Rod Steiger.

Although some readers may find the transitional passages between chapters hold their hands a little too tightly, and Gladwell's closing invocation of the possibilities of social engineering sketchy, even chilling, *The Tipping Point* is one of the most effective books on science for a general audience in ages. It seems inevitable that "tipping point," like "future shock" or "chaos theory," will soon become one of those ideas that everybody knows--or at least knows by name.

**CURRICULUM & LEARNING**

**Teaching for Tomorrow: Teaching Content & Problem-Solving Skills**

by Ted McCain

This is Ian writing this review. Although I may seem a bit biased in that he coauthored *Windows on the Future* with me, I truly believe that Ted McCain understands the big picture in education better than just about anyone out there.

And if you've ever got the opportunity to hear him speak, you'll know exactly what I'm talking about. This said, if you're frustrated with the direction education appears to be heading - if you feel an overwhelming need to reconsider the relevancy of what you teach - or if you want to discover how to get students to develop "real-world" problemsolving skills, you'll definitely want to read Ted's new book *Teaching For Tomorrow: Teaching Content & Problem-Solving Skills* (2005, Corwin Press)

Through first-hand experience, Ted concisely lays out the argument for preparing students for their world, guiding them to become independent & successful critical thinkers. *Teaching for Tomorrow* brings everyday life encounters & situations as text to the classroom, challenging students to engage more deeply in their learning & teachers in their teaching. By eliminating the typical stand & deliver approach,
Ted hopes educators will now focus on using instruction that allows students to create knowledge for themselves.

Major components of the book include:
1. Role-playing scenarios
2. Mapping out 6 changes to teaching that enable teachers to use problem-solving, project-based instruction effectively
3. The outline of the 4 D's (Define, Design, Do, & Debrief), a step-by-step process for student work & for problem solving applicable to virtually any field

By gaining real-world skills rather than just "school" skills, students are engaged in thoughtful work, learning to collaborate, taking responsibility for their own time & tasks, & becoming creative problem solvers in the classroom & for life beyond. This book is HIGHLY recommended.

What Every Teacher Should Know: The 10 Book Collection
by Donna Walker Tileston

This slipcase collection of 10 compact volumes offers a complete training curriculum for teachers that covers all required essentials for teacher induction, mentoring, and support programs. The collection can be used for teacher certification and re-certification programs, as well as for fast-track alternative certification programs. Additional highlights embedded within each individual volume include assessment pre-tests and post-tests, resources, and content about urban learners, making this training program ideal for preparing highly qualified teachers for today’s challenging classrooms, particularly in urban areas.

The entire collection allows instructors and staff developers to offer comprehensive teacher training that meets the requirements of the No Child Left Behind legislation. Individual works can be purchased separately and cover "What Every Teacher Should Know About..."

1. **Diverse Learners**—research-based approaches to working with diverse learners
2. **Student Motivation**—steps teachers can take to motivate and challenge students
3. **Learning, Memory and the Brain**—a holistic approach to student learning
4. **Instructional Planning**—long and short-term goals for lesson planning
5. **Effective Teaching Strategies**—a bag of teaching tools for the written, taught, and assessed curriculum
6. **Classroom Management and Discipline**—effective tools to minimize or prevent the most common discipline problems
7. **Student Assessment**—and the implications of standards-based instruction in the classroom
8. **Special Learners**—effective tools to help students with special needs achieve school success
9. **Media and Technology**—media that work for each of the student modalities
10. The Profession and Politics of Teaching—effective partnerships with parents, teaching peers, mentor teachers, administrators, and teacher organizations

Understanding by Design

by Grant Wiggins, Jay McTighe

McTighe & Williams successfully expound on a subject often mired in philosophical debate: how to assess understanding & evaluate true learning. It is an outstanding framework for developing curriculum intent on extending beyond traditional methods of teaching & preaching to students. The authors contend that measuring performance against six facets of understanding can assess true understanding: explanation, interpretation, application, perspective, empathy, & self-knowledge.

These facets are vital to developing curriculum & the authors do an outstanding job of presenting the material in charts, & exercises, making a difficult topic easier to understand. Comparing & contrasting covering material & uncovering knowledge serves to help teachers think like assessors, rather than activity planners. Helpful design tools are included throughout the book & teachers are instructed to evaluate the effectiveness of their teaching with thoughtful & probing questions.

Understanding by Design will serve as a guide for evaluating your own effectiveness as a teacher. UBD can be used to gauge your own competency in developing & executing lessons. Examples throughout the book illuminating the practical applications of each of the six facets are well organized & easy to follow.

We found the use of keywords & charts especially helpful in furthering our own understanding of how to uncover knowledge. I am confident that if we remain faithful to the tenets of this book, we will be able to put into practice what we believe constitutes effective strategies for learning: student-centered activities which call upon students to question assumptions, draw upon past knowledge, & advance understanding through incremental learning. A series of field books are also available.

Results: The Key to Continuous School Improvement

by Mike Schmoker

A terrific book that tangible, measurable results are the key to school improvement. Under the right conditions, schools can bring about incremental, even dramatic results. Author Mike Schmoker examines these conditions & the theory behind them, using examples from schools to show that virtually any school can begin to successfully replicate the conditions.

Meaningful teamwork, when combined with setting clear, measurable goals & regularly collecting & analyzing a wide variety of contextualized qualitative and/or quantitative performance data, constitutes the foundation for results. Schmoker emphasizes the importance of principals & practices that are simple, supported by research, & relatively few
in number. Such principals have enormous but under-used potential. As the many schools described in this book demonstrate, educators can immediately provide an better education for all students by focusing unwaveringly on better results & the conditions that promote them. A field book is also available.

**For further reading** (in no particular order):
1. *Learning and Memory: The Brain in Action* by Marilee Sprenger
2. *Completing the Puzzle: The Brain-Compatible Approach to Learning* by Eric Jensen
16. *The Owner’s Manual For the Brain*, Howard, P.J., Bard Press, 2000, Austin, TX:

Page 81 of 83

23. A Different Kind Of Classroom: Teaching With Dimensions Of Learning, Marzano, R.J., 1992, ASCD, Alexandria, VA
27. Learning And Memory: The Brain In Action, Sprenger, M., 1999, ASCD, Alexandria, VA:

Journal Articles

Online Articles
6. Understanding the Brain – Towards a New Learning Science, Organization for Economic Cooperation and Development, 2001 http://www.oecd.org/home/0,2605,en_2649_201185_1_1_1_1_1,00.html
7. Memory: How Do We Remember What We Know, by Analysis by Richards J. Heuer, Jr., Psychology of Intelligence, 1999 (updated 2004),

Understanding Digital Kids