Understanding Digital Kids (DKs)

Teaching & Learning in the New Digital Landscape

By Ian Jukes and Anita Dosaj
The InfoSavvy Group
June 2004

Synopsis

Why is this kid like that? It's because they're different! Not just in the clothes they wear. Not just because they dye their hair. Not just because of the body parts they pierce and tattoo. Today's Instant Messenger Generation has grown up in a new digital landscape. For most of them, there's never been a time in their lives when computers, cell phones, video games, the Internet and all the other digital wonders that increasingly define their world haven't surrounded them. These Digital Natives process and interact with information, and communicate in fundamentally different ways than any previous generation before them. Meanwhile, many of us, the Digital Immigrants, struggle as we try to deal with the rapid change and powerful new technologies native to 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 and learning? What will it mean to be educated in the light of modern, changed, and changing world? And how can we reconcile these new developments to current instructional practices in the 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.

Learning in the New Digital Landscape

How many of you have children of your own or that you're responsible for? Don't be ashamed, put your hand up. How many of you have teenagers of your own or that you're responsible for? Be assured that each and every one of you has our DEEPEST sympathies.

Do you ever catch yourself watching kids and just shaking your head? Do you ever find yourself saying "What's going on here? What's up with these kids 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?"

At the same time others might say "Hold on, you're wrong, you're being way to harsh! You need to chill out. Kids are kids. They make look different, may sound different, may act different, but underneath it all they're just kids. They have the same issues, same insecurities, same hurt feelings, 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."

If you believe this second statement, we want you to know that we totally respect your opinion even if it is completely wrong.!

They're different

Kids today really ARE different! But not just in the clothes they 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 the editorial comment); not just because of the way they talk or what they say, or how they act; not just because they seem to have more body parts than we ever did growing up – body parts that they seem to want to pierce, tattoo and/or expose.

No – kids today are different neurologically. A great deal of brain research, in what is called the neurosciences has been undertaken in the past few years. This research is validating much of what we understand from the psychological research, particularly from the psychological sciences.

The bottom line is that kids today are FUNDAMENTALLY different than 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 the modern world. And this holds profound implications for us both personally and professionally. Let's examine WHY this has happened and what it means for us.

Regardless of how old you are
Most of the people reading this article grew up in times of relative stability. For example see how many of these apply to you.

1. I had TWO parents?
2. I had a dad who worked at the same job for more than 30 years?
3. I had a mother who stayed home to take care of the family?
4. We sat down as a family for meals.

These were different times. Even thirty years ago only one of five families had both parents working outside the home. For most of us, life was stable and predictable. I remember being able to literally set my watch by the time Dad turned the corner and came home from work each evening. We all sat down together for a meal – imagine, this was a home-cooked meal - at the same time every night. And Sundays were special. It was church in the morning, play in the afternoon, Sunday dinner, followed by Disney and then a bath, whether you wanted it or not.

For many of the people of this time and generation, there was an amazing rhythm and pace 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 play outside because it was safe. Parents didn't have to worry that something horrible was going to happen to us. Danger didn't seem to be hovering around every corner. And there was a sense of community. Everyone looked out for everyone else. 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. We lead, we followed, we fought, we reconciled, we negotiated, we planned, we built teams and we learned to get along. 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 Ian, the ultimate in technology was his 3-speed Schwinn Phantom bike and a transistor radio that he hid under his pillow at night when he went to bed.

Like most other families, we only had one TV that was located in the living room. (Why would you ever need two?) And that's where we sat together, watching and discussing what we saw. If we wanted to see the latest movie, we had to go to a theater or the drive-in.

Back in those days imagination was essential. We created our own monsters and villains. Our stick became a sword and the rock was a horse. We rode our bikes with chunks of cardboard clothes-pinned to the frame so we could sound like a motorcycle. 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 you was to be sent to your room because there was ABSOLUTELY nothing to do there other than to reflect on your crimes. Do you remember those days?

Communications were basic
Many of us lived on a telephone party line shared 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.

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 happened. Information was finite because we lived in a largely single source world. It was a world 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, decoder rings, Mickey Mouse Club memberships, to mail order purchases.

Doing research was a physical act
We went to the library& 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 what the information we were looking for. Our primary sources 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

Our schools reflected the times we lived in. They were predictable and safe; they were orderly and punctual. Schools had authority. Teachers and administrators were respected. Kids who misbehaved were dealt with swiftly. Some got detentions, others got the strap or a ruler. And the vast majority of parents supported the actions of the school.

We sat in rows. The teacher talked. We were expected to listen. Most information came from the teacher or a textbook. The focus was primarily on content recall. 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. That was then, and in describing the way things were when we were kids, we've literally examined the tip of the iceberg.

So what about today? In more ways than many of us can remember or measure the world of today is VERY different

The future ain't what it used to be

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 to the Osbornes – from Beaver Cleaver to Beavis & Butthead.

For example, in 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 rhythm of life is now dictated as much by work schedules as by family needs. In the 1950's both parents worked in one of five families. It was typically a five-day work week. 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.

Parents today spend 40% less time with their children than parents did just 30 years ago, and much of that time with our kids 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 kids' lives that needs to be filled.

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 kids. Technology has filled the void. It started years ago with the telephone, radio, and TV. It then progressed to videos and video games. Now it's email, surfing, on-line chatting, cell phones, blogging, texting, and a host of other digital experiences.

Today, 64% of kids come home from school to no one, because their parents or only parent are at work. Consequently, many kids 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, talking on the phone and surfing the Web. In this 24/7 world, these new digital gizmos have become the babysitter, the constant companions, and best friends for many kids.

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 and interactions that come through their computers, phones, and video games. This generation is equally as comfortable with virtual, screen-to-screen relationships as they are with face-to-face relationships. So while for our generation, the worst thing that could have happened was to be sent to our rooms, most kids today are completely comfortable nesting in their digital cocoons.

This shift has had a PROFOUND effect on the kids' thinking patterns. In his book Information Anxiety author Richard Saul Wurman estimates that today's college grads have spent 10,000 hours playing video games, 20,000 hours watching TV, over 20,000 hours talking on the phone, not to mention countless hours listening to music and surfing the Web, and using Instant Messenger, chat rooms and email. But at the same time, they've only spent 5,000 hours reading and 11,000 hours attending school.

Richard Walsh from Media Family states that 62% of school-age kids have TV sets in their own bedroom – the equivalent of their own private tutor. In the 1200 channel universe, if you believe that Sesame Street taught your kids something, be assured that MTV as role model is teaching them something entirely different.

And today's world is decidedly more high-tech than our world was. Eighty-two percent of American kids play video games on a regular basis - an average of 8.2 hours a week. As a result, over 70% of dollars spent by children and teenagers on toys are for electronic games.

Today's kids 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 kids and even 10 years ago. For the Millennium generation, there's never been a time where these digital wonders haven't existed. Consequently they haven't just adopted digital media – increasingly they've internalized them.

Let's be clear that this is a FUNDAMENTALLY different environment than the one we grew up in. It's a 600-channel TV universe. It's a 10,000 station radio universe accessible online. It's an 8,000,000,000 plus page Internet.

Kids 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 downfall of Sadaam Hussein, Michael Jackson's arrest, or the beheading of an American in Iraq, 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 twitch speed. Kids accept as normal that they'll 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 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 to get kids to read today. Reading is a delayed gratification medium while TV, video games and the Web are immediate gratification media.

For example, Anita recently heard her son complain that it had taken him 20 minutes to register for his courses at college, which he was doing ONLINE from his room!!!! Anyone remember the good old days - 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, kids have instantaneous access to literally every library, every art gallery, and every museum in the world. More relevant for kids, they also have access to friends, games, music, movies, shopping, cheat sheets, and more than 10,000 online clubs specifically design to attract digital kids.

An MTV mindset
Because they've grown up with not just text-based information, but also images, sounds, and video presented as a single entity, this generation has developed an MTV mindset. For them, this isn't multimedia. As David Thornburg suggests, it's monomedia – it's all just digital 0's and 1's and delivered by a single device.

A visual world
Digital kids are completely comfortable with the visual bombardment of simultaneous images, text and sounds because they 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 – something that helps explain the rise in popularity of reality-based shows like Survivor.

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 kids on the other side of the so-called digital divide, who still have access to video games, cell phones, pagers, and MP3 players. In fact, this trend isn't just unique to North American kids, but pervasive around the world, for most children, regardless of socio-economics, culture, race or religion.

For example, the picture on the next page was taken recently in the 300-year old Arab fabric market in Singapore. For someone who has never experienced the Arab market, it's hard to describe the overwhelming sensory experience – the sights, sounds, and smells of the street are absolutely amazing. According to the locals, other than electricity and automobiles, the scene is little different than it would have been centuries ago.

This picture is of an 11-year-old Muslim 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 digital kids are different than 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. These experiences have become their replacement for what we did on the street, the park, and back yard.

Today's kid'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. This is where they will learn many of their social skills as they've become increasingly immersed in the new digital landscape.

Digital natives

Make no mistake about it. If we could use a time machine to bring 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. Today's kids have been shaped by the digital environment in which they are growing up. They use digital technology transparently, without thinking about it, without marveling at it, without wondering about how it works. This is the first generation that has ever mastered a multitude of essential tools before the older generations have. They have grown up digital – it's their native tongue – a language in which they are digitally fluent. They

are, as Marc Prensky describes them, digital natives. 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 grew up in the 60s, 70s and 80s. In much the same way that kids today have been shaped by their world, we were shaped by the text-based, simpler, predictable, relatively stable, low-tech world we grew up in.

As a result, today, we face a digital divide. Not just one based on the gap between the haves and have-nots, but by one caused by the fundamental difference in the way we grew up. We come from another land and time. In today's world, we are foreigners or at best, as Prensky describes us, digital immigrants who speak and hear digital with 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 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 hear their teachers speak to them, they instantly hear their teachers' accent, and 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.

As digital outsiders 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.

We're DSL

We speak digital as a second language. That's why we're digital immigrants. 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

Digital natives on the other hand, pick up new devices and start experimenting with them right away. They assume the inherent design of the devices will teach them how to use a new gadget. 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.

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, the world is one great big reset button.

Digital immigrants don't understand this

Digital immigrants focus on and try to apply the skills learned in another time. And we often don't appreciate the skill development of digital natives skills that kids 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 kid and got your butt absolutely kicked?

What some digital immigrants can't appreciate is that the reason kids don't have the same skills and literacies as we do are that there has been a profound shift in the kind of skills used and needed 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 kids who act differently. Digital kids 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 change, that it's a new digital world, many immigrants complain and remain attached to the old and talk about how much better it was in the old country.

What we've learned

Because of this constant digital bombardment and the pervasive nature of digital experiences, researchers have long inferred that the brains of the digital generation must be changing physically and chemically. Even though we don't yet fully understand the complex processes involved in thinking, let's take a closer look at what we have learned.

First, 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 kids in the new digital landscape from the perspective of their internalization of the digital language.

Based on these observations, and based on what we now know from the neurosciences and psychological sciences, what we're now beginning to understand is that kids 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, conventional thinking was that by age 3, the brain was stable. It did not change. We had a fixed number of brain cells, which then started to die off one by one. As a result, for the longest time, the assumption was that this was the case regardless of race, culture, or experiences. The conclusion was that we all thought in basically the same way because we all used the same neural pathways or brain circuitry to process information.

However, in the past 10 years most of these beliefs have been shown to be wrong. Neuroscience and neurobiological research shows that on the contrary, the brain is constantly reorganizing itself structurally throughout life based on input or experience.

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 in laymen's terms is that you can change memory capacity; that you can change processing power; and that you can re-grow neurons and change neural circuitry.

This process or reorganization in response to intensive inputs and constant stimulation is called neuroplasticity. Contrary to longstanding assumptions, the brain literally restructures neural pathways on an ongoing basis throughout our lives. It makes new cells, it creates new connections, it sets up new circuitry, and, as a result, constantly creates new thinking patterns.

However, brains don't just change on their own. To do this requires sustained stimulation and focus over long 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 required our brains to be reprogrammed over extended periods of time - several hours a day, 7 days a week. In the same way, watching TV for extended periods of time reprogrammed our brains – but this required several hours a day, 7 days a week.

Does several hours a day, 7 days a week remind you of anything else?
This is increasingly what's been happening to digital kids' brains since the arrival of Pong in 1974. Today video games, computers, cell phones and a multitude of other devices that facilitate hypertext, interactivity, networking, random access and multitasking are being used by digital kids several hours a day, 7 days a week. The bottom line is that these experiences are literally rewiring kids' brains so that they process information differently than we do. How do we know this?

The Human Cognome Projects

A new field of study called neuroinformatics has emerged during the past few year. Neuroinformatics involves the digital analyses of brain processes. Using brain scanners and imaging techniques, including functional Magnetic Resonance Imaging (fMRI), Positron Emission Tomography (PET) scans, and OT (Optical Topography) , we can now 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 analyze the living brain's processing patterns at the molecular level. This allows researchers to locate to within a few millimeters the parts of the brain that "light up" when people move a finger, feel sad, add 2 plus 2, or do certain tasks and helps them to understand how different areas interact to handle complex work. 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.

If we were to take an electronic scan of our parents' brains and compare them to ours, we would quickly see that we use SLIGHTLY different neural pathways to process the same information than our parents. In the same way, if we were to take an electronic scan of our brains and compare them to those of our kids' brains, we would find that they use FUNDAMENTALLY different neural pathways to process the same information than we do.

We all process information in slightly different ways, but with the experiences and stimulation our kids have been exposed to, the research is telling us that digital natives are processing information differently than digital immigrants. This provides some explanation as to why they act the way they do and helps explain the fundamental difference between our generation and theirs.

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 exposes 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 we all learn in the same way and or that memory fades as we age.

Yet, sadly, almost none what we have learned about how the brain functions is being applied to help understand 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 I 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 to 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*

How we can use current research

What current brain research used in conjunction with psychological research does allow us to do is to make inferences and gain understanding as to *why* and *how* our kids' experiences with the digital landscape are impacting their brains and minds so we can make good educational decisions.

The bottom line is, if we can't connect with as our children and build relationships with them by understanding their learning and communication practices, and applying this understanding to classroom practices, no amount of energy, money or mandates will increase student achievement or address the challenges of state standards or No Child Left Behind.

What implications does all this hold for schools?

It's long been known talking AT students is NOT effective. You may have heard the saying:

I HEAR and I FORGET
I SEE and I REMEMBER
I DO and I UNDERSTAND

In How the Brain Learns, Dr. David Sousa writes about how we remember. While we can't hope to do justice to his explanation, research in cognitive psychology has taught us that learning is not a process of transmission, but a process of construction. In other words, for knowledge to really "stick," students need to consistently have experiences where they discover information and then synthesize that into new knowledge by applying it to what they have previously understood to "construct" their own understanding of the world. This is what we call Velcro learning – making connections between the contents of short and long term memory.

Novice learners often just try to remember facts in lists. This is a common strategy for students preparing for quizzes & tests. Information without context or interest is like one side of Velcro, it just doesn't stick.

One of the most important aspects of grasping the implications of Velcro learning is understanding the different roles of sensory information storage (SIS), short-term memory (STM), and long-term memory (LTM) in the learning process.

Let's start with sensory information storage. The SIS system holds incoming images for four or five tenths of a second after they are received by your senses. Information passes from your SIS into your short-term memory, where again it's held for only a very short period of time-this time measured in terms of a few seconds or minutes.

While SIS holds the complete image, STM stores an interpretation of the image. Like SIS, STM holds information temporarily, pending further processing. This processing includes judgments concerning meaning, relevance, and significance, as well as the mental actions necessary to integrate selected portions of the information into long-term memory.

For example, have you ever forgotten somebody's name seconds after you've been introduced? This happened because the name wasn't transferred from your short-term to long-term memory.

There is loss of detail as information or stimuli from your senses move from your SIS into STM and then into LTM. This is the basis for the phenomenon of selective perception. It imposes limits on our subsequent stages of analysis, inasmuch as you can never take a mind back to what was *actually there* in SIS or STM. You can only retrieve your interpretation of what you *thought* was there as stored in LTM!

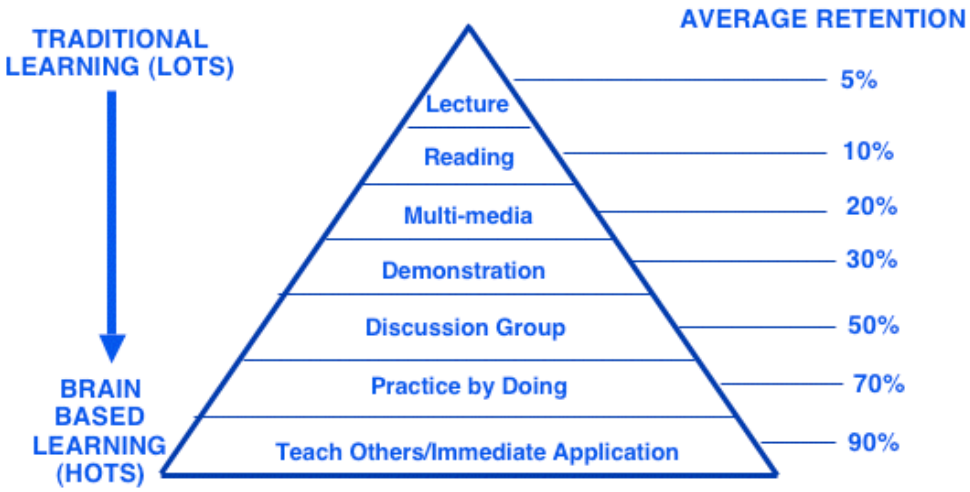
What does this tell us about effective learners

Effective learners build mental models. Mental models are the categories and interrelationships SIS and STM use to refine and store the information gleaned from the experiences and information they encounter in LTM. Effective learners constantly challenge the accuracy and robustness of their mental models and adapt them when necessary to accommodate new data by making Velcro attachments or relationships between the contents of their short and long-term memory.

Novice learners often just try to remember facts in lists. This is a common strategy for students preparing for quizzes & tests. Information without context or interest is like one side of Velcro, it just doesn't stick. Memorization tends to produce only short-term learning. Most of the information is gone in a matter of seconds or minutes.

True learning only occurs when the brain create meaning or relevance by establishing a Velcro connection between past experiences and new information. When the two are combined, long-term learning sticks powerfully to the student. Current research reinforces this. Consider…

The Learning Pyramid



What the research tells us is that essentially, on average we recall:

- 5% of the content of a lecture,
- 10% of what we read,
- 20% of content simultaneously using two or more media,
- 50% of content that includes interactive discussion,
- 75% of content that involves practice by doing
- more than 90% that teaching others or the immediate application of learning

If we want understanding, if we want retention, if you we success on state exams, if we want to address the mandates of No Child Left Untested, 'er No Child Left Behind (no superintendent left employed), if we want children to demonstrate proficiency, we can't just lecture and the emphasis in the classroom can't just be on simple data information recall, low level thinking skills, and lots of information – what we call LOTS.

If we want our kids to be successful on the test, if we want them to be successful in life our emphasis as professional educators has to be on more than just LOTS. Rather there has to be more emphasis placed upon higher order thinking skills and processes (HOTS), on Bloom's Taxonomy of Higher Order Thinking, on critical thinking, problem solving, project and process based learning, Gardener's analysis of multiple intelligences, and application of best practices based on an emerging understanding about how learning actually takes place.

What we must acknowledge

If we truly want to make a difference in the lives of our children, schools must become a place where students are actively engaged in constructing their own knowledge and know how, develop an understanding and the ability to apply key content concepts and ideas, explore dynamically, discover, pose questions and question answers, solve problems, engage in complex tasks that enable them to address essential questions and participate in the processes that make up intellectual accomplishment, tasks that are generally inquiry driven, span different media, link different disciplines, have more than one right answer, multiple routes to each of these answers, an understandable purpose and a connection to the real world outside school.

The context of a significant event provides a frame of reference and relevance for remembering the specific information about what you were doing long after the event. By providing a context for the new information teachers are actually helping students with long-term memory. The power of context to assist with learning is worthy of note for teachers who are struggling to prepare students for large standardized tests. By providing a context for the information teachers are actually helping students learn the material so their short-term recall will be better when they write the test as well as with long-term recall.

What do we see in schools today?

Do schools reflect the reality of the world as it is? Or do they reflect our past, our values, our thinking, our perspectives, our experiences, our comfort zone, or us? Do our instructional practices align with the issues raised by the research? Do our instructional practices align with the issues raised by this presentation? Or is there dissonance between what was and what is? Is there a dissonance between what is and what should be?

Déjà vu all over again

Just like 50+ years ago, many students still sit in rows; the oral tradition continues - the current curriculum regularly stresses content without providing a context. In doing so we don't equip our students with anything more than the ability to regurgitate meaningless facts.; many teachers still chalk and talk; students are still expected to learn primarily by listening; most information still comes from the teacher or textbook – and while we do have some new technologies most use is generally optional not integral and typically it's used to reinforce old practices and assumptions about learning.

The methodologies underlying the technologies and the methodologies underlying instruction have changed very little from our youth. And most importantly, the focus still remains on content without context and low-level content recall. Today's

standards and high stakes testing are simply reinforcing this, making it harder not easier for school to adapt in response to the dramatic changes that are occurring *outside* of education.

As a result it's becoming increasingly evident that there is a fundamental disconnect between the way kids think, learn, and communicate and the ways that schools interact with them.

The Condition of Education

This is reflected in startling new data gathered by the Center for Education Statistics (http://www.nces.org) a web site often cited as containing the type of research-based resources required to align with the mandates of No Child Left Behind. In "The Condition of Education" the data shows the seriousness of the disconnect between the real world of high-school student & the real world of schools.

According to a report released in February 2004, 6% of white kids, 29% of African American & 24% of Hispanic kids were at-risk. A new cumulative method of calculating dropout rates has found that only about half of all black, Hispanic and American Indian students who entered ninth grade in 2000 were expected to graduate in 2004. The study, which breaks down data by state, gender and ethnic group, projects the national graduation rate would be just 68% in 2004.

Beyond this, children's views of the relevancy of their school experience to their future lives have declined steadily and dramatically since the late 1980s. According to The Condition of Education, only 28% of 12th-grade high school students believed that school work is meaningful; only 21% believe that their courses are interesting; And only 39% believe that schoolwork will have any bearing on their success in later life.

These statistics are even more shocking when one realizes that these are only the opinions of those students who have remained in high school for four years. Students who find the high school experience the least relevant have already exited the system in huge numbers.

The Carnegie Institute reports that in the largest 32 urban districts in our country, only 50% of students who enroll actually graduate. Each day, they estimate that 2000 U.S. high school students drop out. If their voices were included in the above poll, the profile would be far worse

Taking a closer look

The world of tapes, books, movies and traditional oral presentation is largely linear. Our youth live and thrive in the world of non-linear information access. "Channel

surfing," for example, is a popular pastime as our students use the TV remote control to keep up with several programs being broadcast at the same time. We wonder, as we see an increased incidence of "attention deficit disorder" among young people, whether this malady is real, or if it is merely an artifact caused by the structure of school. If we persist in presenting information in ways that have nothing to do with how our students perceive information, why wouldn't their attention wander?

So when kids walk into class at beginning of the year and teachers speak to them, they instantly hear their teachers digital accent - some accents are thicker than others - and 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 digital natives live in.

Why has this happened?
Well, who's in control of education?
We are!
So what's wrong with that?

We are digital immigrants. We come from a land and time before most of the dramatic developments in our world occurred. The schools of today reflect our comfort zone, our experiences, our views of technology, our views of instruction and our views of learning. We have a Polaroid snapshot of the world of then and this is the source of the dissonance. We haven't allowed the institutions of education to reflect the world of today and we're now in the unenviable position of having schools that increasingly reflect a world that does not exist.

And for younger teachers, even though you may have been born into a digital world, your educational institutions modeled a non-digital approach to learning.

And thus schools today largely reflect our educentric decades old view of how learning should take place.

The methodologies underlying many of our assumptions about instruction have changed very little from our youth. These methodologies reflect non-digital times. The primary focus still remains on content without context, low-level content recall and LOTS.

And if we're truly honest with ourselves, we'll acknowledge that today's standards & high stakes testing are simply reinforcing this focus. And we'll also acknowledge that some teachers are silently delighted because this simply validates the way they've always taught & tested and reinforces the notion that **THEY** don't need to change, it's T**HE KIDS** that need to change

Unconsciously our Polaroid snapshot of the world of then is also the world of now and this is the source of the dissonance. We have not allowed the institutions of education to reflect the world of today and we are now in the unenviable position of having schools that increasingly reflect a view of teaching and learning that does not apply. As a result, it's our view that we are doing a terrific job of preparing children for a world that increasingly does not exist. This is best summarized by Berkeley philosopher Eric Hoffer, a self-educated longshoreman who 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…*

So who are we as educators?
Are we the learners or are we the learned? More importantly, do we want our kids to inherit the earth, or do we want them to be highly educated useless people; kids who are good at school but unprepared for life.

Reality check!
The reality is that state standards, high stakes testing and accountability are driving today us for all. "No Child Left Behind" is driving us. We can't ignore these mandates. We can't just pretend they don't exist.

So how do we address the issues of standards, high-stakes testing and accountability while at the same time addressing the growing dissonance between digital kids learning and our digital immigrant instructional styles?

How can we ensure that truly no child or teacher is left behind? That no student (or teacher) is left unthinking? This isn't about creating some far-out vision for learning in the future. Conversely, it's not about continuing to fixate on the past - on the back-to-basics mentality that reflects the world of yesterday. It's about understanding that as professionals we must address the issues of standards and accountability on one hand, and the abilities and preferences of digital learners on the other.

If we can do this, we can create truly engaged learning environments that are based on solid and well-established research on learning that will allow us to address both issues simultaneously. The starting point is to understand HOW different we really are from them.

Summarizing the real digital divide…

1. Native learners prefer receiving info quickly from multiple multimedia sources while many teachers prefer slow and controlled release of info from limited sources.
2. Native learners prefer parallel processing and multi-tasking while many teachers prefer singular processing and single/limited-tasking.

3. Native learners prefer processing pictures, sounds and video before text while many teachers prefer to provide text before pictures, sounds and video.

4. Native learners prefer random access to hyperlinked multimedia information while many teachers prefer to provide information linearly, logically and sequentially

5. Native learners prefer to interact/network simultaneously with many others

6. Many teachers prefer students to work independently rather than network and interact.

7. Native learners prefer to learn "just-in-time" while many teachers prefer to teach "just-in-case" (it's on the exam).

8. Native learners prefer instant gratification and instant rewards while many teachers prefer deferred gratification and deferred rewards.

9. Native learners prefer learning that is relevant, instantly useful and fun while many teachers prefer to teach to the curriculum guide and standardized tests.

This isn't a matter of who's right or wrong

It's not a matter of either/or. This isn't a matter of them or us. It's not a matter of which way is better. The bottom line is that kids ARE different. They communicate differently than we do. They're motivated by different things than we are. They process information differently than we do. And most importantly, they learn differently than we do.

So how do we bridge this digital divide?
Teachers must learn to communicate in the native language and style of their students. This doesn't mean changing the focus on what is important or what is going to be measured, but it does mean that we have to change our instructional styles.

1. This requires more making learning fun and more relevant to them and their world.

2. This means going faster so they can receive information quickly.

3. This means less step-by-step instruction and more random access, hyperlinked, just-in-time learning experiences.

4. This means less text and more pictures, sounds and video wherever possible.

5. This means providing more opportunities for multitasking, networking and interactivity.

6. This means applying what we now know from the brain and mind research about learning

This also means understanding that there are now 2 kinds of content
The first is our traditional content - reading, writing, arithmetic, geography, civics, history, languages, the sciences, and logical thinking amongst others. While some of these content areas will become more important as our world changes, others will become less important.

But there is also a second kind of content
What we call 21st century content. This includes critical thinking, problem solving and the structured teaching of process skills, combined with personal life skills, interpersonal life skills, team skills, communications skills, information fluency skills, technology fluency skills, visual fluency skills, biotechnology and bioethics skills. We can't do it all – we have to get rid of some of what is not as important as it was when we went to school to make room for teaching our digital native learners the skills they need for their future lives.

If we want to unfold the full intellectual and creative genius of all of our children - if we are going to march through the 21st Century and maintain our tradition of success - f we want our children to have the relevant 21st century skills - we must create a bridge between their world and ours

School must make it happen for millions of children in the Digital Age. Educators take the pieces of world and put them together so our children can feel whole.

Teachers stand in gap between the present and the future - between failure and fulfillment.

It's your energy, creativity, commitment and hard work every day that builds the bridge so children can cross the gap between now and the future. As they do, so does an entire nation. You are your country's greatest hope and most important professionals.

> *Man alone is the architect of his destiny. The greatest revolution in our generation is that human beings by changing the inner attitudes of their minds, can change the outer aspects of their lives.*
> William James

> *The world we have created is a product of our thinking. It cannot be changed without changing our thinking.*
> Albert Einstein

For further reading:

Bowling Alone: The Collapse and Revival of American Community, Robert Putnam, Touchstone Books, 2001, ISBN: 0743203046

Diffusion of Innovations, 4th Edition, Everett Rogers, Free Press, 1995, ISBN: 0029266718

Information Anxiety 2, Richard Saul Wurman, Que Publishing, 2000, ISBN: 0789724103

Minds, Brains, and Learning, Understanding the Psychological and Educational Relevance of Neuroscientific Research by James P. Byrnes, Guildford Press, 2001, ISBN: 1572306521

Taming the Beast: Choice and Control in the Electronic Jungle by Jason Ohler, Technos Press, 2000, ISBN: 0784298735

Growing Up Digital: The Rise of the Net Generation by Don Tapscott, McGraw-Hill, 1997, ISBN: 0070633614

Who Moved My Cheese? An Amazing Way to Deal With Change in Your Work and in Your Life by Spencer Johnson & Kenneth Blanchard, Penguin USA; 1999 ISBN: 0399144463

How the Brain Learns, David Sousa, Corwin Press, 2001, ISBN: 0761977651

How the Special Needs Brain Learns, David Sousa, Corwin Press, 2001, ISBN: 0761978518

How People Learn: Brain, Mind, Experience, and School by John D. Bransford (Editor), Ann L. Brown (Editor), Rodney R. Cocking, John B. Bransford (Editor) National Academy Press, 1999, ISBN: 0309065577

Schools That Learn: A Fifth Discipline Fieldbook, Peter Senge editor, Doubleday, 2000, ISBN: 0385493231

Journal Articles

Digital Natives, Digital Immigrants Part 1 by Mark Prensky, On the Horizon, September/October 2001, Volume 9, Number 5

Digital Natives, Digital Immigrants Part 2 by Mark Prensky, On the Horizon, November/December 2001, Volume 9, Number 6

Online Articles

Wnt 2 txt? Or r u j/c? The Evolving Lexicon of Wired Teens, The Christian Science Monitor, Society and Culture, December 12, 2002 online edition http://www.rdr.sbml.cc/Click?q=e5-9Z-0QayD

TeenSites.com: A Field Guide to the New Digital Landscape, The Center for Media Education, 2001, http://www.cme.org

Teenage Brain: A work in progress, by National Institute of Mental Health, 2001, http://www.nimh.nih.gov/publicat/teenbrain.cfm

http://www.pbs.org/wgbh/pages/frontline/shows/teenbrain/work/

How People Learn, Executive Summary, John D. Bransford, Ann L. Brown, and Rodney R. Cocking, editors, National Research Council, 1999, http://www.nap.edu/html/howpeople1/es.html

In Search of… Brain-Based Education, by John T. Bruer, 1999, Kappan, http://www.pdkintl.org/kappan/kbru9905.htm

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

Memory: How Do We Remember What We Know, by Analysis by Richards J. Heuer, Jr., Psychology of Intelligence, 1999 (updated 2004), http://www.odci.gov/csi/books/19104/index.html

For further information, contact:
Ian Jukes or Anita Dosaj The InfoSavvy Group
Email: ijukes@mindspring.com or anitadosaj@shaw.ca
Web sites: http://www.infosavvygroup.com