Digital Natives (Students / Millennials)	Digital Immigrants (Teachers)
Receive info rapidly from multiple multimedia sources	Slow, controlled release of information from limited sources
Parallel processing & multi-tasking	Singular processing & single/limited-tasking
Pictures, sounds, & video before text	**Text** before pictures, audio, & video
Random access to hyperlinked, interactive, multimedia info	Linear, logical, & sequentially accessed info
Interact/network simultaneously to many people	Focused attention on 1 or few people
Comfortable moving between real & virtual spaces	Operate in real spaces
Interactive/network approach to work	Prefer students (& themselves) to work independently
Just in time learning	*Just in case* learning
Instant access to friends, services, & responses to questions	Prefer deferred gratification & rewards
Learning is relevant, instantly useful, & fun	Learning is based on curriculum guides and standardized tests

Teenagers' brains aren't getting bigger as they grow. The brain cells, called neurons, are simply rearranging, making new connections, and pruning unnecessary ones to speed and reroute the flow of thought. And by the way, it's neuron pruning not hormones that turns many teens weird.

Neuroplasticity

This process of ongoing reorganization and restructuring of the brain in response to intensive inputs and constant stimulation is called neuroplasticity. So 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…

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 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.

Source: Ian Jukes (2006). Understanding Digital Kids: Teaching & Learning in a New Digital Landscape, pp. 16-17.

According to a recent study out of Toronto, 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, 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.

If students are more inclined towards visual 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 when reading materials.

Their eyes skim the bottom and edges before they focus on the center. And while we find it a distracting to read text of different colors, specific colors attract and repel digital natives when they're reading - blood red draws attention first, then neon green and burnt orange are skimmed - and 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 renowned writer Eric Jensen and others, at least 87% of students in any given classroom are NOT auditory or text-based learners, but 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 who are wired for multimedia.

Yet as Donna Walker Tileston points out, despite this knowledge, at least 85% of the questions on all state exams continue to be based on text.

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.

Source: *Ian Jukes (2006). Understanding Digital Kids: Teaching & Learning in a New Digital Landscape, p. 21.*

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, interactive, 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. Native learners move seamlessly between real and virtual spaces instantaneously – virtual space is any location where people can meet using networked digital devices – chat rooms, blogs, wikis, podcasts, email, discussion threads that come and go – synchronous and asynchronous and with multitasking, can inhabit more than one virtual space at a time – while many teachers prefer to operate in real spaces.
7. Many teachers prefer students to work independently rather than network and interact.
8. Native learners prefer to learn "just-in-time" while many teachers prefer to teach "just-in-case" (it's on the exam).
9. Native learners want instant access to friends, services, and responses to questions, instant gratification and instant rewards while many teachers prefer deferred gratification and deferred rewards.
10. 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 children 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.

To teach effectively today, we need more than superficial understanding of the digital landscape. We need to understand, honor and speak in the language, customs, culture and style of children. This is not about being hip, it's about a fundamental reconsideration in our approach and understanding of how information is processed, how communication takes placed, how information is remembered, what skills are needed to solve problems and operate in this environment.

This requires far more than just a continued reconsideration of our content. We also need to carefully reconsider our methodologies.

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.

Source: Ian Jukes (2006). *Understanding Digital Kids: Teaching & Learning in a New Digital Landscape*, pp. 37-39.

<u>The Amount of Knowledge Available (thinking exabytes)</u>

...if you scanned all of the books in the Library of Congress you would come up with approximately 20 terabytes of digital data. Using that as a reference point, the world created enough data to fill approximately 250.000 Libraries of Congress in 2002. The figure simply boggles the mind.

...They estimate that the world created 161 exabytes of information in 2006. That reflects a 32 fold increase over 2002...By way of analogy, if you could print 161 exabytes, you would end up with 12 stacks of paper extending from the earth to the sun. That would come to about 6 tons of paper for every person on the planet. It would be enough paper to wrap the Earth four times over.

The authors reckon that the trend will continue, with the amount of data being created in 2010 growing to 988 exabytes. That represents another 6 fold increase. This time the resulting stack of paper could go from the sun to Pluto and back.

Source: http://www.abanet.org/lpm/ltt/articles/vol1/is2/firewire/There_Is_a_Lot_More_Data_Out_There.shtml

Current estimates say that our knowledge will double every 72 hours in 2020.

Some Quotes to Ponder:

Competent people resist change. Why? Because change threatens to make them less competent. And competent people like being competent. That's who they are, and sometimes that's all they've got. No wonder they're not in a hurry to rock the boat.

Source: Godin, S. (1999). *Change Agent,* Issue 31, http://www.fastcompany.com/magazine/31/sgodin.html.

❋   ❋   ❋   ❋

"Doubt is an uneasy and dissatisfied state from which we struggle to free ourselves and pass into the state of belief; while the latter is a calm and satisfactory state which we do not wish to avoid, or to change to a belief in anything else. On the contrary, we cling tenaciously, not merely to believing, but to believing just what we do believe."

-Charles Sanders Peirce

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There is nothing that happened last week that is not there for me this week to learn.

There is nothing that happened last week that I cannot search and find out about.

What I have come to understand is the web waits for you. It will hold the information for you until you are ready to learn it, ready to use it. It waits, patiently, always on, always gathering, categorizing and remembering. I can take a week off because the web doesn't.

-Jeff Utecht

Source: http://www.thethinkingstick.com/?p=662

Questions for further consideration:

- If we didn't have the schools we have today, would we create the schools we have today?
- What are the implications of digital natives for our classrooms?
- What are the new pedagogies of information abundant learning environments?
- What will it mean to be educated in the 21st century?
- Do our schools, classrooms & teaching practices reflect the dramatic changes that have taken place in our world?

From an American perspective, Generation We is a recent movement to mobilize and organize the millennial generation, acknowledging some unique characteristics of this group. Check out their video on their website…

http://www.gen-we.org/

The Horizon Report (2008)

The Horizon Report seeks to identify emerging technologies that may impact schools and other learning-focused organizations. The 2008 report is the 5th annual report by the New Media Consortium in collaboration with the EDUCAUSE Learning Initiative. The goal is to give educators a look ahead to what is on the "horizon." According to the Horizon Report (2008), the following technologies are notable:

One Year or Less
- **Grassroots Video**
- **Collaboration Webs**

Two to Three Years
- **Mobile Broadband**
- **Data Mashups**

Four to Five Years
- **Collective Intelligence**
- **Social Operating Systems**

The Horizon Report is available in his full form at http://www.nmc.org/horizon/ and includes explanations and more specific software links.