COLLABORATING WITH
DIGITAL NATIVES AND DIGITAL IMMIGRANTS

Elizabeth Connor, MLS, DM/AHIP
Associate Professor, Daniel Library, The Citadel
171 Moultrie Street
Charleston, South Carolina 29409 USA
elizabeth.connor@citadel.edu

Abstract: Digital natives are individuals who started using computers early in life, often before they learned to read. Digital immigrants, on the other hand, were introduced to computing devices much later on, and as a result, often handle computer-based information and create knowledge differently. Unlike previous generations of learners, digital natives do not interact with text on the screen in the same way that digital immigrants browse, extract, and cite information. These differences have implications for teaching and learning, particularly in the sciences. This paper introduces The Digital Natives/Digital Immigrants Inventory <http://tiny.cc/digital_natives>, an instrument developed by the author to better understand next-generation learners and scientists, and to develop new teaching techniques. These new approaches reflect better tools for collaboration and research-based practice, and optimize the dexterity, habits, and experiences of natives and immigrants alike. The author describes some techniques that bridge the experiences of both groups, and can be deployed with electronic devices. Awareness and appreciation of experience-based learning styles can enrich science teaching, learning, and research partnerships.

Keywords: Generational differences, intergenerational collaborations, learning styles, computer literacy, library instruction

Introduction:
For the purposes of this paper, the terms digital native and digital immigrant are intended to suggest fundamental differences in how different generations of teachers and learners interact with and understand content that is viewed online. How do others far younger or older than one's self interact and understand?

Paul Pival said, "I think students who have only researched through their computer monitor have a very hard time understanding what they are looking at. Through the monitor, a page is a page is a page, whether it be from a scholarly journal, a book, Newsweek, a website, a chat window…."

In my role as the Head of Reference and Research at The Citadel, the Military College of South Carolina, I interact with students that may be much younger than the students and researchers encountered in your workplaces. Freshman cadets, Class of 2013, were born in 1992. My observations about digital natives and digital immigrants go far beyond birth date, though, dealing more with context, experience, dexterity, and adaptability.

Generational Perceptions:
The media is replete with images of babies and young children portrayed as digital savants. For example, E*TRADE's television commercials feature infants talking and using computers to invest and trade stocks online <http://www.youtube.com/watch?v=Yhfl4mFH1No>. Since digital immigrants were introduced to computing devices much later on in life, they handle computer-based information and create knowledge differently.

Digital natives do not interact with text on the screen in the same way that digital immigrants browse, extract, and cite information. Awareness and appreciation of experience-based learning styles can enrich science teaching, learning, and research partnerships.

For example, earlier generations perceive a song as part of an album. The Beatles' *Sgt. Pepper's Lonely Hearts Club Band* was a concept album without pauses between tracks. Was it really meant to be subdivided? Ever? These days, a separate track from that record sells for nine cents.

Do later generations perceive a journal article as part of an issue, or a chapter as part of a book? Later generations focus on kernels of information, often disassociated with its original structure or components, perhaps because of unfamiliarity and lack of experience with or appreciation for previous formats.

Earlier generations are accustomed to seeking print information from the Centers for Disease Control (CDC) or online versions of the same information while later generations may be drawn to video clips from the same organization when accessing information about the H1N1 vaccine <http://tinyurl.com/ma6ne>.

These differences have implications for teaching and learning, particularly in the sciences. Is it easier or harder to follow the path of a scientific idea? Previous generations tracked the articles that cited the articles that cited the articles. Our ideas and solutions are based on the firm foundations of the published literature. Perhaps where we stand in the spectrum of time governs our beliefs of what is published, or how what gets published gets accessed and disseminated.

Content Versus Container?
As the editor of the ePROFILES column published in *Journal of Electronic Resources in Medical Libraries*, I have interviewed various luminaries in the fields of library science and electronic publishing. A typical interview question is: "This generation of science undergraduates fails to recognize a journal issue as a discernible unit. The monitor screen has blurred the distinctions between different kinds of content. Is this a problem or an opportunity?"

How did Harold E. Varmus, Eugene Garfield, and Stephen Abram answer this question?

Harold E. Varmus is Nobel laureate, former director of the National Institutes of Health (1993-1999), president of Memorial Sloan- Kettering Cancer Center, and co-founder and board chair for Public Library of Science (PLoS).

Varmus said, "While the loss of identity of a specific issue of a journal is not important, I don't think we are ready to cast off the notion of a journal as an evaluation device with a certain degree of credibility or as a means to link work to a field of science. But I would like to see the reader's emphasis swing back towards an unbiased assessment of an individual paper's worth and away from a knee-jerk reaction to the paper's venue. The current situation has poisoned academic promotion processes and heaped inappropriate esteem on a very small number of journals" (Connor 2008a).

Eugene Garfield's visionary leadership in the Welch Medical Library machine indexing project at Johns Hopkins University led to the development of *Science Citation Index* and the resulting emphasis on citation analysis. Garfield is founder, president and board chair of Institute for Scientific Information (ISI), and inventor of *Current Contents*.

Garfield said, "There is a problem if students do not believe that anything exists unless it is electronic – which I hear quite regularly. The advent of Google and other search engines was supposed to eliminate the need for medical librarians. On the contrary, as I have stated repeatedly, they have never been needed more in order to educate students and users on how to properly use *Web of Science*, Google, etc." (Connor 2008b).

Stephen Abram is chief strategist for SirsiDynix, past president of Special Libraries Association (SLA), and digital visionary.

Abram said, "Why on earth would anyone care about the journal as a discernible unit? Today's world could care less about the container versus the intellectual content. We are in an article-level economy, and it is extremely rare in a digital world that anyone cares about an article's placement in a journal or even if it is a journal at all" (Connor 2009).

Abram reacted strongly to this question. Do you agree with him? Or do you agree more with Varmus and Garfield?

Inventory:
The Digital Natives/Digital Immigrants Inventory <http://tiny.cc/digital_natives> was developed to better understand next-generation learners, and to devise new teaching techniques.

In order to create better tools for collaboration and research-based practice, we need to optimize the manual and mental dexterity, information-seeking habits, and research experiences of digital natives and immigrants alike. Before doing so, a basic understanding of the circumstances under which our colleagues learned how to learn, regardless of electronic devices, is necessary.

How do we find these contexts? Let me digress into an explanation of another type of native/immigrant situation.

Another Type of Immigrant:
Before arriving in Belgium for the IAMSLIC/EURASLIC conference, I had the good fortune to visit Lithuania, the homeland of my mother's father, Vladislavos Neverdovski (1895-1967).

On August 20, 1912, steam ship *Kaiser Wilhelm der Grosse* sailed from Bremen and reached New York harbor on August 28th. According to the ship's manifest, my grandfather could read and write, had fifty dollars in his pocket, and was on his way to start a new life by mining coal in southern Illinois with one of his brothers who had emigrated many years earlier. Where did my grandfather come from?

Vladislovas Neverdovski was the youngest of ten children in a family of itinerant farmers. Each of his siblings was born in a different farming village but he was born in Laukuva, the same village where his parents and grandparents were born and married. My grandfather's mother was 43 and his father was 56 at the time of my grandfather's birth.

What was going on in Lithuania in 1912? The country was ruled by imperialist Russia. The Lithuanian language had fallen in and out of favor. The population of Laukuva was fewer than 900 people. My grandfather's choices were farming or the military. In the new world, his choices seemed endless. Even though he started as a miner, he later worked at a silk factory in eastern Pennsylvania where he met my grandmother, an emigrant from Italy. Later when my grandparents married and moved to New York, my grandfather worked for Brewster Aeronautical, the company that built the Brewster Buffalo, a single-seat carrier based fighter plane introduced in 1939.

I can't help but imagine Papa in today's world, taking computers apart and putting them back together. I have a good sense of what my grandfather knew how to do, and the forces that shaped his life. How do we learn about the circumstances that shaped the people we work with every day?

Different Mindsets:
Are we so very different from people older or younger than us, people who are more clever or less clever with technology, people from different disciplines? How can we collaborate readily? How are these groups more alike than different? How does early exposure to electronic gadgets shape individual learning styles? How do these devices affect the understanding or creation of new knowledge?

A number of years ago, Beloit College in Beloit, Wisconsin, USA developed a list (http://www.beloit.edu/mindset) that tracks what their incoming freshman know or understand compared to what we know or understand. Incoming college freshmen have a mindset that differs from ours, based on their experiences (see Table 1). In today's workplace, we interact with people of varying ages and backgrounds. How best do we

understand their approaches to technology? How do we shift perceptions of how we learned to how they learn?

Here are excerpted from the Beloit College Mindset List (http://www.beloit.edu/mindset):

> • [Students] have never used a card catalog to find a book.
> • Tattoos have always been very chic and highly visible.
> • Text has always been hyper.
> • The European Union has always existed.
> • They have always been able to read books on an electronic screen.
> • Women have always outnumbered men in college.
> • They have always watched wars, coups, and police arrests unfold on television in real time.
> • Belarus, Moldova, Ukraine, Uzbekistan, Armenia, Latvia, Georgia, Lithuania, and Estonia have always been independent nations.
> • There have always been flat screen televisions.
> • Everyone has always known what the evening news was before the Evening News came on.
> • Two Koreas have always been members of the UN.
> • Migration of once independent media like radio, TV, videos and compact discs to the computer has never amazed them.

Transforming Teaching and Learning:

Regardless of age or fluency with all things technological, we can use Bloom's taxonomy to learn and to teach. Bloom's taxonomy levels (knowledge, comprehension, application, analysis, synthesis, and evaluation) can be mapped to course content. Students studying biology can be asked to define various pollution terms; describe different types of pollution; list examples and reasons; extract the main points of a research article; draw a diagram that illustrates a process; devise an experiment that tests a hypothesis; and evaluate the results of the experiment. Each level is incremental, building on the scaffold of the previous. Can types of pollution be described without defining it first? Can examples or reasons be given without describing them?

This higher-order thinking approach is far different from how I learned subjects in high school and college, and I suspect it is the same situation with many librarians in this audience. In my teaching, I use think/pair/share and clickers, or audience response systems. My pattern is to ask students to define a term and share it with the person next to them. Some students don't know what they think until they write it down.

The act of writing also helps the students hold a view that might be unpopular with their classmates. Most students get this right. By polling three or four students in a group of 25, the class can get a thorough definition of a term. Then, an application question tests this understanding. Typically, the answers vary, with most students choosing two or three of the five possible answers.

What does this mean? Why is it that students can define a term but cannot apply this understanding a real-life example? Herein lie some solutions to fostering collaboration across disciplines and generations.

Novices / Experts:
Awareness and appreciation of experience-based learning styles can enrich science teaching, learning, and research partnerships. This is where the digital natives/digital immigrants inventory <http://tiny.cc/digital_natives> might prove useful. Often an inventory is masked or renamed for the purposes of data collection, to avoid preconceived notions of what the instrument is intended to measure.

How do the perceptions, attitudes, and behaviors of digital natives differ from digital immigrants? The inventory measures five dimensions: self perceptions, types of use, attitudes toward computer hardware and software, perceived drawbacks, and perceived benefits. The instrument will be tested for reliability, content, and validity by comparing it to similar instruments.

Bridging the Gaps:
Generational gaps in the workplace can be bridged by focusing on space, people, and ideas. Of these three, space may be the most difficult to address. Even though there is never enough space but existing facilities can be reconsidered related to how they are used or shared. Simulation, immersion and visualization are examples of collaborative functions that could take place in libraries, or in adjacent space. A collaborative strategy would be to offer precious square footage before it is taken, especially for interesting applications such as these.

Another way to connect with other generations is to observe how existing and potential users work and interact, both inside and outside the library. Some libraries have built group project booths, or installed transparent panels and barn doors to make project work more visible. Such designs lend themselves to sharing and conferring, in casual and serendipitous ways that appeal to the human desire to see and be seen.

In terms of connecting with people, it is vital for us to get out of our offices, out of our departments, and out of our comfort zones. If one usually takes the elevator, one might try taking the stairs, and vice versa. Librarians can broaden their horizons by developing a long, long view. Many of us already function as go-to persons. If not, it is worth striving to be the person everyone knows, the person that everyone calls, the person everyone likes to put on important committees. Whenever there is an strategic initiative, the librarian needs to be on the team and sitting at the table.

I challenge us to think about someone we collaborate with often. Who is it? What is his/her discipline? What is his/her generation? What is his/her facility with technology. I challenge us to think about a colleague or discipline with whom we would like to collaborate. Why hasn't this happened? What are the barriers? How can we facilitate collaborative relationships?

Conclusion:
David Worlock said, "The screen was not meant to be read – it was meant
to be looked through." As we look through these screens, let us imagine how our
experiences with visual information differ from the scientists working beside us, from an
earlier or later generation. How do our devices differ? Are they more or less
ambidextrous than we are?

My intention was to explain how Bloom's taxonomy can be used in teaching and
learning, introduce an inventory that can provide deeper insights into how people of
different technological generations think, and inspire librarians to connect and collaborate
with novices and experts in our midst.

While it is easy enough to categorize each other as natives or immigrants when it comes
to technology, the fact is that each generation has a spectrum of abilities.

Who would have ever dreamed that a 19TH century peasant boy would end up in New
York, and help design the Brewster Buffalo?

References
Connor, E. 2008a. "Interview With Harold E. Varmus." *Journal of Electronic Resources in Medical Libraries* 5(2): 149-159.

Connor, E. 2008b. "Interview With Eugene Garfield." *Journal of Electronic Resources in Medical Libraries* 5(3): 261-265.

Connor, E. 2009. "Interview With Stephen Abram of SirsiDynix." *Journal of Electronic Resources in Medical Libraries* 6(2): 146-151.