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Teaching 21st Century Skills: Voices from the Field

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Abstract

This article presents an overview of the 21st century student characteristics based on the professional literature. It then outlines specific pedagogical techniques that can be used to improve literacy in school-aged children. It also includes specific examples of these techniques used in North American classrooms.

Imagine a world where a teacher could teach a Language Arts or Math lesson through the use of a laptop and an interactive whiteboard. Where the teacher could point out a grammatical rule or algorithm and have the students instantaneously download the information to their smartphones or iPods. Imagine that world today as we are at that point in our pedagogical journey. These students are the digital natives and many of them are being taught by digital natives; not by digital immigrants anymore (Prensky 2010). This is the Net Generation of teaching and learning and it holds so much potential for fundamental change (BCPSEA, 2011; Evers, Lang, & Smith, 2009; Martinez, 2009, 2010; The New Media Consortium, 2010; Naylor, 2011; O'Brien, & Scharber, 2010; Palfrey & Gasser, 2008; Rheingold, 2002; Schrum & Levin, 2009; Tapscott 2009; Toch, 2010). The jointly-sponsored, *Standards for the English Language Arts* (IRA & NCTE, 1996), stressed the fundamental importance of students' using a variety of technological resources from wikis and blogs to WebQuests and websites. To wit, in the last 10 years, there has been an explosion of professional literature related to the topic, especially as it pertains to the improvement of literacy in school-aged children through the use of technology-based resources. Germane to the present discussion, these are the Millennials who possess and need to have reinforced their 21st century skills.

Literature Review

As early as the late-1990s, Brandt (1998) pointed out that there is a disconnect between the 21st century learning skills needed in schools and the surrounding learning environments.

Current education systems were designed with assumptions about the development of human capabilities and learning which are now being systematically revised in the light of new research. Designed to serve the needs of an earlier age, these systems are limited by the technology of the classroom, instruction, uniform progression, and prescribed knowledge. Perversely these limitations inhibit our ability to see radical alternatives based on new understandings about effective learning. Organized around the ideas of the factory and mass production, most current school programs are incompatible with our emerging understandings that learning must be active and that people learn in different ways, and in a variety of places. While most teachers are dedicated and hard working, honestly striving to provide young people with a good education, their capacity to tap into new ideas is frustrated by these outdated arrangements. (Schools)

We can easily remove “schools” and “teachers” and insert “teacher education programs” and

“professors” in the current state of preparing teacher-candidates to teach 21st century skills. His early ideas formed the 21st Century Learning Initiative which emphasizes the importance of brain and learning research and what we now know 21st century learners need to know. Almost a decade and half later, we have a more defined definition of 21st learning and there has been an increase in the number of scholars discussing the concept.

The Partnership for 21st Century Skills (2009) argued that students need to master the core subjects of English, reading or language arts, world languages, arts, mathematics, economics, science, geography, history, and government and civics as well as the five interdisciplinary themes of global awareness, financial, economic, business, and entrepreneurial literacy, civic literacy, health literacy, and environmental literacy. There are also three overarching themes, learning and innovation skills, information, media, and technology skills, and life and career skills. Learning and innovation skills encompass creativity and innovation which, in turn, includes thinking creatively, working creatively with others, and implementing innovations; critical thinking and problem solving which involves reasoning effectively, using systems thinking, making judgements and decisions, and solving problems; and communication and collaboration which includes communicating clearly and collaborating with others. Information, media and technology skills information literacy encompasses accessing and evaluating information, and using and managing information; media literacy which includes analyzing media, and creating media products; and ICT literacy which includes applying technology effectively. Life and career skills encompasses flexibility and adaptability which, in turn, includes adapting to change and being flexible; initiative and self-direction which involves managing goals and time, working independently, and being self-directed learners; social and cross-cultural skills which entails interacting effectively with others and working effectively in diverse teams; productivity and accountability which involves managing projects and producing results; and leadership and responsibility which includes guiding and leading others and being responsible to others. Lastly, and very pertinent to teacher education programs, are the 21st century support systems of 21st century standards (e.g., stressing deep understanding rather than shallow knowledge), assessment of 21st century skills (e.g., balanced assessment), 21st century curriculum and instruction (e.g., applying 21st century skills across disciplines), 21st century professional development (e.g., discussing and learning 21st century learning teaching practices), and 21st century learning environments (e.g., supporting professional learning communities) (The Partnership for 21st Century Skills, 2009).

Citing a 2006 study on job skills and characteristics, Trilling and Fadel (2009; see pp. 7-11 for a fuller discussion of this study and other studies), argued that students graduating from high school, technical colleges, and universities are lacking in specific skills that include: (1) oral and written communication, (2) critical thinking and problem solving, (3) professionalism and work ethic, (4) teamwork and collaboration, (5) working in diverse teams, (6) applying technology, and (7) leadership and project management. In other words, graduates do not possess 21st century skills when they enter the workforce. Trilling and Fadel’s (2009) book is devoted to explaining not only why 21st century skills should be acquired and promoted but also how these learning skills can be encouraged in our students. In particular, they argued that there are four forces that converge and lead us to innovative ways of learning in the 21st century: (1) knowledge work, (2) thinking tools, (3) digital lifestyles, and (4) learning research. The “four forces are simultaneously creating the need for new forms of learning in the 21st century and supplying the tools, environments, and guiding principles required to support 21st century learning practices” (pp. 21, 23).

Knowledge workers, or those that know what is needed in the workplace and how the workplace must operate, is critical to the success of graduates especially in workplaces in which change is constant and requires the worker to adapt to the changing times such as in teaching and in science, technology, engineering, and mathematics (STEM) positions. Thinking tools include

smartphones, desktop computers, laptops, netbooks, tablets, emails, texts, tweets, and physical and electronic storage devices. These tools are the mainstay of 21st century learners and help us remember information rather than memorize information. The digital lifestyles of these learners differ markedly from their parents' and grandparents' lifestyles as they are never without immediate access to information through Facebook, Twitter, the Internet, and so on. They watch movies on their digital devices and manipulate information in a much more efficient manner than previous generations. Learning research has demonstrated that people learn differently now than they did decades ago and we now know more about how people learn, primarily through constructivist researchers, than we did before. That is, we know the importance of authentic and contextual learning, how people build mental models, the use of internal motivation and rise of emotional intelligence, how intelligence is described from multiple perspectives, and the impact of social learning (Trilling & Fadel, 2009). All four of these converging forces on 21st century learning affect teacher education in a direct manner since the primary clientele is the 21st learner.

As board members of the Partnership for 21st Century Skills, Trilling and Fadel expanded on the 21st century framework by arguing that there are seven key skills (the 7 Cs) promoted by the framework: (1) critical thinking and problem solving, (2) creativity and innovation, (3) collaboration, teamwork, and leadership, (4) cross-cultural understanding, (5) communications, information, and media literacy, (6) computing and ICT literacy, and (7) career and learning self-reliance. They further point out that if you take the three foundational skills of reading, writing, and arithmetic (the 3 Rs) and multiple them by the seven key 21st century skills, you have 21 which is an easy and informative way to remember the importance of blended foundational skills with distinct skills to make up the 21st century learner. Teacher education program would be well placed to teach and encourage the seven since the foundational three form the focus of any teacher education program.

The British Columbia Premier's Technology Council (2010) argued that change will occur quickly in the next decade and, more importantly to teacher education, change will be grounded in personalized learning in which the learners will have clear choice in their educations and will pursue different paths to learning. Similar to the Partnership for 21st Century Skills (2009) and Trilling and Fadel (2009), the authors point out that learners will need to master set skills and attributes to be successful in the chosen workplaces: (1) functional literacy, (2) critical thinking and problem-solving, (3) creativity and innovation, (4) technological literacy, (4) communications and media literacy, (5) collaboration and teamwork, (6) personal organization, motivation, self-regulation, and adaptability, and (7) ethics, civic responsibility, and cross-cultural awareness. Heavily influenced by the work of Sir Kenneth Robinson, the province of British Columbia has embraced personalized learning and has encouraged teachers to provide opportunities for students to choose multiple ways of knowing and showing knowledge in relation to these seven skills and attributes. The Premier's Technology Council (2010) pointed out that the tenets of such a proposed system would include a flexible educational path, a blended system of face-to-face (f-2-f) and online learning, access to learning objects and teaching tools, open access to information systems available off- and on-line, constant feedback and assessment that draws on standards that will be higher than they presently are (pp. 3-4). If these students are educated through personalized learning that stresses 21st century skills, teacher education programs will need to ensure that their teacher-candidates are both taught in this manner and trained to teach in this manner.

Drawing on his earlier work, Prensky (2010) argued that one way to view the teaching and learning process with digital natives, or 21st century learners, is to understand the difference between verbs and nouns. The former includes the skills that student should possess like understanding and communicating which change very little over time as evidenced by Bloom's Taxonomy and its revised form whereas the latter are the actual tools that we use to assist in the

learning process such as PowerPoint or WebQuests which change at a rapid rate. His central argument is that we can merge effectively these verbs and nouns and accommodate the students' diverse learning styles through *partnering*. Partnering involves "letting students focus on the part of the learning process that they can do best, and letting teachers focus on the part of the learning process that they can do best" (p. 12). Practical suggestions for the students include students finding out information rather than taking notes from the board, researching and creating information from diverse sources, learning about what constitutes quality and rigor from the teacher, and refining and improving output based on multiple views. Suggestions for the teacher revolve around changing from the all-knowing to the let's-find-out-together coach and include asking key questions to generate discussion, suggesting (but not prescribing) topics and tools, learning about technology from the students and incorporating it into teaching, and evaluating the students' output for quality and rigor. The potential for technology partnering is obvious. If students are familiar with the plethora of technological tools available to them and are free to utilize the technology to meet their own interests with guidance from the teacher, they will be much more motivated to produce exceptional output. Prensky's work with thousands of digital natives and his reporting of successful models across the world demonstrate that this new pedagogy has great potential in the teaching and learning of the new generation of students.

Tapscott (2009) stressed that the new Net Generation. 21st century, teacher should consider the learning styles of his or her students. In particular, he purports that four fundamental shifts need to occur. First, the teacher needs to take the focus off himself or herself and focus on the students. This means a change from a one-way transmission model to a two-way interactive model. Second, the teacher should change from a sage on the stage to a guide on the side. That is, the teacher needs to be one who encourages discovery in the students and assists students in finding multiple ways to pose questions and get answers in a highly collaborative manner. Third, the philosophy of education needs to be altered so that the model is not one-size-fits-all but rather one-size-fits-one (Tapscott 2009). The students come to school with distinct learning styles that need to be accommodated and optimized rather than having the teacher teach in one way. Rather the teacher could encourage the students to discuss how they believe that they can best show their knowledge while still maintaining the integrity of the project under consideration. These ways of knowing could range from podcasts and video productions to written essays and oral presentations. Lastly, learning needs to be collaborative rather than individualistic. In the past, each learner was taught and tested based on the knowledge that the teacher broadcaster. The Net Generation views learning as collaborative in that they observe each other, challenge views, experiment with other alternatives, and make projects together. Social media is one clear environment in which students thrive as it is truly collaborative.

Evers, Lang, and Smith (2009) reported on their innovative use of anchoring alphabet texts and pairing the student stories with effective technology. The literacy journey began in Grade One where Lang introduced a predictable book and had the students practice their oral and written language using a scaffolding approach. Eventually the students produced a book that outlined pertinent information about themselves which were accompanied by digital photos of each student. Working with her Grade Five students, Smith continued the process by having her students create PowerPoint slides that provided details about themselves augmented with digital photos and Internet images with narration for each slide. Lang's Grade Eight students used the ABC PowerPoint format to research, write about, and present information on their chosen topics. Across all three grade levels, the common Digital Native elements of collaboration and problem solving were evident.

Following up on her 2009 article on the new generation of students, Martinez (2010) pointed out that the new generation of teachers will change schools. In 2009, she argued that the new generation of students are, indeed, smart as they understand the value of collaboration and co-creation and eschew top-down, one-way transmission models (Martinez, 2009). In her follow-up

article, she stressed that power and potential of social media for teachers to meet the needs of the Net Generation. In particular, she discussed the myriad opportunities to design, change, and collaborate through the use of open educational resources (OER). These resources include course materials such as lesson plans and handouts and course modules such as videos and podcasts. This form of media would have a clear impact on the Digital Natives as it accommodates their learning styles and allows for just-in-time instruction.

Leadbetter (2008) pointed out that 21st century learning and personalized learning are integrated into each other. Reporting on a number of innovation schools in the United Kingdom, he argued that the schools under study had common characteristics by changing seven elements of learning. First, they changed the timing of the learning so that it occurred when it need to occur rather than when the curriculum indicated that a change must be implemented. Pacing of learning was changed so some students moved ahead of their peers while some needed more time to master the concepts. They made changes to the settings for learning so that rooms and buildings were renovated or built to become more conducive to collaborative learning, small- and large-group discussions, and individualized learning. When alterations to styles of learning, such as direct instruction or independent learning, were made, the students tended to learn better and more. The schools also implemented changes in support for learning by bringing in expertise from community member, parents, teaching assistants, and support staff. The aims of learning were altered so that the curriculum development concentrated on the social and learning capabilities of the students rather than a distanced curriculum. Lastly, the schools implemented technologies for learning that included laptops, computers, wikis, blogs, and learning objects.

The Paul Hamlyn Foundation and the Innovation Unit (2008) conducted a three-phase research project to investigate innovation and “next practice” pedagogies in schools; that is, practices that are possibly more potent and effective than present practices. They concluded that schools needed learning which was deep, authentic, and motivational. Deep learning involves reflection, metacognition, and going beyond the course requirements; Authentic learning brings in real-world contexts and is learning that is meaningful to the students. Motivational learning is learning that stresses task and goal orientation, and that promotes further learning. Drawing on their experiences and research, the authors argued that there were two integral learning dimensions that included deep, authentic, and motivational: engagement and integration. Engagement is drawing in the students and “is built [on] a commitment to creating learning programmes which are both **relevant** to young people’s lives and their interests, and **co-constructed** with them” (p. 10, original emphasis). Integration must include multiple opportunities for learning “so the challenge for educators is to personalize learning **in/out of school** and accommodate a range of learning modes... The **learner/teacher mix** can include locally-sourced experts, college lecturers, parents, and most importantly, the students themselves as leaders” (p. 10, original emphasis).

In their book, Palfry and Gasser (2008) purported that the digital native has a different relationship with the influences in his or her life. The authors presented a diagram that involves a series of concentric circles to capture the depth of role for each of the major influences played. The center is the digital native who is surrounded by friends and family, then teachers, coaches, and mentors, followed by trusted companies and software providers, and on the outside ring, the state and law enforcement. Given the strong role that friends play and the digital native’s penchant for social networking, it is incumbent upon teachers to use the strength of social media to address the learning needs of their students.

This brief literature review has demonstrated that knowledge must be distributed across many individuals and places and cannot be attributed to or held by one person, such as a teacher. In 21st century learning schools, colleges, and universities, from the administrator to the custodian, all elements of 21st century learning must be encouraged so that learning occurs in all aspects of the

school. Paramount to the learning process is student achievement but the paths to that content mastery are varied and include utilizing expert and novice knowledge, Web 2.0 technologies, and multiple ways of knowing and presenting knowledge.

Practical Ideas

Heeding the extant literature, there are several broad practical ideas that can be utilized to teach 21st century learners. These ideas are meant to be suggestive rather than prescriptive so that readers can take the idea and adopt or adapt it to their present situations. To contextualize the suggestion, examples from the field have been used.

Use wikis and blogs as collaborative tools

The potential for using wikis and blogs in the classroom is clear (Knobel & Lankshear, 2009). The 21st century learners prefer to collaborate and co-create so it makes infinite sense to use these social media tools while teaching. The wikis allow for co-creation as each student can add or subtract from the discussion and the wiki can be as public or private as the students or teacher want. Blogs also allow for co-creation but the collaboration and discussion engendered in the platform make blogs a natural choice for teachers and students alike.

Kathy Cassidy from Moose Jaw, Canada had created a wiki for her Grade 1/2 students who wanted to know what a thousand names would look like. The class invited children and adults from around the world to post their name and age on the wiki so that all viewers could see how that large number of names (1537 at the time of writing) would look and to see the power of collaboration and co-creation using social media. For another project, the students wrote a collaborative story about hockey which was written and contributed to by all members of the class. It is no longer used by her students as they have moved on to the next grades; however, all students have continued to add to the story so it bears little resemblance to the original. It does demonstrate the draw and power of on-line collaborative tools.

Controlled access to the Internet

Many school districts worry that mobile learning opportunities are not worth the risk because students would have open access to the Internet or would download music while the teachers is instructing. By controlling access to the Internet, the teacher can create opportunities for learning without worrying about unlimited access to the World Wide Web.

The Nisga'a School District in northern British Columbia, Canada has created a project entitled Nisga'a on Wireless (NOW) that places a laptop computer in front of all students in Grades 4 to 12. Most classrooms are equipped with interactive whiteboards and all classrooms have the capability of teachers' monitoring the students' laptops. The teachers can control how much access the students get to the internet and can even limit certain students from specific programs. The students demonstrate that they can handle unlimited access to the Internet which allows the teachers to use web-based resources to their maximum potentials.

Encourage students to tinker

Tapscott argued that encouraging students to tinker will address their learning strengths as they enjoy playing with learning objects and projects. This form of tinkering involves social and virtual tinkering rather than mechanical tinkering. By deconstructing and constructing while

discussing their ideas with each other, the students tend to produce better and stronger projects from websites to math manipulatives to research essays.

The Richard S. Fowler Catholic Junior High School in Edmonton, Canada has proposed the Power Up To Learn (PU2L) project in which they will become a lighthouse school for technology as the teachers will infuse technology into the curriculum. The students will be able to tinker through social networking and virtual projects. All students will receive controlled access to laptops and iPods for specific lessons. Additionally, there will be a video conferencing suite so that teachers and students can meet other students and researchers to learn outside the four walls of the school. The students will also have myriad apps installed on their iPods from NASA to the periodic table of elements to planetary and solar system to social studies maps. In this way, the students will have plenty of opportunities to tinker with the technology in social settings.

Embrace mobile learning opportunities

Both Tapscott and Prensky provide lucid arguments for embracing mobile learning as a way of addressing the needs of the digital natives or Net Generation. In Tapscott's study of over 11, 000 students of varying ages, he found that an overwhelming majority used m-learning as the primary means of getting and disseminating information. They also yearned for more mobile learning opportunities in their classrooms so that collaboration through digital technologies could be embraced by their educators. Prensky (2010) provided over 30 pages of suggestions for partnering technological tools in the classroom. For instances, rather than banning cell phones in the classroom, he states that they should be embraced by teachers for their potential in social networking, text and on-screen readers, and cell phone novels.

For the 2010-2011 school year, the Sweetwater County School District (Wyoming) integrated iPod Touch and iPad units in their schools through the librarians as media specialists. They used the units for fluency (recordings), podcasting, e-books, "apps" for instruction, interventions (Tier 1 students), and enrichment, along with the traditional uses like word processing and Internet searches. Each student or group completed two media-based research projects in their iPods or iPads during the school year. They also kept a digital reflective journal on the units that discussed their experiences during media time or Language Arts lessons. Lastly, they used specific "apps" and/or e-books on their iPods or iPads to gain new knowledge or to review skills for enrichment or intervention.

Focused Social Monogamy

One of the complaints from high school teachers, in particular, is that students are always texting or surfing during their lectures and discussions. Although discussion, critical thinking, problem-solving, and so forth can be encouraged through the use of smartphones, the issue of time-on-task is a concern for teachers.

One teacher, Ian, discusses, what I have termed, *focused social monogamy* with his students. That is, while he is lecturing or explaining a point, each student has a relationship of fidelity with him for the set period of time. He expects them to be faithful and respectful but encourages them to use their smartphones, Ipads, and netbooks when he is not teaching directly. He acknowledges that the students are 21st century learners and that they are different than students whom he taught years ago. He embraces social media with students and provides opportunities for the students to use Facebook, Twitter, Wikipedia, and so forth as long as they accept his focused social monogamy offer. To date, this relationship has worked very well.

Conclusion

Teaching 21st century learners is a challenge for educators as it definitely can disrupt class as we see how technology is changing the way our students learn (Christensen, Horn, & Johnson 2008). The students learn differently now than when many of their teachers were in school and the pedagogy must change if we hope to meet the students' needs. Many educators and teachers are, in fact, members of the Net Generation so the transition to new technology-based pedagogies might be easier but any change is painful. These students have distinct learning styles and need to learn through collaboration, co-creation, and social networking and they need professors and teachers who guide and coach rather than top-down, authoritarian educators. The mobile age holds much promise for these 21st century students and we need to rise to the challenge by embracing mobile learning opportunities and to get out of the stone-age institutions.

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