

Chapter 2

Inclusive Education in Rural Alberta, Canada: Utilizing ICT to Support Twenty-First Century Learning

Dermod Craig Madden

Abstract Information and Communications Technology (ICT), has become a term with many meanings within many contexts. For the purposes of this paper, ICT in a K-12 context represents the possibility for change in the public education system in Alberta, from traditional pedagogies of exclusion to one which embraces inclusive practice for all students. The implication of such fundamental change has equal significance for teacher practice. The use of ICT has the potential to transform traditional education into multidimensional learning environments that support traditional, mobile, and blended learning environments. In so doing, the significance of ICT for twenty-first century learners may be tantamount to a paradigm shift, which could change the face of public education, and have a significant positive impact on teaching practice and student learning.

2.1 Introduction

Information and communications technology, (ICT) is an often used term to describe a system of unified or connected communications systems. In K-12 education in Canada, and more specifically in Alberta, the term ICT denotes both a process and a product. Since the 1980's, ICT and the extent to which it has been a part of the public education system, has been measured more by the number of devices in the school than the actual utility for said innovations. In 2013, the debate continues, much of which centers around the significance of inclusive education on the public education system. The industrial-age or factory model of education has been obsolete for some time, and as a new paradigm of education is evolving throughout the world a commitment to pedagogically sound change needs to be articulated.

M.D. Craig (✉)

Aspen View Public School Division No. 78, Athabasca University,

3600-48 Avenue, Athabasca, AB, Canada

e-mail: derm.madden@aspenview.org

URL: <http://www.aspenview.org>

Inclusive teaching practice stipulates that students learn in different ways and at different rates. Traditional industrial age pedagogies require all students to learn a concept at the same rate and at the same time. Inclusion supports the practice of holding levels of achievement constant, while allowing time to vary, thereby providing the individual with the necessary time to achieve the outcome and attain the standard, with each student to learning at their own pace.

Two universal themes have emerged in recent years which, if given serious consideration by governments and educational institutions, may provide the necessary contexts for legitimate mobile learning practices. UNESCO is examining the value of mobile technologies in creating universal educational access, equity and quality; and, the extent to which these technologies can support the fundamental changes to instructional design and teaching practice, to meet the needs of today's learners (West 2012). It is with these two considerations in mind that ICT will be reviewed from the perspective of Aspen View Public School Division No. 78, a small rural school division in the province of Alberta, Canada.

Aspen View Public School Division No. 78 is committed to a process, which:

- Accommodates the needs of twenty-first-century new millennium learners
- Embraces the implementation of technology
- Considers initiatives that support differentiated instruction, inclusive practice, and assessment for learning.

2.1.1 Instructional Practice

Central to an inclusive perspective, which acknowledges the ever increasing significance of ICT in K-12 education, is a commitment to a pedagogy that supports the premise of twenty-first century learning. Such pedagogy is constructivism. Constructivism has been cited as, theory of learning, philosophy of learning, component of instructional design, instructional strategy, style of instructional strategy, and learning environment. There are constructivist-based courses, constructivist discussion models, constructivist pedagogy, constructivist-based online courses, the constructivist type of online learning, constructivist instructional principles, and a constructivist framework, just to name a few.

Constructivism as learning theory is not a recent development. Much of what is deemed as constructivist theory today has evolved from several sources over considerable time. The fundamental principles of constructivism have always been present in some capacity in those educators who understood the importance of active engagement and social interaction.

Knowledge is not passively received either through the senses or by way of communication, but it is actively built up by the cognizing subject. The function of cognition is adaptive and serves the subjects organization of the experiential world, not the discovery of an objective ontological reality (Confrey 2011).

Constructivist learning theory has its roots in the works of Dewey (1929, 1938), Piaget (1952), Vygotsky (1978), Bruner (1966), Von Glaserfeld (1989),

Palincsar (1998). Constructivism emphasizes the significance of constructive knowledge on the individual's active and reflective thinking process. Piaget's interests focused more on the impact of constructivism on the individual learner, whereas Vygotsky stressed the importance of social interaction and social systems on individual learning. Dewey believed that learning was dependent on the social environment in which the learner is placed. He also believed in the importance of real learning in context through active engagement within a community of learners.

A constructivist learning environment is one that promotes active student engagement in the learning through discussion, debate, and the use of cooperative learning strategies, to solve problems, to learn from mistakes, and to experience the social contextualized nature of learning through situated, authentic learning (Palincsar 1998). Constructivism is not new, but it is controversial in that it challenges long standing pedagogical practices and brings into question the educational value of standardized testing and the practice of assessing content mastery. Social constructivist learning theory postulates that to meet the needs of new millennium learners, the learning process should be collaborative and social. The learning should be interactive, such that the learner is actively engaged to the point of being self-directed. In this context, the concept of "community of learners" replaces the traditional "learner in isolation".

Constructivism is a philosophy of learning founded on the belief that through our individual life experiences we create a personal understanding of our world. Each individual establishes rules and protocols to rationalize their experiences and their place in this world. Learning then becomes a process of making adjustments to accommodate new experiences. Constructivist theorists claim that learners interpret information and the world according to their personal reality and that they learn by observation, processing, and interpretation; and then transform the information into personal knowledge.

Constructivist learning theory has had a significant impact on instructional practice in K-12, post-secondary education, and in the corporate world. This is in part due to the advent of innovative learning approaches that, almost without exception, are rooted in constructivist theory. Examples of this include problem-based learning, action learning, situated learning, experiential learning, and collaborative learning. Common constructivist characteristics of these models include, "... designing authentic learning activities that are complex, realistic, and relevant; promoting social negotiation as an integral learning activity; supporting multiple perspectives and multiple modes of content representation; and encouraging ownership in the learning process" (Dabbagh and Bannan-Ritland 2005; Driscoll 2000).

2.2 Instructional Design: Inclusive Practice

Innovation and change have been the norm in public education in Alberta in recent years, and it appears that this will be the case for the foreseeable future. Aspen View has embraced this point of view. Advances in technology have laid the foundation for a new

digital world, and established a context for the rebirth of critical reflection and debate about the nature of learning and the role of the teacher. To transform traditional teaching practice from that of the teacher directed, content-driven, one-size-fits-all model of instruction, to one that acknowledges the significance of the student and the need for practices that promotes self-directed, independent, ubiquitous learning; requires a paradigm shift in how we perceive public education in Alberta. Aspen view has initiated a number of pilots and partnerships to facilitate these changes. We promote the use of ICT, and a move away from traditional classroom settings, for less obtrusive, virtual, and mobile learning environments; which challenge the flexibility and adaptability of teachers and their ability to keep abreast of changes in instructional design; and the need for learning environments that support inclusive practice. To this end we have initiated several pilot projects and partnerships that we believe will become best practices for those involved and promising practices for others within our system.

In Aspen View, we are aware of the reluctance of teacher education programs to change, and the consequent reluctance of teachers in the field to accommodate change within the public education system. Rather than mandating system-wide change, we have identified change agents within our system and allowed them to lead. There is a significant body of research that identifies the importance of teacher attitudes and beliefs as an underlying construct of inclusive education, and the impact that those attitudes and beliefs have on educational outcomes for all students. According to the research, the key elements in the successful implementation of inclusive policy are the attitudes, values, and beliefs of teachers, who have the major responsibility for implementing them (Ainscow and Sandhill 2010; Avramidis and Norwich 2002; Cullen et al. 2010; Van Laarhoven et al. 2007). “Successful inclusion requires persistence and innovation to sustain the effort, and to develop approaches to meet the new challenges that emerge over time” (Porter 2008, p. 64).

Alberta has a well established reputation as a global innovator in education and as a world leader in educational reform. Albertans have had the good fortune of living in a province rich in natural resources, where investment in education has been a priority. Education and technology has been a very important component of this investment. Unlike students in the developing world, Alberta students have had access to computer technology since the early 1980s, albeit, mostly in the form of standalone computer labs used primarily as word processors, with limited access to the internet. Since that time, despite the significant changes in technology, very little change has occurred in pedagogy and instructional design at the classroom level to incorporate the new technology. Part of the issue is that technology was initially introduced without a clear understanding of its utility or its potential. For a time it seemed that just having the technology was sufficient. The norm was to utilize the technology to accommodate existing teacher practice and pedagogical beliefs. Changes to pedagogy were minimal.

Ubiquitous social networking is a reality. Social networking practices are providing opportunities for educators to engage students in inclusive learning environments, wherein the design of the learning environment mandates a degree of student autonomy, that is usually absent in traditional classroom settings. Mobile learning environments, under the guidance of the right teacher, have the potential to foster the

necessary degree of "distance" required by students to ensure the six dimensions of freedom associated with twenty-first century learning; access, content, media, pace, space, and time (Paulsen 1993). The flexibility of ubiquitous engagement has implications for education in Alberta, for the K-12 system and the post-secondary system. By implication, the interconnected nature of both systems and the importance of student bridging and transitioning, establishes the need for partnerships and collective educational planning processes that encompass the life of the learner.

There is a broad range of research and investigative studies on the scholarship of ICT and blended learning environments. Global access to mobile technology is increasing daily, due to the advantages of size, portability, cost, and universal ease-of-use. This, in conjunction with the ever-changing advanced features of mobile technology, is creating a context for ubiquitous global learning. The use of ICT in mobile and blended learning environments has the potential to accommodate the needs of twenty-first century learning while supporting pedagogically sound practices. Community instructional resources and activities can be brought into the classroom; and the portability of ICT allows the classroom to move outside the school walls, facilitating more meaningful learning.

An inclusive philosophy among governments and educators focuses on welcoming and supporting the diversity of all children in a given community, within a socially just education system (Ainscow and Sandhill 2010). There is a growing consensus among educators that the use of ICT in education has the potential to enhance instruction that takes place within the traditional classroom, as well as to support experiential field learning experiences, and distance education systems; by allowing for immediate, enhanced access to resources and learning supports previously not available to students (Anderson 2006; Belawati 2005; Chun and Tsui 2010; Stead 2006). The use of this technology may also promote inclusive practices, providing equitable access to educational supports and services for students regardless of ability, ethnicity, gender, religion, and location.

At present, given the limited amount of quantitative and qualitative research available on the use of ICT in education, using mobile technology in blended learning environments within K-12 public education systems, there is a need for ongoing research that incorporates an inclusive perspective. Such a perspective would highlight the importance of self-direction in learners, and the need to move away from teacher-directed, content-focused approaches to teaching and learning. Student-directed approaches encourage independence, reflection, and understanding, and the ability to apply this understanding in a real life context, in collaboration with peers; rather than teacher-directed approaches which focus on memorization of content for the purposes of summative evaluation. Distance technologies have created contexts for such learning, which in a blended context may have significance for K-12 systems.

2.3 The Importance of Partnerships

Aspen View is currently involved in a number of ICT initiatives and partnerships with other school districts, post-secondary institutions, and corporate entities, all of which are designed to promote twenty-first century learning within an inclusive

framework. The following is a synopsis of some of these collaborations and partnerships designed to promote twenty-first-century new millennium learning:

- Aspen View and Portage College: online EA certification program in Inclusive education and Rehab services; online apprenticeship courses in Culinary Arts, Welding, Carpentry.
- Aspen View, cross-ministry group and the University of Calgary: online graduate level program in Inclusive Leadership.
- Aspen View, Athabasca University, Beijing Normal University: Using ICT to establish and maintain partnerships between students at Landing Trail Intermediate School in Athabasca, and students at Heping li No. 9 Primary School, Beijing, China.
- Aspen View, Athabasca University, and Xerox Canada: Grade nine students from Edwin Parr Composite and Outreach students at Vilna School use android tablets within a secured virtual space that functions as a virtual classroom, incorporating the use of Moodle and Adobe Connect. Student progress is tracked using an online Learning Management System (LMS), and a semantic/syntactic parsing tool (ongoing formative assessment for learning), which tracks individual student development. Students assume anthropomorphic pedagogic agent (a.p.a.) personas and function within an online virtual learning environment.
- Aspen View, Blue Quills College: Students and staff in Vilna school: collaborate in real time and in virtual space to study, celebrate and promote aboriginal history and culture.
- Aspen View, University of Lethbridge, Concordia University: Abracadabra, the online early literacy program for preschoolers.
- Alberta Provincial Dual Credit Initiative: Aspen View, Athabasca University, Xerox Canada, Alberta Education, College of Alberta School Superintendents: 'Twenty-First Century Learning: An Introduction to Information Systems, Computer Applications and online Learning COMP 210; COMP 214. Second Year University courses are offered online to Aspen View high school students through Athabasca University, for dual credit.

In addition, there are a dozen ICT initiatives involving 250 android tablets, ongoing within the school system involving every age group, and cross-ministry service providers. Aspen View continues to pursue partnerships that promote constructivist pedagogy, sound instructional design and twenty-first century learning practices.

2.4 Embracing Change

Within the parameters of an inclusive educational system there is the need for two developments to occur in public education to ensure a shift away from the current standardized time-based paradigm of education. The first is the need to advance learner centered psychological principles and methods of instruction. The

second is the development and application of advanced technologies (ICT), which are embedded within the curriculum and within teacher practice (Reigeluth and Carr-Chellman 2009). The challenge to educators is to proceed with caution, but proceed nonetheless to help schools, teachers, students, and parents as we transform public education from the noninclusive standardized model founded in the Industrial Revolution, to a learner centered information age paradigm of education. Technology itself is not the answer, but ICT can support a broad range of instructional design theories that facilitate learner centered instruction, such as problem-based learning (Downing et al. 2008), self-directed independent learning (Broad 2006); and individualized learning (Race 2002).

Reluctance to change is systemic in public education and has its roots in traditional teacher education programs at the post-secondary level. In addition to the need for change in our teacher preparation and education programs, K-12 school systems need to consider their role in embracing change by ensuring that the skill-sets of their teachers are of the highest quality. This can only be done through a focus on lifelong learning and professional development.

2.5 Outcomes-Based Assessment Practices

As technological changes advance and ICT becomes synonymous with learner centered education, constructivist teaching, blended learning environments, mobile learning, and ubiquitous learning, the need for technology in education will be obvious. The one way to ensure that there is utility for ICT is to articulate learner outcomes within the K-12 curriculums in all subject areas and at all grade levels. These outcomes should also correlate with both formative and summative assessment processes, at least up to and including grade nine. This is the case in Alberta. Using the Alberta model one can see a structure that supports twenty-first century learning, inclusive education, outcomes-based assessment and outcomes that require active student and teacher engagement within the core curriculum. When such a foundation is in place, which delineates ICT outcomes for all students, and does so within an inclusive framework, the chances that students will incorporate ICT within their work are significantly enhanced. In the case of Alberta, the outcomes are classified under three distinct headings, which are the same for every grade. They are as follows:

- Communicating, inquiring, decision-making, and problem-solving
- Foundational operations, knowledge, and concepts
- Processes for productivity.

Within each of the three areas there are a series of "students will", action statements, each of which consists of a number of suggested activities to achieve the outcomes through the use of ICT, both in and out of the classroom, in traditional, blended, virtual, and concrete learning environments. Although only in its infancy stage, the approach is significant in that it acknowledges the importance of

technology in education, and by default the need for change in teacher training as well as traditional teaching and assessment practices. Notwithstanding the importance of embedded ICT learner outcomes in kindergarten through grade twelve, there is the possibility that such outcomes may also remain ignored by teachers who are not comfortable with technology.

Assessment, evaluation, and communication of student achievement and growth are essential parts of the teaching and learning process. This is also the case when assessing the ICT outcomes in grades K through 12. To ensure that the process is inclusive, the following four principles are in place for every student that every grade:

1. Assessment practices should be carried out in such a way that they support and enhance ongoing student learning and development; as such assessment should be continuous.
2. Students benefit when they are involved in the assessment process; as such assessment should be collaborative.
3. Assessment practices should address learner outcomes and include a variety of strategies that meet the diverse learning needs of students; as such assessment should be comprehensive.
4. Assessment practices should identify and clearly define the critical aspects of performance for demonstrating student learning; as such assessment should include criteria (Alberta Education 2007).

Research shows that this type of assessments (rubrics), in which students are engaged in content that is articulated through the use of ICT, accommodates metacognition that is both reflective and flexible. Opportunities to engage in a process of reflective thinking, which affords students the opportunity to engage in a well-constructed dialog, may be conducive to a process of knowledge construction, or constructionism (Rovai et al. 2008).

Those educators who continue to dismiss the significance of ICT by association are also dismissing the significance of those skills deemed as twenty-first century learning skills, of which systemic or systems thinking skills has been identified by many as crucial (Luterbach and Brown 2011).

2.6 ICT Outcomes

Educational leaders are beginning to realize that digital learning is no longer a possibility, but rather a necessity. There will always be a place for the lecture in the classroom, but such teacher-directed engagement processes tend to engage only the teacher. Often the concept without context remains unlearned. Technology has the ability to enable and engage the student in relevant student centered personalized learning activities. Incorporating common core standards, which focus on analytical thinking, almost certainly requires a move away from teacher dominated instructional practices to learning environments that are

more student-centered and conducive to the development of analytical thinking skills. Such learning environments, which incorporate traditional classroom and online learning or e-learning practices, are often referred to as blended learning environments.

Within the Alberta framework for ICT outcomes in K-12, those skill sets deemed as essential for twenty-first-century learners are: communication, collaboration, critical thinking, personalization, and knowledge creation. As such, the significance of ICT on the learning process is tantamount to a paradigm shift, away from the traditional process of absorbing content, for the purposes of summative, evaluative accountability of the system; to that of learning how to learn new concepts in new ways, and acquiring new skills that facilitate scaffolding and transitioning beyond the immediate classroom. More and more the rhetoric of pedagogy and instruction focuses on processes, which are not conducive to traditional classrooms, but rather support student-centered learning approaches, which promote the use of ICT, such as student centered learning, personalized learning, constructivism, inquiry-based learning, project/problem-based learning, collaborative learning, and flipped classrooms (Alberta Education 2002).

Educators who still believe that they do not need ICT to do their job, or those teacher training programs that have shied away from inclusive practice and constructivist pedagogy, the die has been cast. ICT will soon be the driving force behind inclusion, constructivism, and meaningful student engagement. Systems are already moving beyond simply integrating technology, and in many places students and staff are utilizing ICT to realize their goals. As utility for technology continues to grow, there will come a time when student and teacher goals can only be realized through the use of ICT.

With ICT outcomes embedded within the core curriculum, technology may provide solutions to many of the ongoing problems faced by public education systems around the world. The most obvious advantage of access to ICT is the immediacy of access to information that it provides; which should foster a mindset that is conducive to lifelong learning opportunities. Digital curriculum and digital content will soon be available on a global scale, as well as convenience and security of digital testing. Most important of all, however, is the underlying premise of inclusive education, which acknowledges the significance of every individual within the education process.

Much of what is deemed as instructional practice in public education has been in place since the industrial revolution. School jurisdictions and in particular teacher training programs will have to adopt a more flexible approach to imagining new worlds and anticipating the future needs of teachers and students. As we take leaps of imagination, we begin building the worlds where these new ideas make sense. Success in the twenty-first century will only be achieved through a willingness to consider new and creative solutions. The needs of twenty-first century learners can only be met through an understanding that change is a constant and that the willingness to embrace the change is the first step in that process. Public education as we know it today is not meeting the needs of twenty-first century learners.

2.7 Twenty-First Century Learning Skills

The needs of twenty-first century learners mandate a sophisticated skillset and mindset on the part of teacher education programs and school jurisdictions whose job it will be to ensure that the needs of students are met. These are just a few of the ICT skills required of twenty-first century learners:

- Have a strong background in psychology and human development.
- Possess comprehensive subject matter knowledge.
- Know how to communicate effectively (face-to-face; email; instant messaging; social networking) and be able to make presentations in large groups both in person and online.
- Possess knowledge of instructional strategies and processes, including: problem-based learning, group-based learning, authentic tasks, criterion-based assessment, and ways to manage students progressing at different rates (inclusion).
- Be able to facilitate group processes and group work.
- Understand the process by which instruction is designed to accommodate inclusive practice.
- Be aware of research based best practices.
- Understand how to incorporate technology as a resource into the learning environment.
- Ensure equitable and inclusive access and availability to instructional resources for all students.
- Have the necessary ICT skills to ensure competency for the following: (1) planning for inclusive student learning; (2) delivery of appropriate instruction for learning, for traditional, blended and online learning environments; (3) appropriate assessment for learning practices; (4) install and run computer software.
- Develop instructional materials using digital technologies (Luterbach and Brown 2011).

Research in utility for ICT has shown that when available and provided within a secured learning environment in which to work, increased student engagement that facilitates self-directed learning behaviors is most often accomplished through online assignments (Strom et al. 2009). Within a few short years, the quality of public education as we know it today will be determined by the degree to which students demonstrate twenty-first century learning competencies. This can only be accomplished through the use of ICT.

Acknowledgments Aspen View Public School Division No.78, Athabasca University.

References

- Ainscow, M., & Sandhill, A. (2010). Developing inclusive education systems: The role of organizational cultures and leadership. *International Journal of Inclusive Education*, 14(4), 401–416.

- Alberta Education (2007). Classroom Assessment Tool Kit for I.C.T. Division 3. Retrieved from http://education.alberta.ca/media/453622/div_3.doc-2007-09-26
- Alberta Education (2002). *I.C.T. Program of studies rationale and philosophy*. Retrieved from <http://education.alberta.ca/media/453069/pofs.pdf>
- Anderson, P. (2006). The future of human-computer interaction. In A. Pinder (Ed.), *Emerging Technologies for Learning* (pp. 24–31). Coventry: BECTA ICT Research.
- Avramidis, E., & Norwich, B. (2002). Teachers attitudes towards integration/inclusion: A review of the literature. *European Journal of Special Needs Education*, 17, 129–147.
- Belawati, T. (2005). *ICT- supported distance education in Indonesia*. Retrieved from http://www.idrc.ca/panasia/ev-9678-201-1-DO_TOPIC.html
- Broad, J. (2006). Interpretations of independent learning in further education. *Journal of Further and Higher Education*, 30(4), 119–143.
- Bruner, J. (1966). *Toward a theory of instruction*. Cambridge, MA: Harvard University Press.
- Confrey, J. (2011). The transformational epistemology of radical constructivism: A tribute to Ernest von Glaserfeld. *Constructivist Foundations*, 6(2), 177–182.
- Cullen, J., Gregory, J., & Noto, L. (2010). *The teacher attitudes toward inclusion scale (TATIS) technical report*. Paper presented at the Eastern Educational Research Association.
- Chun, D., & Tsui, E. (2010). *A Reflection of the State of Mobile Learning in Asia and a Conceptual Framework [Paper Presented at IADIS International Conference Mobile Learning]*. Portugal: Porto.
- Dabbagh, N., & Bannan-Ritland, B. (2005). *Online Learning: Concepts, Strategies and Applications*. Upper Saddle River, NJ: Prentice Hall.
- Dewey, J. (1929). *My pedagogical creed*. Washington, D.C.: Progressive Education Association.
- Dewey, J. (1938). *John Dewey experience and education*. London: Collier Books.
- Downing, K., Kwong, T., Chan, S.-W., Lam, T.-F., & Downing, W.-K. (2008). Problem-based learning and the development of metacognition. *Higher Education*, 57, 609–621.
- Driscoll, M. P. (2000). *Psychology of Learning for Instruction*. Needham Heights, Maryland: Allyn and Bacon.
- Luterbach, K., & Brown, C. (2011). Education for the twenty-first century. *International Journal of Applied Educational Studies*, 10(2), 14–32.
- Palincsar, A. S. (1998). Social constructivist perspectives on teaching and learning. *Annual Review of Psychology*, 49(1), 345–375.
- Paulsen, M. F. (1993). The hexagon of cooperative freedom: A distance education theory attuned to computer conferencing. *DEOSNEWS* 3(2), 74. Retrieved October 13, 2009 from <http://www.nettskolen.com/forskning/21/hexagon.html>
- Piaget, J. (1952). *The origins of intelligence in children*. New York: International Universities Press.
- Porter, G. (2008). Making Canadian schools inclusive: A call to action. *Education Canada*, 48(2), 62–66.
- Race, P. (2002). Effective learning. A fresh look at independent learning. Retrieved from <http://www.lgu.ac.uk/deliberations/eff.learning/indep.html>
- Reigeluth, C., & Carr-Chellman, A. (2009). *Instructional design theories and models*. New York, London: Routledge.
- Rovai, A., Ponton, M., & Baker, J. (2008). *Distance Learning in Higher Education: a Programmatic Approach to Planning, Design, Instruction, Evaluation and Accreditation*. New York: Teachers College Press. ISBN 978-0-8077-4878-7.
- Stead, G. (2006). Mobile technologies: Transforming the future of learning. In A. Pinder (Ed.), *Emerging technologies for learning* (pp. 6–15). Coventry: BECTA ICT Research. Retrieved from <http://publications.becta.org.uk/display.cfm?resID=25940&page=1834>
- Strom, P., Strom, R., Wing, C., & Beckert, T. (2009, June 30). Adolescent learning and the internet: Implications for school leadership and student engagement (doi: 10.1177/0192636509340436). *NASSP Bulletin*, 93(111). Retrieved from <http://bul.sagepub.com/content/93/2/111>
- Von Glaserfeld, E. (1989). Cognition, construction of knowledge, and teaching. *Synthese*, 80, 121–140.

- Van Laarhoven, T., Munk, D., Lynch, K., Bosma, J., & Rouse, J. (2007). A model for preparing special education pre-service teachers for inclusive education. *Journal of Teacher Education*, 58, 440–455.
- West, M. (2012). *Mobile Learning for Teachers: Global Themes*. Paris, France: United Nations Educational and Scientific Cultural Organization, UNESCO.

Author Biography

Dermod Craig Madden I have been a student or a teacher my entire life. As a teacher, principal, director and superintendent I have learned a great deal about curriculum, instruction and leadership. Now, as a doctoral student at Athabasca University I am learning about the importance of distributed learning and the paradigm shift that is occurring in education today, and for the foreseeable future. I am married and have two children. We live on an acreage in Athabasca, Alberta.

ICT in Education in Global Context
Emerging Trends Report 2013-2014
Huang, R.; Kinshuk; Price, J.K. (Eds.)
2014, XII, 283 p. 59 illus., Hardcover
ISBN: 978-3-662-43926-5