The Association of Alberta Deans of Education

A Framework of Effective Teaching for Learning

Presented to
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Abstract

This study was commissioned by the Professional Standards Branch of Alberta Education to address the question: *What competencies do teachers need to support students to be engaged, ethical and entrepreneurial citizens?* Based on a selective examination of the research literature, this paper presents a *Framework of Effective Teaching for Learning* (FETL). The FETL builds on the dynamic, complex and professional conception of teaching expressed in the 1997 *Teaching Quality Standard Applicable to the Provision of Basic Education in Alberta.* Contemporary research in the areas of student engagement, formative assessment and the learning sciences along with advances in our understanding of technological, pedagogical and content knowledge have contributed to the conception of effective teaching conveyed in the teaching competencies described in the FETL. An important purpose of this paper is to generate dialogue toward the next iteration of the Alberta consensus on effective teaching.

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Introduction

As part of Alberta Education's review of *Ministerial Order 016/97 Teaching Quality Standard Applicable to the Provision of Basic Education in Alberta* (TQS), the Association of Alberta Deans of Education (AADE) was asked by the Professional Standards Branch of the Ministry of Education to conduct a research review framed by the following question: *What competencies do teachers need to support students to be engaged, ethical and entrepreneurial citizens?* Based on a selective examination of the research literature, our paper presents a *Framework of Effective Teaching for Learning* (FETL) designed to help address the complexities teachers face in working with students in today's rapidly changing world. Our *Framework* provides a foundation for dialogue toward the next iteration of the Alberta consensus on effective teaching.

The current conception of teaching conveyed in the TQS is the product of ongoing research and discussion about teaching that began in the mid-1980s and that has continued through ongoing stakeholder involvement and related document development into the present (Alberta Education, 1984, 1994, 1995, 1996, 1997a, 1997b, 1998, 2006). Over this time, notions of good teaching evolved from a technical-rational list of 44 discreet characteristics of effective teaching into the more coherent context-based, informed professional judgement construct of quality teaching with one *Standard* and two sets of *Descriptors of Knowledge, Skills and Attributes* (Brandon, 2005). Fifteen years later, our review of contemporary research in the learning sciences, student engagement, formative assessment and effective teaching, as well as advances in our understanding of technological, pedagogical and content knowledge, provide a basis for further stakeholder engagement to yield a new consensus on what it means to teach effectively in our province.

The paper begins with a description of the process used to conduct the review. Next, five guiding principles generated from the research are described. We then present five research derived "competencies needed by teachers to support students to be engaged, ethical and entrepreneurial citizens" (Marc Prefontaine, personal correspondence, December 5, 2011). A summary table that maps each competency to key research sources is provided as Appendix B. An annotated bibliography of selected studies comprises Appendix C. The purpose of these two appendices is to more fully illustrate the linkages between the research considered and the five competencies for teachers.

Research Review Process

Our research review process was framed by four considerations, three of which stem from Alberta Education's research question and parameters. First, an AADE panel of seven experts in teaching and learning was formed to conduct the review. In addition, opportunities were extended the Deans of all nine of the province's teacher preparation institutions to participate in the research and to shape the paper's development. In total, 15 teacher educators engaged in a two-month collaborative inquiry, which consisted of two day-long research dialogues at the University of Calgary, two video-conference sessions and ongoing online exchanges. Participants jointly determined the more specific review parameters, shared expertise, analyed research and mobilized knowledge toward a fresh perspectives on the art and science of good teaching going forward into the second decade of the current century.

Second, the panel collaborated to make shared sense of Alberta Education's vision of the kind of education that students will need in the 21st century: "All students are inspired to achieve success and fulfillment as ***engaged thinkers*** and ***ethical citizens*** with an ***entrepreneurial spirit***

[emphasis in the original] (Alberta Education, 2011a, p 6). These three meta-outcomes or "three Es" in the vision are further described as follows:

> ***Engaged Thinker***: [An individual] who thinks critically and makes discoveries; who uses technology to learn, innovate, communicate, and discover; who works with multiple perspectives and disciplines to identify problems and find the best solutions; who communicates these ideas to others; and who, as a life-long learner, adapts to change with an attitude of optimism and hope for the future.
>
> ***Ethical Citizen***: [An individual] who builds relationships based on humility, fairness and open-mindedness; who demonstrates respect, empathy and compassion; and who through teamwork, collaboration and communication contributes fully to the community and the world.
>
> ***Entrepreneurial Spirit***: [An individual] who creates opportunities and achieves goals through hard work, perseverance and discipline; who strives for excellence and earns success; who explores ideas and challenges the status quo; who is competitive, adaptable and resilient; and who has the confidence to take risks and make bold decisions in the face of adversity. (Alberta Education, 2011a, p. 6)

The panel concluded that most of what is expressed in the "three Es" is well aligned with related major educational sources on the dispositions, skills and knowledge students need to meet the opportunities and challenges of the 21st century (e.g., Binkley et al., 2010; Bransford, Brown, & Cocking, 2000; Friesen, 2009, 2011; Friesen & Lock, 2010; Koehler & Mishra, 2008; Sawyer, 2006, 2008; OECD 2001; Scardamalia & Bereiter, 2006; Willms, Friesen, & Milton, 2009). Panel members were unable to establish such educational research linkages with the notion of "entrepreneurial spirit," though several of its constituent attributes were seen to be

supported in the literature (e.g., perserverance and discipline, challenging the status quo, being adaptable and resilient). For the purposes of this review, the panel takes "entrepreneurial" to mean "to undertake" and "competitive" to mean "to strive together" in today's educational context.

A third consideration for framing the review was for the panel to develop a common understanding of what the Ministry means by its use of the term "competencies" for students, teachers, and school leaders (Alberta Eduction 2011, 2011b). The Ministry defines a competency as "an interrelated set of attitudes, skills and knowledge that is drawn upon and applied to a particular context for successful learning and living" (2011, p. 3). This meaning ties closely to the Organization for Economic Cooperation and Development's (OECD, 2005) perspective that a competency is:

> more than just knowledge and skills. It involves the ability to meet complex demands, by drawing on and mobilizing psychosocial resources (including skills and attitudes) in a particular context. Competencies involve a mobilization of cognitive and practical skills, creative abilities and other psychosocial resources such as attitudes, motivation and values. (p.4)

The meaning of competency is further illuminated by Friesen (2010), who indicates that:

> it involves the ability to conform the knowledge-action, beyond automation, to the unique context depending on and connected to the specific, given situation worked, thereby promoting transfer to other situations and contexts using internal and external resources such as: prior knowledge, skills, human resources,

networks, peers, interests, experiences, attitudes, values, skills and information. (p. 11)

This meaning of "competency" differs from the way in which the term is widely used in the management field. Leithwood (2012) indicates that "competency" is typically defined in the management literature in a narrow manner as "an underlying characteristic of an individual that is causally related to effective or superior performance in a job" (p. 5). In contrast, ensuring that our review was focused on the broader definitions of competency (Alberta Education, 2011; OECD, 2005; Tardif, 2006) was a pivotal consideration in our panel deliberations.

The panel's fourth review process consideration was to determine which research literature would be selected for the study. The AADE response to the *Draft Professional Practice Competencies for Teachers* (PPCT) called for "the development of five interrelated principles of professional practice along the lines of Friesen's (2009) CEA *Teaching Effectiveness Framework"* (AADE, 2011, p. 3). The paper further suggested that the Ministry should call together a panel of Alberta experts in teaching and learning to work toward the development of a new consensus on quality teaching. The recommendation was to begin with the CEA *Framework* and to review additional research literature, with the specific inclusion of a number of sources in which teaching is conceived as a complex professional activity that involves situated and expertise in action (e.g., Bennett & Rolheiser, 2001; Darling-Hammond, 1999, 2007; Danielson, 2007; Hattie, 2009; ITASC, 2011; Joyce & Calhoun, 1996; Marzano, 2007; NTBS, 2002; OECD, 1994; Stronge, 2007). We believe that the new Alberta consensus on quality teaching must continue to be informed by the best available evidence and the practical wisdom of the province's professional educators.

Given the extensive research base of the *CEA Teaching Effectiveness Framework*, the panel decided to use its five principles as the starting point for our review. A large number of related works from respected provincial, national, and international scholars were also examined, including Alberta Education's TQS Revision sources (Alberta Education, 2011b). Two summaries of the research literature selected are provided in the appendices. A table of major sources is presented in Appendix B and an annotated bibliography comprises Appendix C. In addition to the specific titles cited in this paper, which appear on the list of references starting on p. 19, a more extensive bibliography of scholarly sources is also provided.

Guiding Principles

Recent studies of learning (Bransford, Brown & Cocking, 2000; OECD, 2001, 2007, 2008; Sawyer, 2006, 2008) seek to better understand the cognitive, emotional and social processes that result in the most effective learning and to use this knowledge within the design of curriculum, teaching and assessment so that people learn more deeply and effectively. These approaches to learning are not only different in degrees, but also significantly different in kind. It is important for teachers to keep abreast of new advances in learning, as the task of teaching is to sponsor learning. Research from the learning sciences, an interdisciplinary field which includes cognitive science, educational psychology, computer science, anthropology, sociology, information sciences, neurosciences, education, design studies, and instructional design, is yielding new insights into learning as well as the implications for designing more effective learning environments, including school classrooms.

Learning environments emerging from contemporary research recognize learners as core participants, requiring active engagement and developing in them an understanding of their own

activity as learners. These learning environments recognize that learning is not merely a solo activity, rather a distributed activity, social in nature, through the processes of interaction, negotiation, cooperation, collaboration and participation. They are highly attuned to the inextricably entwined nature of the emotional and cognitive dimensions of learning. Learning within these environments is organized to sponsor deep conceptual understanding rooted in disciplinary ways of knowing, doing and being connected both vertically within the discipline and horizontally across disciplines. Such learning environments are learner-focused and acutely sensitive to the fact that students differ in many ways, including their prior knowledge. Learning within these environments is maximized when each learner is sufficiently challenged and supported to reach just above their existing level and capacity. Assessment and instruction work together in these environments to ensure that learning goals are transparent and learners receive substantial, regular, timely, specific, meaningful feedback to improve learning.

The core principles of the *CEA Teaching Effectiveness Framework* (Friesen, 2009) stand up well when viewed through the lens of this recent research; they serve as a starting point for the five guiding principles below. Together these interrelated principles generate research informed images of robust teaching and learning for today's complex and rapidly changing world. In turn, these principles provide the foundation for the FETL's competencies for teachers, which are presented in the paper's next section.

1. **Principle One:** *Learning is socially constituted. The thoughtful and intentional design of learning supports academically and intellectually engaging learning environments.*

   Effective teaching practice begins with the design of academically and intellectually engaging learning for all students. While academic engagement involves important learning

that helps students succeed in school, intellectual engagement refers to an absorbing, creatively energizing focus requiring contemplation, interpretation, understanding, meaning making and critique. The term intellectual engagement reflects the interrelated connection between emotion and cognition. Intellectual engagement results in a deep, personal commitment on the part of learners to explore and investigate ideas, issues, problems or questions for a sustained period of time.

To design challenging work that engages all learners, teachers require a deep understanding of their disciplines, the students they teach, how people learn, the resources available to them, as well as the curriculum outcomes. These design ideas are supported in a number of studies (e.g., Bransford, Brown & Cocking, 2000; Clifford, & Marinucci, 2008; Friesen, 2009, 2011; Friesen & Lock, 2010; Hattie, 2009, 2012; Koehler & Mishra, 2006, 2008; McTighe, 2010; OECD, 2001, 2007; Perkins, 2010; Rose & Meyer, 2002, 2006; Sawyer, 2006; Wiggins & McTighe, 2005; Willms, Friesen & Milton, 2009).

2. **Principle Two:** *The work students undertake is personally meaningful and locally and globally situated.*

Students become intellectually engaged in work that teachers design for and with students to instill depth of thinking and intellectual rigor in situated learning environments through face to face and digitally networked learning tasks. Situated learning environments move away from " a transmission-and-acquisition style of instruction, toward more collaborative, active and, inquiry-oriented classrooms" to create activity systems wherein students interact with each other, experts and an array of learning resources (Greeno, p. 92). Teachers must be able to continually draw out students' pre-existing understandings to

scaffold them to a place of deeper learning and deeper understanding. Digital technologies play a powerful role when used to support learning and knowledge-building activity. They are particularly powerful not only in helping students solve problems but also in posing new problems. These approaches allow students to be engaged in elaborated forms of communication, collaboration, requesting and gathering feedback, creating new products and participating in and contributing to local and global learning communities. A multitude recent of research studies take these approaches to sponsoring student learning (e.g., Binkley, Erstad, Herman, Raizen, Ripley & Rumble, 2010; Bransford, Brown & Cocking, 2000; Dede, 2007a, 2007b, 2010; Clifford, & Marinucci, 2008; Friesen, 2011; Friesen, Jardine & Gladstone, 2010; Friesen & Lock, 2010; Greeno, 2006; Hattie, 2009, 2012; Koehler & Mishra, 2006, 2008; Rose & Meyer, 2002, 2006; Sawyer, 2006; Scardamalia & Bereiter, 2006; Wiggins & McTighe, 2005; Willms, 2003; Willms, Friesen & Milton, 2009).

3. **Principle Three:** *Assessment practices are focused on improving student learning and guiding teaching decisions and actions.*

The intentional design of assessment for learning that invites students to co-create assessment criteria with teachers is one of the most powerful teaching strategies. When instruction and assessment work seamlessly together they enable students to think deeply to understand next steps and to become increasingly self-directed in their learning. Ongoing formative assessment is required throughout the learning activity to make students' thinking visible to both students and teachers. Assessment needs to be embedded in instruction and must include clear criteria for performances of understanding along with helpful feedback during learning. These approaches make learning goals transparent and ensure that learners

receive substantial, regular, timely, specific, meaningful feedback to improve their learning on an ongoing basis. Recent studies support the application of this most powerful of learning strategies (e.g., Assessment Reform Group, 2006; Black & Wiliam, 1998; Friesen, 2009, 2011; Friesen & Lock, 2010; Goodrich, 1999; Hattie, 2009, 2012; Wiliam, 2011).

4. **Principle Four:** *Supportive relationships promote and sustain a strong learning culture.*

Over time, as students participate in a variety of supportive relationships in caring learning environments that encourage risk-taking and build trust, students' confidence in themselves as learners grows. In such teaching and learning contexts, diversity in a student population becomes something that is welcomed, appreciated, and explored.

Fostering a variety of relationships is a critical component of effective teaching. In addition to pedagogical relationships (teacher and student), peer relationships and community relationships (students with others inside and outside of the school) are important aspects of supportive learning environments. An extensive body of research underlines the importance of supportive learning relationships (e.g., ATA, 2003; Clifford & Friesen, 1993; Engle & Conant, 2002; Friesen & Lock, 2010; Gilbert, 2005; Hattie, 2009, 2012; Levin, 2009; National Research Council – Institute of Medicine, 2003; Newmann, Wehlage & Lamborn, 1992).

5. **Principle Five:** *Communities of professional practice enhance teaching and learning.*

Effective teachers improve their professional practice in the company of their peers. As collaborative professionals, effective teachers engage with students, teacher colleagues, educational leaders, parents, professionals from other fields, community members and

colleagues in the collective leadership of the school. Frequent professional conversations through networked or school based communities of inquiry, access to each other's classrooms, and collaborative planning are effective professional learning practices well supported by the research (e.g., Friesen, 2011; Friesen & Lock, 2010; Friesen, S. & Lock; Hattie 2009, 2012; Timperly, 2008, 2011; Willms, Friesen, & Milton, 2009).

These five guiding principles support images of rich, robust and meaningful learning for all students and undergird a research informed approach to teaching practice. The principles support pedagogical design and practice which nurtures active and in-depth learning, organizes knowledge around key concepts and connections, requires authenticity, utilizes prior knowledge and experience, fosters collaboration, weaves formative assessment into the fabric of instruction and supports the development of metacognition.

Competencies for Teaching

Based on the research informed principles and supporting literature described in the preceeding section, five teaching competencies that effect learning emerge and are described below. The principles and supporting research call upon teachers to work with colleagues to design learning environments that deeply engage students in meaningful learning tasks. Teachers support student understanding through a variety of reciprocal approaches, including formative assessment as a seamless part of the learning process. Effective teaching and learning are founded on supportive relationships and collaborative approaches that contribute to social cohesion and instil lifelong intellectual curiosity.

Each competency describes an important area of teaching expertise that is contingent on the dynamic interplay of content, teacher, learner and context. In keeping with the definitions

presented in section two of the review (Alberta Education, 2011; Friesen, 2010; OECD, 2005. Tardiff, 2006) a teaching competency is understood as an interrelated set of attitudes, skills, and knowledge that and knowledge that teachers draw upon and apply to a particular context to support successful learning. Teaching competence means "knowing how to act by making appropriate choices and the proper use of various resources in highly complex situations" (Friesen, 2010, p. 11). Effective teaching practice requires the demonstration of competency in all five of the following areas of expertise.

Teaching Competency One: *The effective teacher designs academically and intellectually engaging learning.*

Competency in this area of teaching practice involves the design of academically and intellectually engaging learning in keeping with principle one. Evidence of teaching practice reflecting this competency can include, but is not limited to:

- connecting with students' prior knowledge
- linking curriculum outcomes to students' lives in the world to develop disciplinary expertise
- organizing subject matter knowledge around key disciplinary concepts
- designing learning tasks that tap into children’s individual interests and abilities
- creating opportunities for productive collaboration and teamwork
- building assessment into daily, unit and yearly planning
- applying deep disciplinary expertise

Teaching Competency Two: *The effective teacher engages all students in meaningful, situated learning experiences.*

Competency two involves teaching practice that engages students in learning, is personally relevant, and is deeply connected to the world in keeping with principle two. Evidence of teaching practice reflecting this competency can include, but is not limited to:

- communicating and monitoring high and achievable expectations
- translating curriculum content into meaningful student work that develops student competence in an area of study through depth of thinking and intellectual rigor
- applying a range of instructional strategies, including the appropriate use of technology, that vary according to context, content, desired outcomes and learning needs of students
- scaffolding student understanding based on a foundation of knowledge, skills and strategies organized to facilitate retrieval and application
- addressing questions that have relevance beyond the classroom, require elaborated forms of communication and invite community engagement

Teaching Competency Three: *The effective teacher assesses student learning to guide teaching and to improve learning.*

Assessing learning to build student competence and to guide teaching practice in keeping with principle three is the third teaching competency. Evidence of teaching practice that reflects this competency can include, but is not limited to:

- embedding assessment in the design of teaching and learning
- developing student understanding of learning intentions and achievement standards
- involving students in individual and peer formative assessment
- providing specific, timely constructive feedback during instruction to allow students to take their next learning steps

- collaborating with students and colleagues to review and reflect on assessment data

Competency Four: *The effective teacher fosters supportive learning relationships.*

Competency four describes teaching practice fostering a variety of interdependent supportive learning relationships in keeping with principle four. Evidence of teaching practice reflecting this competency can include, but is not limited to:

- fostering productive relationships with and among students, parents, colleagues, and people outside the school
- cultivating meaningful relationships between students and the subject disciplines they are learning
- nurturing relationships of stewardship between students and the environment
- creating collaborative learning environments that encourage risk-taking and trust
- welcoming, appreciating and exploring diversity in a student population

Competency 5: *The effective teacher collaborates to enhance teaching and learning.*

Collaborating to enhance student and teacher learning is a competency area reflecting guiding principle five. Evidence of teaching practice that demonstrates this competency can include, but is not limited to:

- collaborating through shared planning and co-teaching.
- engaging with colleagues, parent and community members
- participating in professional learning and in communities of practice
- contributing to the professional learning of peers
- relating with peers through networked and school based professional dialogue
- inviting feedback on teaching from colleagues and educational leaders

It is important to recall that these five areas of teacher practice are more than just knowledge and skills. Each competency is an area of teaching expertise that involves the ability to meet complex demands, by drawing on and mobilizing psychosocial resources (including skills and attitudes) in a particular context. Competencies involve a mobilization of cognitive and practical skills, creative abilities, and other psychosocial resources such as attitudes, motivation, and values (OECD, 2005, p. 4).

Concluding Thoughts

The ideas conveyed in this paper are meant to contribute to the dialogue toward the next iteration of the Alberta consensus on effective teaching that we believe should be designed to help address the complexities teachers face in working with students in our rapidly changing world. We contend that the research informed principles and competencies described in our *Framework of Effective Teaching for Learning* will serve as a vital support to students and educators on the multiple pathways toward the realization of Alberta Education's vision of the kind of education that students will need in the 21st century. The five principles and five compentencies map well to each other, the research and to the three "E's" in the vision: "All students are inspired to achieve success and fulfillment as ***engaged thinkers*** and ***ethical citizens*** with an ***entrepreneurial spirit*** [emphasis in the original] (Alberta Education, 2011, p. 6).

We look forward to engaging with other stakeholders as the Ministry's review of *Ministerial Order 016/97 Teaching Quality Standard Applicable to the Provision of Basic Education in Alberta* unfolds over the next few months. We believe that Alberta consensus on the nature of quality teaching must continue to be informed by the best available evidence and the practical wisdom of the province's professional educators. We further believe that once the

new consensus on teaching is reached, our work together under the leadership of Alberta Education will need to continue on at least two fronts. First, it will be vitally important to provide thorough and thoughtful support to teachers, schools and school jurisdictions as educators in the field take up the new competencies through the implementation process. Second, Alberta's teacher preparation institutions will also require support in their efforts to ensure that undergraduate programs are adjusted to reflected the new competencies for teachers. The Alberta " dialogue on teaching quality" must continue.

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Appendix A: TQS Comparison Table

Teaching Competencies: *The effective teacher*	**TQS Area of Practice**	**Interim KSAs**	**Permanent KSAs**
Designs academically and intellectually engaging learning	Ongoing analysis of context	2a	3a
	Legal/ethical frameworks of teaching	2b and c	3b
	Subject and pedagogical knowledge	2d	3c
	Instructional planning	2f	3e
Engages all students in meaningful situated learning experiences.	Varying instructional approaches	2e and i	3d and g
	Leveraging technology	2j	3h
Assesses student learning to guide teaching and to improve learning.	Student assessment	2k	3i
Fosters supportive learning relationships.	Respectful Learning Environment	2g and h	3f
Collaborates to enhance teaching and learning.	School, Home and Community Partnerships	2l, m and n	3j
	Career-Long Learning	2o, p and q	3k

Appendix B: Major Research Sources

Teaching Competencies: *The effective teacher*	**Selected Applicable Sources from the Research Literature**
Designs academically and intellectually engaging learning.	Bransford, Brown & Cocking, 2000; Clifford, & Marinucci, 2008; Friesen, 2009, 2011; Friesen & Lock, 2010; Hattie, 2009, 2012; Koehler & Mishra, 2006, 2008; McTighe, 2010; OECD, 2001, 2007, 2008; Perkins, 2010; Rose & Meyer, 2002, 2006; Sawyer, 2006; Wiggins & McTighe, 2005; Willms, Friesen & Milton, 2009.
Engages all students in meaningful situated learning experiences.	Binkley, Erstad, Herman, Raizen, Ripley & Rumble, 2010; Bransford, Brown & Cocking, 2000; Clifford, & Marinucci, 2008; Dede, 2007a, 2007b, 2010; Friesen, 2011; Friesen, Jardine & Gladstone, 2010; Friesen & Lock, 2010; Gilbert, 2005; Hattie, 2009, 2012; Koehler & Mishra, 2006, 2008; Rose & Meyer, 2002, 2006; Sawyer, 2006; Scardamalia & Bereiter, 2006; Wiggins & McTighe, 2005; Willms, 2003; Willms, Friesen & Milton, 2009.
Assesses student learning to guide teaching and to improve learning.	Assessment Reform Group, 2006; Black & Wiliam, 1998; Friesen, 2011; Friesen & Lock, 2010; Goodrich, 1999; Hattie, 2009, 2012; Wiliam, 2011.
Fosters supportive learning relationships.	ATA, 2003; Clifford & Friesen, 1993; Engle & Conant, 2002; Friesen & Lock, 2009, 2010; Gilbert, 2005; Hattie, 2009, 2012; Levin, 2009; National Research Council – Institute of Medicine, 2003; Newmann, Wehlage & Lamborn, 1992.
Collaborates to enhance teaching and learning.	Friesen, 2011; Friesen & Lock, 2010; Friesen, S. & Lock; Hattie 2009, 2012; Timperly, 2008, 2011; Willms, Friesen, & Milton, 2009.
Conceptions of Teaching as Complex, Situated, Professional Expertise in Action	Bennett & Rolheiser, 2001; Danielson, 2007; Darling-Hammond, 1999, 2007; Friesen, 2009; Hattie, 2009, 2012; Joyce, B. & Calhoun, 1996; ITASC, 2011; Marzano, 2007; NBPTS, 2002; OECD, 1994; Stronge, 2007.

Appendix C

Annotated Bibliography

The purpose of this annotated bibliography is to provide additional information about several of the key research sources cited in this paper. The following 24 entries represent a cross section of research literature in the learning sciences, student engagement, assessment and teaching in the 21st century.

Bennett, B. & Rolheiser, C. (2001). *Beyond Monet: The artful science of instructional integration*. Toronto: Bookation.

Bennett and Rolheiser's conception of teaching blends scientific and artistic elements into *teaching intelligence*. They contend that teaching is an "art informed by both science and the individual's experiences over time" and that "art and science have common ground—one informs the other" (p. 5). The complexity and creativity of expert teaching involves "continual practice and reflection over time" (p. 6). A further claim is that teaching effectively is "a complex, demanding and important process" and that to be "effective over time, teachers must become creative experts who collectively make wise decisions related to the teaching and learning process: (p. 25).

Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M. & Rumble, M. (2010). Draft white paper 1: Defining 21st century skills. Assessment and Teaching of 21st Century Skills. Retrieved March 10, 2010 from http://www.atc21s.org/

Binkley and colleagues developed a conception of twenty-first century learning comprised of ten skills within four categories. There are three *ways of thinking*: (1) creativity and innovation; (2) critical thinking, problem solving, decision making; (3) learning to learn,

metacognition. Category two involves two *ways of working*: (4) communication and (5) collaboration (teamwork). There are two *tools for working*: (6) information literacy and (7) ICT literacy. The final category, *living in the world*, consists of three skills: (8) citizenship - local and global; (9) life and career; (10) personal and social responsibility - including cultural awareness and competence. Ways of thinking, ways of working, tools for working and living in the 21st century world are acquired through knowledge-building activity.

Black, P. & Wiliam, D. (1998) Inside the black box: Raising standards through classroom assessment. *Phi Delta Kappan, 92* (1), 81-90.

An extensive review of the literature regarding formative assessment shows effect sizes between 0.4 and 0.7, larger than most educational interventions. To improve formative assessment practices in schools, Black and Wiliam make three recommendations. First, assessment should not be punitive, leading students to give up, but should rather provide specific feedback about how to address gaps between the students' learning and the desired outcomes. Second, involving students in self-assessment creates a greater awareness of the desired goal, evidence about the learners' present status and a way to close the gap. Finally, effective teaching should genuinely provoke and reveal student understanding and misunderstanding so the teacher can help address the misunderstandings and improve student learning.

Bransford, J., Brown, A. & Cocking, R. (2000). *How people learn*. Washington, DC: National Academies Press.

According to Bransford, Brown & Cocking, the emerging science of learning underscores the importance of rethinking what is taught, how it is taught, and how learning is assessed" (p.13). The learning sciences underscore the importance of conceptual understanding in the work

of knowledge creation. This means that students need to be presented with many examples where the same concept is at work. It requires depth in the key concepts of a discipline and "active coordination of the curriculum across school years" (p.20). They challenge teachers to create 21st century classrooms that are knowledge-centered, assessment-centered and learning-centered. They argue that digital technologies are resources that support these activities within community-centered collaborative learning environments.

Danielson, C. (2007). *Enhancing professional practice: A framework for teaching*. Alexandria, VA: Association for supervision and Curriculum Development.

Charlotte Danielson's 1996 book (updated in 2007) describes the complexity of professional practice within a four-domain teaching framework. The model is based on research, views teaching as a dynamic and complex process and is flexible enough to be used in a variety of contexts, levels and content areas. Teacher knowledge, skills and dispositions are categorized into four larger domains: Planning and Preparation, the Classroom Environment, Instruction and Professional Responsibilities.

Dede, C. (2010). Comparing frameworks for 21st century skills. In J. Bellanca & R. Brandt (Eds.), *21st century skills: Rethinking how students learn*. (pp. 51 – 77). Bloomington, In: Solution Tree Press.

Dede's review of prominent frameworks of 21st century skills rand competencies (in the case of the OECD (2005) rationalizes the need for developing conceptions of 21st century skills primarily on economic and technological grounds. His comparison of frameworks, which include several that focus on digital literacies, notes a number of similarities across the documents. Many of the frameworks include "perennial skills" that have been valued throughout history as well as the "contextual" skills required to meet with success in today's world. While collaborative

capabilities can be viewed as perennial skills in that the value of teamwork and collaboration has long been appreciated, new forms of online collaboration for the digital age fall into the contextual category.

Dewey, J. (1938). *Experience and education*. New York, NY: Collier Books.

While traditional education often failed to show students the relevance of their studies, Dewey cautions against the opposite extreme – a laissez-faire version of progressive education that leaves children to simply experience the world with little teacher guidance. Instead he argues for a rich conception of education that begins with the everyday experiences of students but links these experiences to broader applications in society and the world in which they live.

Darling-Hammond, L. (1999). *Reshaping teaching policy, preparation and practice: Influences of the National Board for Teaching Standards*. New York: American Association of Colleges for Teacher Education.

Linda Darling-Hammond has written extensively on the evolution of professional teaching standards "for teacher education and for teacher licensing, certification, and ongoing evaluation have become a prominent lever for promoting system-wide change in teaching (p. 5). She calls for standards that define teaching as a collegial, professional activity and that view "teaching as complex, contingent on students' needs and instructional goals, and reciprocal—that is, continually shaped and reshaped by students' responses to learning events (p. 14). Such organizations as the National Board for Professional Teaching Standards (NBPTS), the Education Testing Service (ETS) and the Interstate New Teacher Assessment and Support Consortium (INTASC) have provided leadership in this direction in the United States.

Darling-Hammond, L., Wise, A.E. & Pease, S.R. (1983). Teacher evaluation in the organizational context: A review of the literature. *Review of educational research,* 53 (3), 285-328.

As part of a larger study of teacher evaluation through the RAND group in the 1980s, Darling-Hammond et al. developed five images of teacher work, each of which suggests a specific approach to teaching. At a basic level a *teacher as laborer* image involves preplanned, highly structured and routinized, and closely supervised work. The teacher implements the "program in the prescribed manner and adheres to specified routines and procedures" (p. 291). At slightly more sophisticated level the *teacher as technician* implements predicable learning strategies predetermined by the administration. Conception is separated from execution thereby placing the teacher in the role of a technician. *Teaching as craft* envisions teachers who exhibit specialized knowledge, with decision-making based on the application of standardized modes of practice. "Tricks of the trade" are emphasized over theory and reflection. Personal creativity, adaptability and novelty of practice are emphasized in the *teacher as artist* conception. At the highest level is *teaching as a profession.* Darling-Hammond and her colleagues distinguish between craft and profession in that the professional exercises judgment based on theoretical knowledge as to the best application of the techniques at his or her disposal in a particular context. Professionals not only know whether and when to choose particular courses of action according to general principles, but they can also evaluate multifaceted situations in which many variables intersect.

Friesen, S. (2011). Guiding principles for WNCP curriculum frameworks projects. A research report prepared for the Western and Northern Canadian Protocol for Collaboration in Education.

In this paper commissioned by the western provinces and northern territories of Canada to inform curriculum design, Friesen reviews the learning sciences consensus on the following seven aspects of learning. (1) *Collaborative knowledge building* is essential to the process through which learners engage in innovation and knowledge creation. When we actively control our experience, that experience sculpts the way that our brains work, changing neurons, synapses and brain activity. When we are simply exposed to events and information (as opposed to acting on them), our brains and bodies are not much affected. (2) *Conceptual understanding* is required for deep learning and deep understanding that enables learners to make connections, reason, innovate, problem solve, critique and create. (3) *Scaffolding* requires that teachers have deep understanding of their disciplines, the students they teach, how people learn, the resources available to them, as well as the curriculum outcomes. Teachers must be able to continually draw out students' pre-existing understandings to scaffold them to a place of deeper learning and deeper understanding. (4) *Authentic intellectual engagement* with things that are personally meaningful and worth knowing triggers the desire to understand. Authentic intellectual engagement is the hallmark of 21st century learning. (5) *Ongoing formative assessment* is required throughout the learning activity to make students' thinking visible to both students and teachers. It needs to be embedded in instruction and include clear criteria for performances of understanding along with specific, helpful feedback during learning. (6) *Digital technologies* play a powerful role when used to support learning and knowledge-building activity. They offer elaborated forms of communication, collaboration, building local and global communities, revision, requesting and gathering feedback, providing scaffolding, creating new products and participating in and contributing to local and global communities. (7) *Reflection or metacognition*. Knowledge about one's own learning, of one's own learning strengths and

weaknesses, and the demands of the learning task are essential for creating the self-directed learner.

Friesen, S. & Lock, J. (2010). High performing districts in the application of 21st century learning technologies: Review of research. A research paper prepared for the College of Alberta School Superintendents.

Friesen and Lock's review indicates that the mindful infusion of networked digital technologies leads to rich, robust and meaningful learning through pedagogical practices which: (1) nurture active and in-depth learning, (2) require authenticity, (3) foster collaboration, (4) utilize prior knowledge and experience, (5) use formative assessment, (6) organize knowledge around key concepts and connections and (7) support the development of meta-cognitive skills.

From their analysis of seven top performing school systems in the application of learning technologies, five characteristics of *Teachers as Designers of 21st Century Learning* are delineated. Such teachers (1) develop strong authentic discipline-based inquiry work for students; (2) scaffold student work with robust instructional practices that conform to the learners and assessment practices that assist and aid each child to improve, grow and thrive; (3) call upon networked digital technologies to create knowledge-building classrooms; (4) create strong relationships with their students and other teachers and created processes so that students built strong relationships with each other and with experts in the field as they learn together; and (5) work with peers to critically reflect on their practice and work on improving their practice in the company of their peers.

Hattie, J. (2012). *Visible learning for teachers: Maximizing impact on learning.* New York, N.Y: Routledge.

Visible Learning for Teachers builds on Hattie's (2009) ground breaking synthesis of over 800 meta-analyses in the largest ever collection of evidence-based research into what works in schools to improve learning. The additional meta-analyses reviewed in this work bring the total cited to over 900. Hattie outlines the 42 most successful interventions within a five sequence lesson framework: preparing the lesson, starting the lesson, interpreting learning and providing feedback during the lesson and post lesson follow up. Expert teachers are distinguished from experienced teachers by the learning outcomes achieved. To Hattie, inspired and passionate teachers (1) solve instructional problems, (2) interpret events in progress, (3) are sensitive to context, (3) monitor learning, (4) test hypotheses, (5) demonstrate respect for all in the school, (6) show passion for teaching and learning, and (7) help students to understand complexity (pp. 30 – 31).

Joyce, B. & Calhoun, E. (1996). *Creating learning experiences: The role of instructional theory and research.* Alexandra, VA: Association for Supervision and Curriculum Development.

Joyce and Calhoun present a summary of teaching models grouped into four families. The eight models in the *information-processing* family emphasize inquiry and problem-solving strategies which develop learners' "conscious awareness of strategies for learning and use those strategies to inquire into and reflect upon the world" (p. 9). Seven *social* models "share the objectives of increasing social skill and synergy and ultimately imbuing students with commitment and the tools to participate in the highest forms of democratic process (pp. 11-12). The *personal family*

is made up of five models that "encourage productive independence, so that people can become increasingly self aware and responsible for their own destinies (p. 12). The six models that comprise the *behavior systems family* share a common behavioristic theoretical stance. A long history of research supports the thoughtful application of these models across elementary and secondary grades (p. 7). The models "adapt easily to a wide spectrum of curriculum areas and types of learners" (p. xi). Evidence shows that they "work in enhancing students' ability to learn: All are backed by research that tests their theories and abilities to effect learning" (p. 8). The authors frame each model as an "inquiry into teaching and learning" and call upon teachers to study the impact of the model on student learning. "Rather than a formula to follow slavishly, each model brings us into the study of how students learn and makes us reflective action researchers in our classrooms" (p. xii).

Koehler, M. & Mishra, P. (2008). Introducing TPCK, in (Ed. AACTE Committee on Innovation and Technology, Handbook of technological pedagogical content knowledge (TPCK) for educators). New York, N.Y., Routledge.

Koehler and Mishra conclude that effective technology integration requires the intersection among the bodies of knowledge that are represented by pedagogical content knowledge, technology content knowledge and technological pedagogical knowledge. The intersection of all three knowledge types is described as technological pedagogical content knowledge (Mishra and Koehler, 2006). Their Technological Pedagogical Content Knowledge (TPACK) framework can be used to design pedagogical strategies, which can be based on sound content knowledge and an understanding of what it means to teach successfully with technology. TPACK-competent teachers understand the true nature of effective teaching and learning with technology.

Marzano, R. (2007). *The art and science of teaching: A comprehensive framework for effective instruction*. Alexandra, VA: Association for Supervision and Curriculum Development.

Marzano presents a framework that contains research-based strategies from three of his earlier works. In this approach, ensuring quality teaching balances the necessity of research-based data with the equally vital need to understand the strengths and weaknesses of individual students. The framework is organized around 10 design questions that help teachers use their knowledge of their students, their subject matter and their situation to identify the most appropriate instructional strategies. Though classroom instructional strategies should clearly be based on sound science and research, in Marzano's scheme, knowing when to use them and with whom is more of an art. The framework helps teachers examine and develop their knowledge and skills, so they can achieve a dynamic fusion of art and science that results in effective teaching for learning.

National Board for Professional Teaching Standards (NBPTS). (2002). What teachers should know and be able to do. Washington, DC: NBPTS.

The National Board standards are organized around the following five major propositions: (1) Teachers are committed to students and their learning. (2) Teachers know the subjects they teach and how to teach those subjects to students. (3) Teachers are responsible for managing and monitoring student learning. (4) Teachers think systematically about their practice and learn from experience. (5) Teachers are members of learning communities. Related to each proposition are more specific statements. "They employ multiple methods for measuring student growth and understanding and can clearly explain student performance to parents" is an example of such a statement related to proposition number 3. A second sample statement within the same proposition is that teachers "command a range of instructional techniques, know when each is

appropriate, and can implement them as needed". One further example, in this case subsumed within proposition number 2, is the expectation that "Their instructional repertoire allows them to create multiple paths to knowledge, and they are adept at teaching students how to pose and solve their own problems" (p. 7).

Organization for Economic Co-operation and Development (OECD). (1994). *Quality in teaching* Paris: OECD Centre for Educational Research and Innovation.

This major international study completed in 1994 came to several conclusions about the complexity and richness inherent in good teaching. *Quality in Teaching* analyzed teaching practices through case studies in eleven industrialized nations. The report concluded that quality teaching "should not be seen in terms of narrow behavioral competencies, but more in terms of dispositions. Teacher quality should be regarded as a holistic concept, that is, as a gestalt of qualities rather than a discrete set of measurable behaviors" (p. 14). While the study defines teaching quality in terms of the "individuality, intelligence, artistry, grace and fluidity of individual teacher," it also concludes that this individual artistry "is nurtured by a strong school wide emphasis on teamwork, collaboration and risk-taking " (p. 87). Schools that exhibit high levels of teacher quality have over time modified their internal conditions to explicitly support good teaching.

Porter, A., Youngs, P. & Odden, A. (2001). Advancements in teacher assessments and their uses. In Richardson, V. (Ed), *Handbook of research on teaching* (pp. 751-776). Washington: American Educational Research Association.

Porter, Youngs and Odden examined the conceptions of teaching that underlie the National Board for Professional Teaching Standards (NBPTS), the Interstate New Teacher Assessment and Support Consortium (INTASC) core standards and the Praxis III assessment

criteria. Even though the INTASC and Praxis III are focused on beginning teaching whereas the NBPTS propositions refer to the practices of accomplished teachers, striking similarities are noted in six general teaching areas: subject-matter knowledge, knowledge of students, ability to engage students in active learning, reflective practice and pedagogical content knowledge (pp. 265-266). Two additional common points were identified (1) they emphasized advanced content, deep understanding, reasoning and applications over a focus on basic facts; and (2) they shared a conception of pedagogy "leaning more to constructivist teaching than toward direct instruction" (p. 293).

Rose, D. & Meyer, A. (2002). *Teaching every student in the digital age: universal design for learning.* Alexandria, VA: ASCD.

This two-part introduction to Universal Design for Learning (UDL) begins with an overview of the research based principles of UDL. In the second section, Rose and Meyer present ideas for using UDL in the classroom. UDL is not conceived as an add-on to other approaches to teaching. Rather, UDL uses what has been learned from the learning sciences and the application of the digital technologies to support teachers. Though originally focused on meeting the needs of students with identified disabilities, UDL utilizes flexible methods and materials to maximize learning opportunities for all students. The UDL Framework is based on the three principals: "(1) to support *recognition* learning, provide multiple flexible methods of presentation; (2) to support *strategic* learning, provide multiple, flexible methods of expression and apprenticeship; and (3) to support *affective* learning, provide multiple, flexible options for engagement" (p. 75).

Sawyer, K. (2006). *The Cambridge handbook of the learning sciences.* New York, NY: Cambridge University Press.

Sawyer highlights six important findings from the learning sciences. This research confirms that, in contrast to traditional teaching practices, deep learning requires that learners (1) relate new ideas and concepts to previous knowledge and experience; (2) integrate their knowledge into interrelated conceptual systems; (3) look for patterns and underlying principles (4) evaluate new ideas and relate them to conclusions; (5) understand the process of dialogue through which knowledge is created and can examine the logic of an argument critically; and (6) reflect on their own understanding and their own process of learning (p.4)

Stigler, J. & Hiebert, J. (1999). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom.* New York, NY: The Free Press.

Stigler and Hiebert claim that true professionalism in teaching is closely linked the development of standard practice. In their view efforts in this direction must recognize the complex, contextualized and individual nature of current North American teaching practice. To go forward the profession must focus on achieving improvements in student learning over time and "disseminate into standard practice the improvements in teaching that are responsible" (p. 178). Their position is that improvements in the practices of individual teachers "will never improve teaching in the average classroom" because they "do not change *standard practice*". To improve the "the practice of the profession, it is the standard, common practice that must improve . . . steady, continuing effort to gradually improve the standard ways in which we teach" (p. 175).

Stronge, J. (2007). *Qualities of effective teachers.* Alexandra, VA: Association for Supervision and Curriculum Development.

Strong organizes the qualities of effective teachers into six domains. Five qualities make up the first domain – *prerequisites of effective teachers*. The *teacher as a person* domain is made up of six qualities. Three qualities are found in each of the next two domains – *classroom management and organization* and *organizing for instruction. Implementing instruction* and *monitoring student progress and potential* are the final two domains. There are five qualities subsumed in *implementing instruction* and three in the final domain. Effective teaching is more than simply implementing the twenty-five qualities listed within these six domains in Stronge's view. "To succeed, the effective teacher must have sufficient knowledge of content, of pedagogy, of context, and of students to appreciate the intricacies that are bound up in the teaching and learning process" (p. 63).

Wiggins, G. & McTighe, J. (2005). *Understanding by design* (Expanded 2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Wiggens and McTighe contend that substantive student achievement gains are more likely when teachers teach for understanding of transferable concepts and processes while giving learners multiple opportunities to apply their learning in meaningful or authentic contexts. They further contend that students learn knowledge and skills through the process of actively constructing meaning or coming to an understanding and in transferring learning to new situations.

Willms. J. D, Friesen, S., & Milton, P. (2009). *What did you do in school today?* First National Report. Toronto, Ontario: Canadian Education Association.

This national Canadian Education Association study examines the relationships among student engagement, achievement and effective teaching. Ongoing research in a large number of Canadian secondary schools is grounded on the premise that, in order to raise achievement and narrow the gap, it is necessary to guarantee that all young people are engaged in their learning and that all receive effective and intellectually challenging instruction. Four convictions are advanced: (1) Teaching practices exist that enable all students to achieve at high levels. (2) Certain teaching practices and learning processes engage students in deeper and more sustained learning. (3) The achievement gap could be narrowed, if not eliminated, by consistently using the teaching practices that we know are effective. (4) Students have a better educational experience when teachers actively collaborate in the process of improvement.