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This chapter discusses the range of initiatives that are offered under the banner of 21st century educational reform and outlines three strands in a coherent response to the challenges and opportunities facing schools. More specifically, it discusses:

- the main concerns fueling this reform movement;
- the urgency and uncertainties in addressing these concerns;
- the complexities and potential pitfalls of the many proposed responses;
- a three-part response to the challenge of 21st century reform which provides the structure for the discussions throughout the rest of the book.

Opportunities and challenges in a digital age



If we are to understand a given educational reform movement, then it is more important to examine its basic values and principles than the type of pedagogical activities or structures it champions.
- Jesse Goodman¹

When it was first becoming popular to talk about learning for the 21st century, I met a secondary school administrator who proudly announced that his school had pretty much resolved the problem of student engagement at the senior grades.² The solution was to allow for significant student choice. By dropping the requirement for students to complete mandatory senior courses, they had become free to pursue electives of their own choosing. I asked what kinds of courses students were opting for: Interesting topics? Courses that remediated gaps in their learning? He said “no.” For the most part, students were taking easy courses, including online offerings, that they could waltz through without much effort, or they were redoing courses solely to improve their grades.

It didn’t seem that the school had done much to engage students educationally (except to reinforce a mark-driven mindset) or to better prepare them for a 21st century world. Their choices were not going to make them more successful engineers or mechanics, or better citizens and companions. These students weren’t choosing courses that would help them develop personal or career interests; instead, they were navigating through the hoops in the system. Students who may have entered the system twelve years earlier filled with curiosity and wonder were now uninterested in learning. Rather than solving the challenges of learning for the 21st century, this school’s “solution” highlighted, or even compounded, the problems that must be overcome.

This incident reminded of my own experience 30 years earlier as a beginning teacher in a high risk elementary school. In an effort to interest my students, I promised that every Wednesday afternoon they would be allowed to choose what they would do, provided it was safe, feasible and had some educational merit. Initially students greeted the announcement with great joy but soon after some began to worry about what they would choose to do. After much prompting, almost every student brought something to do on the first afternoon. However, within minutes several students were bored and by the end of the first period all but two students had abandoned their chosen activities. Because I had promised to allow this for the rest of the term, we had to continue the charade for a few more Wednesdays until the class agreed to abandon the plan. While school had taught students what they did not like, it had not engendered in them a curious spirit. My students couldn’t even figure out what would challenge or interest them. Of course, this scenario would play out differently if I replicated this invitation in a contemporary classroom. The vast majority of students would likely show up with a mobile device eager to text or play video games for hours on end. If that is what contemporary students would choose to do with their school time, we have to ask what would be the point of their coming to school?

1 Jesse Goodman, “Change without Difference: Schools Restructuring in Historical Perspective,” *Harvard Educational Review* 65 (Spring 1995): 4.

2 For linguistic convenience, we will use the first person to indicate that one of the authors had the experience.

The answer to these questions is crucial and yet is still very much a matter of debate. There is little clarity as to what 21st century learning might actually mean and even less consensus on how it would play out in practical terms. This is because 21st century learning is a slogan. Slogans are ubiquitous in education, and like other educational slogans—authentic assessment, inclusive education, visible thinking, integrated curriculum—this one has two characteristic features. Slogans always sound positive—so everyone should be in favour of them. Who could possibly champion inauthentic assessment, invisible thinking or disintegrated curriculum? In addition, slogans are notoriously vague, which means diverse groups can advocate for them without actually meaning the same thing. In fact, most educational initiatives began as slogans, and many never rise above being a slogan.

Contemporary calls to promote 21st century learning in a digital age don't gain traction unless they have considerable merit, but they are doomed to be largely ineffectual or, worse yet, aborted fads, if we don't strip away the flash. The challenge is to identify the truly substantive elements behind the slogan, and simultaneously expose the less helpful and perhaps dangerous elements that have attached themselves to these inherently vague ideas. While it is important to understand how various advocates use these terms, there is no definitive version to be found—slogans can and will come to mean what people decide they want them to mean. The goal of this book is to help thoughtful educational leaders at the system, district and school levels give substance to the breadth of widely-used contemporary slogans by exploring what they could and perhaps should be interpreted to mean. Without this kind of clarity, efforts to implement 21st century learning will look a lot like attempting to nail jelly to a wall.

Before discussing what educators and others identify as the reasons why we need to improve our schools, it is important to remind ourselves that Canada has one of the better educational systems in the world. Canadian students are consistently among the upper ranks on international tests. In addition, all of us can recount numerous inspiring stories of teachers who made profound differences in the lives of their students. Despite all the opportunities for improvement, there are many wonderful things going on in schools. Proof of this is found in a survey of over 29,000 students in 83 schools across Canada that reported that 41 per cent of students were intellectually engaged by schooling.⁴ In short, there are many students for whom schooling is already a positive and rewarding experience, and relative to other countries, Canadians may be doing very well.

There are two things implied by our current level of success.

- **We stand to lose ground if we get it wrong.** Because our system is currently functioning at a relatively high level compared to other jurisdictions, we have lots to lose if our efforts to reform the system undermine the practices that contribute to its current level of success.

⁴ Jodene Dunleavy, Penny Milton and Douglas Wilms, *What Did You Do in School Today? Trends in Intellectual Engagement* (Research Series Report Three, Canadian Education Association, Toronto, September 2012), 5.

For example, opponents of inquiry learning have claimed that this reform initiative is undermining mastery of basic skills. Recent declines in mathematics scores in some jurisdictions have been cited as evidence of the negative consequences of this supposedly ill-advised reform effort.⁵ Equally troubling if we get the reform wrong is the impact on teacher morale. Many of us who work extensively with teachers have noticed increasing levels of teacher burnout. It is an abuse of the goodwill and commitment of teachers if we urge upon them a range of difficult reform initiatives that are eventually found to be ill-conceived or fruitless.

- **Good test results simply mean higher than average scores on pen and paper tests.** Simply because Canadian students perform better on standardized tests than students from most other countries does not mean that we are teaching our students what they really need to learn to succeed in life. Many critics have documented the limitations of such standardized tests, especially their inability to measure many of our most important educational goals.⁶ The gap between what is measured and what really matters may be worsening as teachers are pressured to spend more time teaching to the test. We may be improving our test results at the expense of genuine student learning. This point was brought home recently when I asked a talented student who was just graduating with top marks from high school what she had learned from her schooling. Much to my dismay, she said “I think what I most learned in school was how to write multiple choice exams.”

The urgency to improve

Despite its successes, there are many areas in need of improvement within the educational system. Our analysis of the dissatisfaction among educators that is fueling the call for 21st century reform suggests that the concerns concentrate around two growing and significant problems.

Disaffected students

Many students do little within school or leave school entirely because it is boring and irrelevant. According to 2008 statistics, 9 per cent of Canadian youths between the ages of 20 and 24 have

5 Dr. Nhung Tran-Davies, a leading critic of inquiry learning in Alberta, writes: “From 2003 to 2012, Alberta’s average PISA scores declined 32 points, the second biggest drop in Canada. The rate of math illiteracy almost doubled, from 7.4% to 15.1%. One in six Alberta 15-year-olds now do not have the math skills, as PISA puts it, to ‘participate fully in modern society’. The number of students achieving excellence (PISA Level 5 & 6) dropped from 26.8 to 16.9 per cent. Alberta’s grade six math PAT scores also decreased from 70% (2009) to 56% (2012) . . .” Quoted in Stuart Wachowicz, “Five Ways the Alberta Government’s Radical ‘Inspiring Education’ Plan for Transforming our Schools Will Hurt our Children,” *Edmonton Journal* (blog), April 6, 2014, blogs.edmontonjournal.com/2014/04/06/alberta-educations-planned-changes-to-schools-will-damage-economy-limit-our-childrens-future/.

6 Alfie Kohn, “Fighting the Tests: A Practical Guide to Rescuing our Schools,” *Phi Delta Kappan* (January 2001), <http://www.alfiekohn.org/article/fighting-the-tests/>.

not completed high school.⁷ The previously cited report by the Canadian Education Association indicated that 41 per cent of students from grades 6 to 12 are intellectually engaged by school; but this suggests that a majority of students who stay in school are not intellectually engaged. In addition, this average masks the fact that levels of intellectual engagement are much lower in the senior grades. A 2012 Gallup survey of 5000 American students in grades 5 to 12 found that 75 per cent of elementary students are engaged by school, but by high school that figure is down to 44 per cent.⁸ Other U.S. reports paint an equally depressing picture: “between 40–60 percent of high school students are chronically disengaged; they are inattentive, exert little effort, do not complete tasks, and claim to be bored.”⁹ The total when considering both high school dropouts and tune out is staggering.

Dissatisfaction may be increasing, but is not a new phenomenon: “Nearly half a century ago, educational philosopher John Dewey and others claimed that if schools were to succeed in preparing the great majority of young people, not just a select few, to be responsible and productive citizens, they would have to do a better job of motivating and engaging the broad spectrum of students in learning.”¹⁰

Before we can decide on a prudent course of action we need to understand why we are in this situation. There are two main explanations we will consider.¹¹ One hypothesis is that the root problem resides in what we are teaching students. Some critics call for a more relevant set of outcomes or suggest that we abandon a common prescribed curriculum and let students decide what and when they need and want to learn.

A second hypothesis is that the problems reside not so much in what we teach but in how we instruct and engage students in the things that schools currently are trying to teach. Later in this chapter, we will offer our analysis of the extent to which we need to change our pedagogy and methods, and the extent to which the content of the curriculum is the source of this problem. The lack of attention to the underlying reasons for our current state of affairs was brought home by the admission by a deputy minister of education that his ministry didn’t have a view on what was behind the problem of dropouts and tune outs. All they knew was that they want to take steps to resolve the situation.

7 Canadian Council of Learning, *Composite Learning Index 2010: Indicator Fact Sheets* (Ottawa: Canadian Council of Learning, 2010), <http://www.clica.ca/en/about/about-cli/indicators/know-dropout-rate.aspx>.

8 Brandon Busted, “The School Cliff: Student Engagement Drops with each School Year,” Gallup (January 7, 2013), <http://www.gallup.com/opinion/gallup/170525/school-cliff-student-engagement-drops-school-year.aspx>.

9 National Research Council and Institute of Medicine, *Engaging Schools: Fostering High School Students’ Motivation to Learn* (Washington, DC: The National Academies Press, 2004), 18.

10 *Ibid.*, 16.

11 There are two other causes worth considering. One pertains to the physical, social and emotional conditions that students are raised in. Poverty, malnutrition, and parental and community neglect clearly influence student performance and engagement. A second cause may be the working conditions in schools. Relatively large classes with many high needs students and inadequate training and support for teachers also undermine success at school. These issues are not addressed in this book since its focus is on the curricular and pedagogical dimensions of educational reform—but this in no way diminishes their importance as obstacles faced by schools.

Ill-prepared graduates

A second driving concern behind 21st century reform is the perception that successful graduates don't have the knowledge and skill set that parents, professors, employers and governments consider essential, given the new realities of global economics and a digital world. The Conference Board of Canada, for example, is "alarmed and concerned that . . . many graduating students don't seem to have the learning, adaptive, technical, critical thinking and relations skills they need. . .".¹²

Here, too, there are alternative explanations of the problem. Are "successful" students not learning what the current system has to offer or is the system not currently offering the kinds of things that are actually needed by students and society?

The hypothesis that students aren't learning what schools currently are trying to achieve is supported by evidence that many "good" students seem driven by a desire for high marks rather than by a desire to learn. According to the previously cited Canadian Education Association report: "Many students who are behaving in ways traditionally associated with high engagement at school (e.g., attending classes, participating in teams) are actually experiencing low levels of engagement in learning."¹³ A parallel study in the U.S. offers a similar assessment:

*Students who attend class and complete assignments to avoid punishment or bad grades are less likely to become engaged beyond a superficial (just get it done) level, whereas students who complete assignments because the material captures their interest or because they experience a sense of pride in accomplishment are more likely to go beyond the minimal requirements and become actively and deeply engaged.*¹⁴

If we accept this evidence, then the problem is rooted to some extent at least in a failure to create teaching, learning and assessment conditions that engage students and foster in-depth understanding and high-level skill development.

Alternatively, many critics claim that the bigger problem is that schools are teaching the wrong things. It is often suggested that the digital age has significantly shifted what students need to learn. The more critical voices in this camp suggest that an entirely new set of skills are needed, and

Many students who are behaving in ways traditionally associated with high engagement at school (e.g., attending classes, participating in teams) are actually experiencing low levels of engagement in learning.
—Canadian Education Association report

¹² Reported in Jim Parsons and Leah Taylor, *Student Engagement: What Do We Know and What Should We Do?* (Edmonton: University of Alberta and AISI University Partners, March 2011), https://education.alberta.ca/media/6459431/student_engagement_literature_review_2011.pdf.

¹³ Jodene Dunleavy, Penny Milton and Douglas Wilms, *What Did You Do in School Today? Trends in Intellectual Engagement* (Research Series Three, Canadian Education Association, Toronto, September 2012), 2.

¹⁴ National Research Council and Institute of Medicine, *Engaging Schools: Fostering High School Students' Motivation to Learn* (Washington, DC: The National Academies Press, 2004), 32.

some even suggest that “mastery of bodies of knowledge or content has become less important, even pointless” because of the explosion of new knowledge and changing information.¹⁵ These radical views seem exaggerated when we remind ourselves that many of the most commonly advocated 21st century competencies, such as literacy, numeracy, critical thinking, creativity and innovation, and problem-solving, have been educational goals for decades, even centuries. Furthermore, the kind of information that is changing at an exponential rate has not been the primary focus of the intended curriculum. Policy documents tend to emphasize more enduring concepts, such as sustainability, interdependence, democracy, and theories of thermodynamics, evolution and anatomical functioning, which will continue to have currency for generations to come, even if modified from time to time.

Our analysis of the situation aligns with the view expressed by two American educators:

... the skills students need in the 21st century are not new. ... What's actually new is the extent to which changes in our economy and the world mean that our collective and individual success depends on having such skills ... This distinction between “skills that are novel” and “skills that must be taught more intentionally and effectively” ought to lead policymakers to different education reforms than they are now considering. If these skills were indeed new, then perhaps we would need a radical overhaul of how we think about content and curriculum. But if the issue is, instead, that schools must be more deliberate about teaching critical thinking, collaboration, and problem solving to all students, then the remedies are more obvious, although still intensely challenging.¹⁶

A similar point may be made about the contents of the curriculum. Reliance on multiple choice tests and fact-focussed textbooks has often pushed recall of a litany of facts ahead of the broad conceptual understanding recommended in the curriculum. Rather than throw out the curriculum, the more sensible option is to do a better job of aligning our examinations, resources and teaching practices to the intended outcomes.

The need to recognize the urgency to improve the system and to ensure that we diagnose the causes accurately has never been greater. For the first time in history, there are viable alternatives to public education. Private schools and homeschooling were never realistic options for most families, but a digitally delivered alternative education is now feasible. As well, the large-scale outsourcing of educational services to commercial interests has placed even greater pressure on schools to perform or be replaced. A failure to address the identified problems may have significant consequences for the educational system as we know it.

¹⁵ John Sener, “Do We Really Need a Core Curriculum?” *ETC Journal* (February 22, 2011), <http://etcjournal.com/2011/02/22/7347/>.

¹⁶ Andrew Rotherham and Daniel Willingham, “‘21st Century’ Skills: Not New, But a Worthy Challenge,” *American Educator* (Spring 2010): 17–18.

The many directions for change

There are a surprisingly large number of diffuse initiatives bundled under the call for 21st century reform. In times such as these, when the calls are for wholesale reform, it is not surprising that change initiatives span all aspects of the system. A first step in making sense of the breadth and interrelationships among these initiatives is to recognize that they function at different levels of generality and purpose.

Four operational components of an educational system

Popularly recommended initiatives are directed at changing the operations of the school system in four domains:

- **School and classroom practices** are the individual strategies and procedures and the comprehensive programs that teachers and administrators implement to achieve the desired outcomes. Practices define almost every aspect of what educators do in schools, including assessment (use of rubrics), instruction (use of advance organizers, use of textbooks), group work (use of think-pair-share or placemat strategies), school structures (flexible timetable) and grading policies (no penalty for late assignments, no letter grades before grade 4). Many of the proposed 21st century reform initiatives are aimed at school and classroom practices. These include the flipped classroom, problem-based learning, one-to-one mobile devices, open questions, and the use of interactive whiteboards. Their direct focus is on the particular actions and policies that teachers and principals implement in classrooms and schools.
- **Guiding principles** are the instrumental values that inform the practices that teachers, principals and other educators adopt. They are instrumental in that they are not the goals of education that we hope students will achieve, but instead identify the desired conditions that need to be created to enable students to achieve the desired goals. Student voice and choice, student engagement, authentic assessment and differentiated instruction are some of the principles associated with 21st century reform. As principles, they do not typically specify particular classroom strategies or school programs. In fact, educators may act on the same principle by adopting very different practices, even contradictory practices. For example, some teachers may promote student engagement by making assignments easier for students to complete; other teachers may make assignments more challenging to complete. Both practices are motivated by the principle of promoting student engagement. As we will see, the different direction that each of these practices takes is grounded in individual teachers' basic beliefs about students and about the nature of learning.

- **Educational goals** are the ultimate outcomes that we hope students will acquire from their education. The most discussed goals in the context of 21st century reform are various types of competencies, including digital literacy, social responsibility, critical thinking, creativity and innovation, and collaboration. Deep understanding and developing essential habits of mind or dispositions, such as curiosity, open-mindedness and flexibility, have also been mentioned. As was suggested earlier, some reformers advocate for an entirely new set of educational goals, whereas others recommend that current goals in education be revised or re-emphasized.
- **Foundational beliefs** are embedded assumptions or basic tenets held about teaching and learning. These form the core of one's philosophy or educational worldview. They are often broad generalizations or belief statements about the most basic elements of schooling. The foundational statements found in the literature on 21st century reform focus on various themes:
 - › *the nature of learners and learning*. Foundational beliefs of this type include: Students are inherently curious. Students need to be motivated to learn. Learning requires active participation.
 - › *the role of the teacher*. Foundational beliefs of this type include visions of the teacher as a mentor, guide, expert or facilitator of learning.
 - › *the nature of knowledge*. Foundational beliefs of this type include: Information is obsolete. Knowledge is changing at exponential rates.
 - › *the purpose of schooling*. Foundational beliefs of this type suggest: Schools should nurture the interests and needs of each child. Schools should give priority to the needs of society and business.

These core assumptions underpin almost every educational decision about what goals to pursue and what practices and principles to implement.

Targeting the most appropriate locus for intervention

One reason for distinguishing the various components is to ensure that change efforts target the most appropriate aspects of the system. For example, differing beliefs about the reasons for the perceived state of ill-prepared graduates will determine whether we revise our educational goals, adopt new principles of learning or institute specific teaching practices. Many initiatives that focus on particular classroom practices and principles don't have the desired effect because the root of the problem lies with questionable or incompatible foundational beliefs. For example, implementing student engagement may look very different depending on educators' beliefs about

the nature of learners. Educators who believe that students are inherently curious will try to fuel children's curiosity by creating a stimulating learning space, but will otherwise try to stay out of their way. Conversely, educators who presume that students are not inherently motivated to learn will pursue a more activist role. Awarding grades for extra work or using social media to arouse student interest may be among the practices that these educators might use. Recognizing the different levels of generality and purpose that various initiatives operate at helps us to identify the most suitable locus at which to direct our reform efforts.

Making sure our ducks are aligned

A second reason for distinguishing various components stems from the fact that schooling is an interactive system. Each of the parts must align with one another if the system is to be effective. For example, much of the pressure on ministries of education to change assessment practices or to reduce the amount of content in the curriculum is to ensure that these practices and goals do not undermine efforts to support inquiry learning and student engagement.

The interrelated balance needed among these four components is analogous to the core structures in a building. As the following diagram suggests, foundational beliefs are the platform upon which all other aspects of the building rest. The roof is the pinnacle of the building. Educationally speaking, it represents the goals we aspire to achieve. The guiding principles are the equivalent of the pillars or framing that are anchored to the foundation and reach up to the roof. They provide the supports that keep the building intact. Finally, school and classroom practices are the equivalent of wall coverings and sidings. They are the most visible aspects of a building and they

Structural components of a building with parallels to education



determine its “look and feel.” However, as with the façade of a building, they must be attached to the infrastructure; otherwise they will fall away or crumble.

Three potential pitfalls

The conundrum when confronted with so many different kinds of change initiatives is in figuring out which ones are most needed and in what combinations they should be implemented. What would a blueprint for change look like that included all the essential design features? Before outlining the three-pronged response that we propose in this book, let’s consider three pitfalls that educational leaders will want to avoid.

Quest for a silver bullet

One reaction to the call for reform has been what can be referred to as a quest for a silver bullet. This is an attempt to find one or a few core changes that will transform the system. In some respects, limiting focus to a handful of initiatives is highly commendable, since it increases the likelihood of a sustained effort that will be well understood by those who must implement these initiatives. The danger is that the particular initiative is seen as “the” response to 21st century reform—as though all the important shortcomings can be addressed by these few changes. In addition, this approach under-appreciates the interactive nature of the educational system. Or, to use the building metaphor, changes may introduce new elements without ensuring that they align with the other structural components of the system.

We can see the limitations of a singular response by considering one of the most popular recommendations, namely promoting a handful of new goals often referred to as 21st century competencies. These competencies typically include critical and creative thinking, collaboration and communication, including digital literacy. While we believe that efforts to promote these competencies are worthwhile and important, there are pitfalls that would result if this solitary initiative were to be implemented in isolation from the array of other components that must be accommodated to achieve systemic reform.

Even if educators successfully incorporate these competencies into their practice, unresolved 21st century challenges will remain. This emphasis on competencies seems to address the concern that graduates are ill-prepared for the world beyond school. But are we sure that this solution addresses this completely? Perhaps preparing graduates for a rapidly changing world has as much to do with instilling life-long habits of mind such as flexibility, curiosity and perseverance as it does with promoting a new set of abilities. As well, it leaves open the extent to which this initiative addresses the other major concern that we identified, namely lack of student engagement. Can we expect that students will actually benefit from the new emphasis on these competencies if many students

remain disengaged by schooling and seem largely motivated by doing things only for marks? At another level, the focus on competencies leaves open the implications for alignment with other aspects of the system. Historically, researchers have noted the prevalence of a didactic orientation to teaching in many secondary school classrooms.¹⁷ This deeply-rooted foundational belief may well be at odds with the vision of 21st century competencies. If this is the case, then changing the goals will have marginal impact unless teachers' philosophy of teaching and learning is more closely aligned with the conditions for competency development.

In short, the worries with a silver bullet approach are that one or two initiatives won't address all of the most important issues fuelling the call for reform, and that the interrelated nature of the educational system necessitates supporting any single initiative with complementary initiatives at various levels within the system.

A laundry list of changes

Another potential pitfall—one that is in some respects the opposite of the quest for a silver bullet—is the danger of proposing a long laundry list of changes. Rather than focus on a few initiatives, the tendency is to recommend what may be a grab bag of initiatives. This impression is created by some ministry policy documents and graphic representations of vision statements. To their credit, these lists acknowledge the multidimensional nature of the challenges by enumerating a host of changes ranging from foundational beliefs to pedagogical principles and goals, and individual practices. The danger, however, is their failure to articulate the connections among the changes proposed or appreciate the extent of missing or incongruent elements within their lists.

Consider, for example, the challenges that emerge when trying to reconcile two commonly cited initiatives: personalized learning and competencies. If personalized learning allows for significant student choice of topics delivered through non-traditional learning situations, how can educators ensure that students master all the competencies they need and not simply the few competencies that the students favour? As was suggested by the stories that opened this chapter, what other changes in the system are required in order to prepare students to make responsible, productive choices? Can we expect students to successfully navigate self-directed independent learning if they have not already developed an ability and inclination to effectively self-assess their learning on assigned tasks and to responsibly initiate remedial efforts without waiting for the teacher to prompt them?

In short, a laundry list approach may lack coherence. Individual initiatives must be supported with often unacknowledged, complementary initiatives at various levels of the system, and collectively, the initiatives must be brought into alignment.

¹⁷ The widely cited and extensive study of 1000 American classrooms by John Goodlad concluded that from the early grades school-based activities and environments condition students to reproduce what they are taught (p. 241) and not to use and evaluate information (p. 236). John Goodlad, *A Place Called School: Twentieth Anniversary Edition* (Whitby, ON: McGraw-Hill, 1984).

Rush to the practical

The final pitfall to consider is what we call the rush to the practical. The most visible elements of schooling are the practices—the activities, routines and procedures—that occur within the school and classroom. These are the equivalent of the paneling in a room or the exterior siding of a building. As soon as you approach the space, this is what you will notice.

Teaching practices are understandably the most pressing focus of teachers' attention—their survival depends on what they do and what they have their students do each day. It is therefore predictable that, when faced with calls for educational change, attention turns to what this means in terms of their practical implications. It is not that attention to practices is wrong-headed. Our concern is that the practices get “hollowed out”—they start off well-intended but often become cardboard versions of their original selves. In short, they get lost in translation.

A particularly alarming failure of an early widespread attempt to personalize learning was an attempt by a group of 3000 schools to introduce individual guided learning. Despite their efforts, researchers found that only 20 schools experienced a substantive change in teaching practices. Implementation in 99 per cent of the schools was at a superficial level that left untouched the core assumptions and habits that entrenched the old practices. Although the vast majority of the teachers espoused the language of individual guided education, their routines and arrangements were unchanged.¹⁸ Similar concerns have been expressed about the lack of impact of billions of dollars of spending on digital technologies. It has been reported that little has changed inside most classrooms. Instead of innovating, most teachers use technology “to sustain their existing practices and pedagogies.”¹⁹

More recently we have seen the hollowing out of various efforts to implement inquiry learning. Without a deep understanding of the principles and purposes of inquiry, this complex orientation to teaching and learning can be reduced to a five-step method for conducting independent research. Inquiry understood in this way is likely to have minimal impact: the difference may simply be that instead of using the textbook to find facts, students search for them on the internet. Properly understood, to inquire is to ask questions where the answers are not already known—requiring students to draw their own critical conclusions. This interpretation of inquiry need not involve formal steps to follow nor does it require sending students to the computer lab. In fact, inquiry can be conducted with and about the textbook. Only if teachers understand the principles behind inquiry will adopting this initiative make any real difference to student learning.

The worry with the rush to the practical, then, is that educators may be caught up in the procedures without thoroughly understanding the principles that should guide their use.

¹⁸ Cited in Jesse Goodman, “Change Without Difference: Schools Restructuring in Historical Perspective,” *Harvard Educational Review* 65 (Spring 1995): 3.

¹⁹ William Ferreter, “Preparing to Teach Digitally,” *Educational Leadership* 67, no. 8 (May 2010): 88.

Three promising directions

Answering the call for 21st century reform will require a sustained and coherent response that remains mindful of the big picture and takes the long view on educational change. Our focus in this book is less on recommending particular initiatives and more with articulating the constellation of broader kinds of goals, principles and foundational beliefs—and the practices that support them—that must anchor, orient and enrich whatever initiatives are chosen. Regardless of the particulars, we advocate for a three-pronged response: build on enriching the goals that we strive for, invigorate existing practices with powerful pedagogical principles, and instill thinking as the fundamental orientation to teaching and learning.

Pursue richer not new or higher results

In our view, preparing students for the 21st century is not a matter of getting more students to score in the upper percentiles on standardized tests. What most of these tests measure is not what will empower students in the ways needed. This is the reason that many educators and parents are calling for less reliance on these kinds of measures. Nor will instituting an entirely new set of topics or skills provide the preparation that our students require. There is no magic and revolutionary skill-set that will transform students. Students still need to be able to read, write and do mathematics. If not new or higher results, what is the solution?

The notion of richer results directs us to reinterpret the existing curricular goals—regardless of whether they are knowledge, skills or attitudes outcomes—in more authentic and robust ways. We believe that the emerging preference for the term “competencies” in place of “skills” is intended to signal a shift in emphasis from pen and paper to real-life abilities. For example, we are less satisfied in teaching students to solve word problems that include all the variables when these students are unable to then use these skills to solve more open-ended real-life mathematical problems that employ the same mathematical processes.

The same can be said of the shift in emphasis from talking about promoting knowledge to engendering deep understanding. Research suggests, for example, that a large proportion of university students who have passed examinations in physics are unable to provide credible explanations for simple real-world problems, such as which of two dropped balls, one heavier than the other, would hit the floor first. In explaining this anomaly between advanced study in a subject and lack of basic understanding, Nobel Prize-winning physicist Richard Feynman concludes: “After a lot of investigation, I finally figured out that the students had memorized everything, but that they didn’t know what anything meant. When they heard ‘light that is reflected from a medium with an index,’ they didn’t know that it meant a material such as water. They didn’t know that the ‘direction of the light’ is the direction in which you see something when you’re looking at it, and so on. Everything was entirely memorized, yet nothing had been translated into meaningful

words.”²⁰ In short, the issue is not that there is a new body of knowledge to master as much as we want students to understand the core areas of knowledge more thoroughly so that they can actually use them to inform their lives.

A similar point can be made about the teaching of attitudes. Flexibility, open-mindedness, perseverance and other such dispositions have been longstanding attitudinal goals prized by educators. Teachers exhort students to adopt these virtues and invite students to discuss their importance. However, it is one thing for students to espouse the virtues of open-mindedness but what really counts is that they live this out in their day-to-day lives. The problem is not with the attitudes that we seek to promote in schools, but that our efforts to nurture attitudes don’t consistently translate into commitments that characterize how students act.

Our analysis suggests that the failure to prepare students for the world may largely be because we have been interpreting and teaching the existing goals in ways that don’t lead to deep understanding, real-life competence and genuine commitment. The solution is not to change the curriculum radically—most of the essential goals already exist in curriculum documents. Our more pressing challenge is to reframe how we understand and promote the existing goals so that we produce richer results.

Invigorate rather than invent practices

The tendency in education when something isn’t working well is to replace it. Fortunately this is not the pattern in medical practice. Health practitioners are more likely to modify the dose or alter the regime before implementing a brand new treatment. The thinking in medicine is that the original treatment was adopted for a reason and a new regime may have more unintended negative consequences than the existing practices. Rather than quickly abandoning practices, medical professionals will first do what they can to make them work, before deciding that they must be dropped. The cumulative effect of this approach is growth in the collective wisdom of the profession by building on progressively refined practices.

Things are different in education. To use a cliché, the tendency here is to “throw the baby out with the bathwater.” We start anew when existing practices don’t achieve everything we want them to. Because there are only so many practices to draw upon, we revive old methods that have been revised and renamed, only to re-abandon them a few years later. The effect is not a progressively refined practice as much as it is a perpetually supplanted practice. Many educators recognize this as the proverbial educational bandwagon.

The power of principles to invigorate partially effective practices can be illustrated by a simple

²⁰ Richard Feynman, *Surely You’re Joking, Mr. Feynman* (New York: WW Norton, 1997), 212–213.

example of etiquette. “Be gracious and polite to others” is a social principle and “saying hello” is a practice. The practice of saying hello to people we greet is motivated by the value we attach to being gracious and polite. When a practice becomes a hollow ritual, it means the principle behind the practice has been lost. All of us can distinguish a perfunctory, often grumpy, greeting and a sincere, cheerfully delivered one. The solution is not to discourage the former person from saying hello but to help the person rediscover the missing or lost principles behind his or her practice.

Similarly in education, principles identify the features or values that guide the intended action. Practices that deviate from sound guiding principles are unlikely to produce a desirable result. Reconsider the example of letting students choose their electives or their learning activities. Students who choose easy courses or courses involving already covered material to secure higher marks miss the intention—which was to support students in pursuing areas of passion and in better meeting their educational needs. This failure is not an indictment of the practice of student choice per se, but of our lack of success at empowering students to make responsible and effective choices about their educational needs and at awakening students to potentially fruitful interests. In other words, how can we use these principles to guide teachers and students in implementing student choice?

We believe that many existing practices and the proposals for new practices will succeed only if they embody powerful principles of effective teaching and learning. Our reading of the literature on 21st century reform highlights five such principles that are widely mentioned and that address the key complaints that critics offer about the system:

- › engage students;
- › sustain inquiry;
- › nurture self-regulated learners;
- › create assessment-rich learning;
- › enhance learning through digital technology.

It is instructive that these five principles are also the core principles of digital game design. Designed around such principles, games such as *Minecraft* and *Angry Birds* have become the most popular games among young people. It has been claimed, for example, that, at its zenith, each day *Angry Birds* was played for 140,000 hours—the equivalent of 16 years each day. Coincidentally this is the length of time a youth spends in public school.

These five principles so powerfully embedded in the structure of successful digital games are not specific methods but guiding principles or essential features for virtually all effective learning. Later we look in depth at each of these principles, explaining what they mean, why they are important and how they can be embedded in teaching practices.



Lessons from *Angry Birds* about the principles of effective learning

Embedded in the structure of *Angry Birds* are five powerful features (guiding principles) that empower users to develop increasing proficiency at hitting their targets as they launch projectiles of various bird species.

First, the game **engages users**. Its appeal is rooted in the challenge it presents users to grow in their ability to achieve a complex task that they are freely willing to devote their time towards; it's not played because it is compulsory, but because it offers a challenge. The game presents a differentiated challenge to everyone who wishes to play, simply by mastering greater levels of difficulty.

Second, the game involves **continuous trial, diagnosis and proffered solutions**. By observing the tracking of the launched birds' trajectories, users can experiment with various strategies. Each new configuration and advanced level presents users with new challenges to figure out. In other words, it requires sustained inquiry by users in order to succeed.

Third, the game provides **timely and helpful feedback** on how to improve. In other words, it offers assessment-rich learning. Every launch of a bird is accompanied by an immediate indication of what works and what doesn't work. The tiered level of the game offers evidence of the greater skill users are able to demonstrate.

Fourth, the game requires and supports **self-regulated learning**. With timely feedback, students learn that they can't simply repeat what they've done before. Without adults standing over them explaining how the game is to be played and what to do to improve, students learn to take charge of their learning: they learn to use what they know and the data they receive to make thoughtful decisions about what's working and what's not, and why, and how to improve.

Fifth, the above conditions are possible and so effectively managed because the **technology enhances user ability** to do things that they could not otherwise do, or at least to do them more quickly and effectively. In other words, the game illustrates the potency of digitally-enhanced learning.

Instill thinking as the foundation to teaching and learning

Fundamental beliefs and assumptions are often the least visible but the most pervasive aspect of a classroom. No structure will stand without a solid foundation. It is our view that a “thinking classroom” ought to orient every activity in school if we are to realize the goals of 21st century reforms. It might seem rather simple-minded to suggest that thinking is foundational to schooling. After all, thinking is fundamental to being human so, of course, it is central to virtually everything we do, especially in intellectual endeavours such as schooling. Despite the obvious connection, it is not clear, however, that rigorous thinking permeates the practices in many classrooms.

One reason for this state of affairs is the widespread influence of Bloom's taxonomy as a basic tenet of teaching and learning. Popular interpretations of the taxonomy, which is the most widely known theory in education,²¹ has encouraged teachers to teach subject matter through direct transfer of information before asking students to think about the content. At least initially, students are simply asked to recall or summarize what they have been presented with. In addition, this theory fuels the belief that rigorous thinking is best reserved for more able students because of a presumption that mainstream or at-risk students who struggle with knowledge and comprehension tasks shouldn't be taxed with “higher order” tasks. In one case, a curriculum document for an applied history course replaced the higher order verbs found in the mainstream curriculum with lower order verbs. Thus, instead of being asked to assess, synthesize and apply,

21 Lee S. Shulman, “Making Differences: A Table of Learning,” *Change: The Magazine of Higher Learning* 34, 6 (2002): 36–44.

students in the applied course were asked merely to list, summarize and recall.²² The most recent version of this course expects applied students to learn to describe the big ideas whereas academic students are invited to analyze them.²³

The implications of a regurgitation mindset were brought home when working with a grade 7 class. I had challenged them to decide whether the 9/11 World Trade Center bombers were crazed martyrs or masterful strategists. Students were asked to use a briefing sheet on the topic to help them identify reasons for and against each conclusion and to record their ideas on a pro and con chart. Partway through, one student pointed to a passage in the briefing sheet and asked me “Where do I put this?” At first I didn’t understand what he meant. After some probing, I realized that his idea of reading for information was to identify key words that directly matched the question on the worksheet and to transfer the phrases to the suitable blank space on the student page. He did not understand that he was being asked to think for himself: to judge the relevance and implications of the information on the briefing sheet in order to arrive at his own conclusions about the issue. Apparently, thinking was not a regular expectation.

*One gains
knowledge
only through
thinking.
—Richard Paul²⁴*

Similarly, it is not at all clear that skill development is a “thinking” exercise in many classrooms. To make this point, consider two approaches to teaching the slap shot in hockey:

- ▶ **Rote practice:** Coaches show their players exactly how they should stand, hold their stick, shift their weight, swing back the stick and follow through. They practise identical actions exactly as instructed hundreds, if not thousands, of times until they master “the” way to execute a slap shot. The coach’s role throughout is to remind and correct the players’ technique whenever it deviates from the “correct” approach.
- ▶ **Thoughtful repetition:** Coaches introduce players to the principles of the slap shot and suggest various techniques. Players are expected to practise slap shots repeatedly. But instead of mimicking one prescribed way, they are asked to experiment and test out variations: to consider what happens if they bring their stick farther back; what they need to do to keep the puck on the ice or to lift it a few inches or a few feet; to see what difference it makes to approach the shot from a standing position or while skating; and so on. The coach’s role throughout is to suggest options, and to exhort players to refine or change techniques when the current one isn’t working.

²² Fabrizio Antonelli, *From Applied to Applause* (Toronto: Ontario Secondary Teachers’ Federation, 2004), 38. Available online.

²³ Ministry of Education, Province of Ontario, *The Ontario Curriculum Grades 9 and 10: Canada and World Studies* (Toronto: Queen’s Printer, 2013), 108–109, 126–127, www.edu.gov.on.ca/eng/curriculum/.../canworld910curr2013.pdf.

²⁴ Richard Paul, “The Logic of Creative and Critical Thinking,” in R. Paul, *Critical Thinking: How to Prepare Students for a Rapidly Changing World* (Santa Rosa, CA: Foundation for Critical Thinking, 1993), 277.

With rote practice, there is no real thinking—merely countless drills of the same gestures—whereas thoughtful repetition involves mindful repeated testing of options. Repetition and instruction are evident in both approaches. But how these are used differ significantly. With rote practice, players repeat an action time after time exactly as before without necessarily understanding why each gesture must be done as directed. The coach’s instructions are offered as prescriptions to follow verbatim. Within a thinking approach, instruction is intended to provide a platform from which players can explore options and variations. The repetition is thoughtful in that the players are imagining possibilities, observing the effects of each trial and making further critical adjustments as needed.

Many of us will recognize that the rote practice approach was how we learned many basic skills in school, from shooting a basketball to solving math problems. The presumption of thinking has not been present in many skills-based lessons. As one teacher recently recounted, she was taught to divide fractions by memorizing the phrase “Tis not for me to question why, just invert and multiply.”

The point that we want to make here and will extend in the next section is that beliefs about what students can be expected to do and how learning should best occur are powerful determinants of teaching practices. Despite the formal endorsement, thinking is not embedded as thoroughly into our teaching and learning practices as it should be.

Concluding thoughts

The daunting challenge facing educators is to make sense of the multitude of initiatives that fall under the banner of 21st century reform. While we may agree in general terms about the failings of our system, there is less consensus on the underlying causes and the most appropriate directions to take. To avoid the pitfalls that may hamper or derail reform efforts, we offer a three-pronged coherent response:

- ▶ **Establish a thinking orientation.** Because teachers’ educational worldviews determine virtually every decision they make, it is imperative that their foundational beliefs are compatible with and supportive of the directions of 21st century reform. An orientation that places thinking at the centre of all teaching and learning is foundational to all other changes. This is the focus of our discussion in Part One, “Reorient the foundations.”
- ▶ **Enrich our goals.** Current interest in educational reform is more profitably viewed as a call to rehabilitate classic goals and not an attempt to superimpose entirely new goals for schooling—many of the so-called 21st century goals have been longstanding educational

objectives. A global, digitally-connected world has changed the environment in which these classic goals must be nurtured and made them even more valuable. In Part Two, “Refocus the goals” we discuss what is involved in a more robust understanding of the three traditional goals that schools strive to achieve.

- ▶ **Invigorate our practices.** Rather than focus on a new array of practices, educators should ensure that existing practices support powerful principles of sound teaching and learning. We offer five principles that are especially relevant to the challenges presented by 21st century reform. In Part Three, “Align with guiding principles,” we explain these principles and show their potential to guide and invigorate teaching practices.

The book’s closing chapter in Part Four, “Support teacher growth,” suggests how educational leaders might conceptualize and plan to support teachers in this journey using a tiered approach: invite educators (1) to affirm those aspects of their teaching that support and advance the goals, principles, practices and foundational beliefs; (2) to refine those aspects of their teaching that can easily be modified to bring greater coherence; and (3) to aspire over time to tackling those more substantial changes that may take years to nurture.

Opportunities for leadership

Refine rather than replace

Before deciding to redirect efforts to introduce a new initiative, determine what aspects are working well and which could be improved with a few refinements. Then consider what more significant changes educators might aspire to bring about. Only then is it appropriate to consider which new initiatives might best serve these goals.

Anchor initiatives to guiding principles

When adopting a new initiative, formulate the principles that should guide how it is translated into classroom practice. For example, when implementing an initiative such as problem-based learning, educators might set the following principles to direct their efforts: make sure students are on board at every step of the way; let the project drive all of the learning, not just the final days of the unit; and check that the project actually supports the desired outcomes in a powerful, non-contrived manner.

Anticipate ambiguity

Recognize that educational initiatives are often wrapped in ambiguous language and vague directions. Rather than looking elsewhere for a definitive definition, seek to interpret the proposal in ways that align with the best of the beliefs and principles that lie at the core of one's teaching practices. This requires walking a fine line between simply making a pretense of changing one's practices and imposing an initiative that is inconsistent with the best of one's practices.