Introduction

The "Three Sisters": RTI, Technology, and Differentiation Are Changing the World of Teaching

"In a world changing drastically, what can we imagine our future to be?"

IMAGINING

The famed songwriter, and some would say philosopher, John Lennon once invited us to imagine a new world.

The civil rights leader, and many would say the stand-alone moral leader of the 20th century, Dr. Martin Luther King invited us to dream what might be, thereby providing us with a vision to guide human interaction—a vision of kindness, nonviolence, and understanding.

The great Mahatma Gandhi imagined a world in which political and economic justice would be achieved through nonviolence. He created that reality for the first time in history with the sheer power of his single-minded will.

And from a text sacred to Christians, Jews, and Moslems alike, we read, "God said, 'Let there be light!' And there was light."

These examples show the amazing power of imagination. The power of thought is fundamental to the Jewish, Christian, and Islamic traditions, in that God's imaginings—his very words—created our world and breathed life into our species. Each of the men mentioned knew and deeply understood that singular fact, as shown in the amazing power of their dreams, their imaginings. Human thought, imagining, is a profound creative power of will; it can and frequently does change the world. If the pen is indeed mightier than the sword, then the power that drives the pen—the power of the mind, the power of imagination—is the most profound power of all. Imagining is the most influential creative force in our universe.

As parents and educators concerned with our schools in the early decades of the 21st century, we might use that creative power to imagine into existence an education for our children. If our world is already in transition, as we believe it to be, then we should, we must, use our imagination to guide that transition, that teaching revolution. At the very least, these thoughts might provide us the freedom to ask some profound questions about teaching and learning in the 21st century, such as,

"How do we want our children to experience learning?"

"How are our children experiencing learning in the midst of the current digital communications revolution?"

"What can we imagine schools of the future to be?"

"What might schools become if we free ourselves from all the trappings, practices, and disappointments of today and truly imagine infinite possibilities for our students in the 21st century?"

OUR IMAGININGS

Here are a few initial thoughts—our imaginings, if you will—on education, teaching, and learning in the 21st century.

- Imagine freedom to learn any time and anywhere.
- Imagine an empowering curriculum that all students find worthy and actually want to study.
- Imagine teaching without whole-group lesson plans or unit-based instruction.
- Imagine collaborative, real-world projects as the basis for all or most of the school curriculum, thus harnessing the cognitive power of students everywhere to solve problems in society.
- Imagine all learning as project-based learning, rooted in real-world problems and engaged in a never-ending search for real-world solutions.
- Imagine the power of using student preferences, student voice, and student choice—and not textbooks or curricular standards—as our primary guide to what we teach.
- Imagine formative assessment processes designed to spot and respond to specific learning problems almost immediately, as students experience them.
- Imagine using technology as the primary engine for, and basis of, the freedom to learn.
- Imagine teachers as supportive facilitators of learning, not as class leaders or group policemen.
- Imagine a teaching/learning process that is immediately responsive to the academic and behavioral needs of every individual student.

- Imagine a wired digital classroom; smartphones, or laptops on every child's desk, as well as one at home, used constantly by students to engage in high-quality learning activities.
- Imagine immediate and complete interconnectivity in the digital world, controlled and mediated by the mind, not a keyboard.
- Imagine the Internet, organized appropriately to serve as both the curriculum and the assessments for our students.
- Imagine students educated to use such a learning system, carefully separating the gems from the meaningless fluff—the wheat from the chaff—along the information superhighway.
- Imagine students taught in such a way that they consider learning fun.
- Imagine students receiving exactly the instruction they need, given their learning approaches and preferences, not merely instruction delivered to whole groups of students who happen to be the same age.
- Imagine a curriculum wholly created in the 21st century, for the 21st century.
- Imagine a world where "political correctness" or any other attempt to limit thought (e.g., burn books, identify or limit hate speech) is viewed as a distorted misunderstanding. In that imagined world, all ideas are free to stand or fall on their own merits.
- Imagine students who are able to tell the difference between fact and opinion, or between informational stories and today's "media opinion" shows or comedy shows that masquerade as news.
- Imagine all assessment as dynamic, authentic assessment rooted in projects that lead to creative answers for real problems in society. Why should we waste the profound collective energy of learning by millions of students on "made up" problems? Can't we learn to let students work and solve real problems?

Given this rather broad list of imaginings, we can make a few initial observations. First, these are merely the rambling thoughts of two educators who have collectively participated for many decades in the educational system and have, for years, reflectively questioned that system. We freely acknowledge that other educators, while perhaps sharing some of these thoughts, would certainly have other imaginings; of course, we cannot know what those might be. Given that rather profound limitation, we do invite them to communicate directly with us or others about these thoughts and ideas. In fact, we would love nothing better than for this book to start a dialogue of imaginings on what schools need to be. Let the creative dialogue begin!

Next, in looking over the imaginings, we observe that some of these are now underway, while others seem merely distant dreams. Several of

these ideas represent factors that are already at work in the marketplace (i.e., social-networking interconnectivity, or a computer on every desk, at least in some schools) and only remain unrealized in all of our classrooms because of limited budgets and, perhaps, a lack of imagination in our politicians—perhaps (dare we say it?) even in our educators.

Next, we put these imaginings down with no distinct priority but rather as a catalyst for our own thoughts. In fact, some of these seem to be directly contradictory to others. For example, how can topical studies be driven exclusively by student preference or choice? Perhaps this might lead to seeking one or more guiding principles that might govern these imaginings. If so, then what should be the driving force or guiding principles in seeking to conceptualize and perhaps enact this list of imaginings? Should there even be such guiding principles?

THE TEACHING REVOLUTION

We cannot now see the ultimate value of these imaginings, and we know not what power they may have. While some may see that as "overhyped," we believe these imaginings are quite justified, given the transformation of instruction that has, in some locales, already begun, as well as the fundamental communications changes in our digital world that are impacting and will continue to impact teaching in a profound way. In short, a drastic change is coming in the very structure of our teaching/learning process that is likely to dramatically alter the very look and feel of our classrooms and ultimately of our entire educational system. Many have already commented on this imminent change (East, 2006; Kay, 2010; Partnership for 21st Century Skills, 2009a; Tomlinson, 2010; Wilmarth, 2010). The coming changes in instruction are so profound that many of today's teachers, students, and parents might not recognize the learning environments only a decade from now.

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As one example, the Partnership for 21st Century Skills, an advocacy group promoting modernization and full implementation of technology in every aspect of our schools, has recently encouraged a refocusing of our educational institutions to adequately address skills for the next century. Such content as technology skills, use of the new "mobility technologies," digital media skills, content creation, and interpretation skills, along with many other informational skills that will be critical in the digital world of tomorrow, must be more heavily emphasized in our classrooms today (see www.p21.org).

However, this group advocates more than merely adding these skills to our curriculum; rather, the very structure of knowledge is likely to change as production of new knowledge becomes based on social networking and actual creation of knowledge by students, as opposed to using these new technologies merely to make information available to students (Kay, 2010; Wilmarth, 2010). When that transition takes place—a transition that many see as imminent—our current instructional practices will seem as dated as required courses in blacksmithing. In 2010, as this book was in preparation, an emphasis on these skills did not characterize most classrooms (Kay, 2010). However, the change is coming (Partnership for 21st Century Skills, 2007, 2009a, 2009b), a fundamental transformation of education, involving everything from the design of our schools to the constant use of technology, into something that more closely resembles the productive environments that now characterize our businesses in the modern world.

More so than technology, however, other changes are dramatically restructuring our classrooms. Response to intervention (RTI) is another change in instructional procedure that is currently impacting our students and will soon impact all teachers across the grade levels (Bender, 2009a; East, 2006). The importance of this instructional paradigm has grown far beyond its roots in special education eligibility discussions, and the impact of RTI in classrooms today cannot be overemphasized. Elementary classrooms around the nation are functioning very differently today than did the same classrooms in 2005 or 2007, as a result of the implementation of RTI (Bender, 2009a). As this book goes to press, middle and high schools are exploring the same profound change.

Finally, the concept of instructional differentiation (Tomlinson, 1999, 2010), an idea that has guided our instructional endeavors for a decade, has now matured, leaving its roots in multiple intelligences theory far behind and transforming into a new instructional model for classrooms at all grade levels (Bender & Waller, 2011; Tomlinson, 2010; Tomlinson & McTighe, 2006). Because of the nationwide implementation of differentiated instruction, whole-class instruction, that icon of teaching for nearly fifty years, is likely to either significantly decrease or simply come to an end across the grade levels (Bender & Waller, 2011). It will be replaced, in large measure, by differentiated instruction framed in learning centers or by using other differentiated instructional models such as project-based learning, creation of knowledge through social-network-based digital environments, or cooperative instructional practices. Perhaps most instruction will ultimately be computer or web based, facilitated but not led by the teacher. Such instruction promises to be not only effective but also much more individualistic. Student voice and student choice will play a much larger role in what is studied and learned.

Of course, today's digital communications media, by and large, did not exist when Tomlinson published her initial work on differentiation in 1999, and that demands the following question: What opportunities do

modern digital and social-networking media such as *MySpace*, *Facebook*, or *Twitter* hold for differentiated instruction? As this book was written (late 2010 through February 2011), the whole world witnessed a never-before-seen lesson on the impact of online social networking. An actual revolution, the "Twitter Revolution," took place in the streets in Egypt in February of 2011, leading to the downfall of the head of the government, largely resulting from the amazing power of digital communications media—communications media that only seven years ago did not exist.

The sheer power of the social-networking, digital media phenomenon has surprised nearly everyone, and given technology today, it is hard to imagine where differentiated instruction—coupled with these technology-based digital tools, computerized learning environments, or totally individualized, web-based curricula—can ultimately lead. Most proponents of technology describe these developments as an extremely fast train, increasing in speed exponentially and heading into what is now termed the *singularity*. The singularity is defined as the moment when technological change becomes so rapid and so profound that it causes a fundamental rupture in the fabric of human history (Grossman, 2011). At the singularity, technology embedded within artificial intelligence, coupled with today's automated manufacturing power, makes human beings both unnecessary and, some might say, obsolete.

The singularity might also be seen as the moment in time when artificial intelligence overtakes and surpasses the brainpower of all human beings worldwide, and the growth curve in a variety of technological fields suggests this may happen sometime between 2020 and 2045 (Grossman, 2011). Some scientists are seriously discussing the migration of the human mind into software at the point of what, in the 20th and early 21st centuries, was called *death*. Those scientists predict virtual immortality as individual human beings outlive their bodies and continue to live and thrive in the form of complex software programs. Others who study the singularity suggest that combinations of nanotechnology and bioengineering may preclude human "death" entirely, making these speculations about "human personality" software moot. Further, data from those fields, once again, suggest a technology growth curve and time frame for reaching the singularity in 2045 (Grossman, 2011). These discussions, from serious scientists, remind one of the computer known as *Hal* in the famed movie *2001: A Space Odyssey* (1968) overtaking human decision making and ultimately controlling human destiny—a *Hal* on steroids, if you will! As educators, we must ask, what does the teaching/learning process look like as we approach the singularity? With nanotechnology leading to computers much smaller than the eye can see, and those computers eventually embedded literally within the human brain, our Internet and social-networking interface will be both seamless and instantaneous at the singularity. What does learning look like in that world, when all access to all digitally recorded human knowledge is immediately accessible to everyone?

Lest anyone suggest that the singularity is pure science fiction, we should point out that the singularity was originally identified at a NASA symposium as early as 1993, and today, the Singularity University, with a very impressive faculty, offers a series of graduate study programs for a highly selective group of future leaders (Grossman, 2011). The university's summer program in 2011 will be hosted at the NASA Ames Research Park, in the heart of Silicon Valley. In short, these are highly talented, highly skilled scientists and leaders in the technology industries holding serious discussions on the future of technology and humanity.

Again, what does this mean in classrooms next year or the year after, or perhaps five years from now? How will teaching and learning be transformed within the next two, five, or ten years? Educators must consider these drastic technology changes—and perhaps even this approach to singularity—and what they might mean for the classrooms of this and the next decade. If we do not undertake these discussions now, we risk becoming increasingly irrelevant in the world of today's "wired" generation. While there is little consensus on the singularity, and even less agreement on the other rather dramatic, futuristic propositions, there is one point that all advocates of technology in the classroom do agree on: Our current instructional procedures are clearly and woefully inadequate in preparing our students for the 21st century (Dretzin, 2011; Kay, 2010; Partnership for 21st Century Skills, 2009a, 2009b; Wilmarth, 2010). We must, as responsible educators, ask, "In order to do our best for our students, where do we go from here?"

In this book, we have chosen to consider most of the possibilities—the imaginings already mentioned—within an overall educational structure that is rooted in these three dynamic changes in education: the infusion of modern technology into our classes, RTI, and differentiated instruction. We believe that fundamental transition in both our society and our classrooms is already underway as a result of these changes, and we have chosen to structure this book based on these factors. Initially, three innovations in instruction—the three sisters—will be described as the basis for the coming dramatic change in the teaching/learning process. While RTI and increased use of technology are relatively recent changes, the shift to highly differentiated instruction, we believe, provides a fertile basis for the other two. Each of these, by itself, represents a rather profound change in the dynamics of the classroom, and the combined impact is likely to be a *dynamic synthesis* of innovation that is transitional in nature, providing a second-order change in instructional technique within the classrooms of the future.

Three innovations in instruction—the three sisters—provide the basis for the coming dynamic change: RTI, communications technologies, and the shift to highly differentiated instruction.

However, this coming revolution is an example in which *the whole is greater than the sum of the parts.* The synthesis is dynamic in that the symbiosis of these rather dramatic changes extends and multiplies their overall individual impact in such a way that these innovations will soon create a catalyst for dramatic reformation in teaching. Thus, we believe, as do many others, that a revolution in our teaching/learning structures is coming and that some of the imaginings may come to fruition sooner rather than later.

In developing various books over the last decade, we became cognizant of a "dynamic" shift that is currently underway—a critical mass for change in our teaching/learning structures—which we believe is founded, primarily, in these three areas. Our effort here is not intended to provide an extensive premier of these changes in teaching and learning but rather to introduce each of these briefly in an effort to show how these innovations are dramatically, and collectively, impacting classrooms today.

After describing the "imaginings" wrought by these changes—changes that are already underway—we will go further, speculating on how these changes may drive education over the next decades. We hold absolutely nothing sacred in our current educational practices—to do so would be a disservice to our imaginings. But we will track our discussion logically with guidelines and suggestions for using the emerging communications technologies based on what innovative educators are already doing, as well as current curricula standards, innovation in brain-compatible instructional practices, the nature and context of meaningful change in education, and the fundamental question of what is important to learn in and for a 21st-century world.

At the very least, this promises to be an exciting, if not profound, intellectual endeavor, and we invite our readers to come along. Let the journey begin!

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