Seton Hall University Libraries

WARNING CONCERNING COPYRIGHT RESTRICTIONS

The information stored in the Electronic Reserve system is protected under the Copyright Laws of the United States (Title 17 U.S. Code) governing the making of photocopies of copyrighted material. While the provisions of "fair-use" apply, the person using the system is liable for any infringement of copyright.

Opening this Electronic Reserve document indicates that you accept these copyright restrictions.
K-12 COMPREHENSIVE DOCTORAL EXAMINATION

ELMP K-12 DOCTORAL PROGRAM

FALL 2010

EXAM DATE: NOVEMBER 5, 2010

Directions

Attached please find the K-12 Comprehensive Exam. The exam is divided into two main parts. In Part I, you are offered three questions and asked to answer two. In Part II, you are required to answer one Research question and all Statistics questions. Please indicate on each question answered, the number and title of the question (i.e. Question 2—Leadership, etc.)

• Before you begin, create a header for each page with your student ID number (found on the label of this envelope), the name of the exam you are taking (Comp K12) and today’s date.

• When you complete a section, insert a page break before starting the next section.

In developing your responses, be sure to organize them in a logically coherent way and to make optimal use of relevant/current research and literature applicable to each question.

Part I

Choose Two of Three Questions

1. Organization
2. Leadership
3. Curriculum

Part II

Answer Research and Statistics

4. Research – Answer one question
5. Statistics – Answer ALL questions
PART I

K-12 COMPREHENSIVE EXAM

Choose two of three questions from the subject areas below:

1. Organization
2. Leadership
3. Curriculum
K-12 COMPREHENSIVE EXAMINATION

PART I

1. ORGANIZATION

ORGANIZATIONAL STRUCTURES EXAM QUESTION

Respond to the dilemma indicated below in terms of demonstrating your knowledge, comprehension, application, synthesis and evaluation of organizational theory and practice. Remember to support your analysis with the appropriate research and theoretical references.

Scenario: You are the Principal of a troubled school in terms of student academic achievement. The problems are particularly troubling at the middle grade level. In fact, they have recently become so problematic, that there have been two parental-led demonstrations, demanding a response to the consistent poor performance by the middle grade students in their reading and math scores. To further complicate the situation, one of the middle grade classes out performs all the other grades in both reading and math, at significant levels. Parents are waiting for your response.
LEADERSHIP EXAM QUESTION

You are asked to prepare a critique of the following Educational Leadership professional journal article, “Teaching for the 21st Century - What Would Socrates Say?” In so doing, be certain to include in your discussion the relationship of this article to current literature and related research on this topic. It is also important to employ the higher order thinking skills of analysis, synthesis and evaluation in writing your critique.
Teaching for the 21st Century

What Would Socrates Say?
Peter W. Cookson Jr.

When technology pairs up with Socratic inquiry, students have an opportunity to start a purposeful conversation—with the world.

My greatest fear about 21st century education is that Socrates' humility will be turned on its head. The noted philosopher once said, "I know nothing except the fact of my ignorance." My fear is that instead of knowing nothing except the fact of our own ignorance, we will know everything except the fact of our own ignorance. Google has given us the world at our fingertips, but speed and ubiquity are not the same as actually knowing something.

Think of learning as a continuum of cognitive and expressive experiences that range from gathering data for the purpose of understanding the world; to organizing data into useful and coherent informational patterns; to applying information to real questions and problems and, in the process, creating knowledge; to developing wisdom that offers the hope of transcendent unity. As our minds travel along this learning continuum, our understanding and depth of awareness grow, reshape themselves, and continue to evolve. At the same time, the great unexpected disrupters—imagination, spontaneity, and
revelation—enable us to see the world differently and change it.

Socrates believed that we learn best by asking essential questions and testing tentative answers against reason and fact in a continual and virtuous circle of honest debate. We need to approach the contemporary knowledge explosion and the technologies propelling this new enlightenment in just that manner. Otherwise, the great knowledge and communication tsunami of the 21st century may drown us in a sea of trivia instead of lifting us up on a rising tide of possibility and promise.

Two Opposing Camps
Some advocates believe we can Google, blog, Skype, and Twitter our way to enlightenment. They assume that disorganized, radically democratized data lead to useful information and thus to real knowledge through some process of collective, randomized, constant connectivity. This argument rests on the premise that we learn best through data collection without the burdens of judgment and discernment. From an epistemological point of view, this is a highly questionable hypothesis. Learning requires stable, flexible cognitive frameworks and consistent forms of adaptive assessment.

In opposition are the skeptics, such as Mark Bauerlein, who argues in his book *The Dumbest Generation* (Penguin, 2008) that this incessant communication is really a complex manifestation of miscommunication that does not lead to intellectual growth, but rather to a stunting of genuine intellectual development. The Internet culture facilitates a kind of solipsistic, permanent adolescence that is profoundly anti-intellectual. A quick walk through the cultural landscape of the Internet suggests that "being online" can contribute to hyperindividualism and a sense of unearned celebrity, not to mention occasional weirdness.

The inventive curve of new technologies is so steep that the Internet culture will undoubtedly become more ubiquitous and
communicatively dense as it continues to challenge the intellectual and academic culture that has come down to us from the European Enlightenment and the Industrial Revolution, both of which convinced us that we can make a better world through creating knowledge and applying it to human needs. This process requires literacy, a personal and communal discipline that appears to be in decline. As fewer of us are reading books, more of us are surfing the Web for fragments of thought. The collapse of the conventional newspaper business is perhaps an early warning sign of what is to come in the next 5 to 10 years.

*Human society has experienced three profound social, economic, and cultural transformations—the agrarian revolution, the Industrial Revolution, and now the electronic revolution. We need to be on the right side of history if we are to survive and thrive. If we harness them correctly, we can blend the best of our traditional intellectual linear culture—Socrates’ wisdom of the 5th century BCE—with the current digital culture, creating a new learning and intellectual environment consistent with the cognitive and expressive demands of the 21st century.*

The 21st Century Mind

*A child born today could live into the 22nd century. It’s difficult to imagine all that could transpire between now and then. One thing does seem apparent: Technical fixes to our outdated educational system are likely to be inadequate. We need to adapt to a rapidly changing world.*

The 21st century mind will need to successfully manage the complexity and diversity of our world by becoming more fluid, more flexible, more focused on reality, and radically more innovative. Four elements of the 21st century mind could be the basis of a new approach to education.

Critical Reflection

*Every day we are exposed to huge amounts of information, disinformation, and just plain nonsense. The ability to distinguish fact from factoid, reality from fiction, and truth from
lies is not a "nice to have" but a "must have" in a world flooded with so much propaganda and spin.

Human beings already are prone to think in magical terms; our media-driven social environment has intensified this tendency to live in imaginary worlds. The celebrity cult replaces real heroes with made-up ones, much to the detriment of children's mental health. Tragically, far too many young people experience this manufactured culture as though it were real.

Critical reflection enables us to see the world from multiple points of view and imagine alternate outcomes. For example, for many years, the dominant U.S. culture described the settling of the American West as a natural extension of manifest destiny, in which people of European descent were "destined" to occupy the lands of the indigenous people. This idea was, and for some still is, one of our most enduring and dangerous collective fabrications because it glosses over human rights and skirts the issue of responsibility. Without critical reflection, we will continually fall victim to such notions.

Empirical Reasoning
A second element of the 21st century mind that we must cultivate is the willingness to abandon supernatural explanations for naturally occurring events. Floods, famines, and human misfortune have often been attributed to angry gods, fate, and fantastic cosmologies that externalize our locus of control, making us perpetual victims who must please the gods or fate to survive. These non-empirical "theories of everything" require us to suspend reason, fact, and logic. Although we can appreciate these worldviews for their aesthetic and poetic beauty, they are a poor foundation for problem solving. We can overcome our ignorance not with wishful thinking, but with testable hypotheses using observable data.

Thinking empirically is a form of social responsibility. The methods of science offer us a way of thinking that is a strong framework for a healthy and viable approach to problem solving and living together peacefully.
Collective Intelligence

The third element of the 21st century mind must be the recognition and acceptance of our shared evolutionary collective intelligence. Many people believe that education is a personal rather than a collective possession. Echoing our culture of possessive individualism, education has taken on the role of dispensing "cultural capital" to individuals on the basis of a merit system that is a camouflaged proxy for social class and social position.

Yet even a moment's reflection tells us that all knowledge is social. None of us are educational islands unto ourselves. There is a great deal of talk about teamwork today; the real basis of teamwork is the willingness to think collectively to solve common problems. Think of a team of astronauts in a space shuttle: No one astronaut, no matter how highly trained, can master the complexities of maneuvering a spacecraft alone. It requires a team on the ground and a team in space to overcome the technical and scientific complexities of exploring space, thus enlarging our understanding of the universe.

Metacognition

To solve the 21st century's challenges, we will need an education system that doesn't focus on memorization, but rather on promoting those metacognitive skills that enable us to monitor our own learning and make changes in our approach if we perceive that our learning is not going well.

Metacognition is a fancy word for a higher-order learning process that most of us use every day to solve thousands of problems and challenges. When we think about thinking, we turn our mental pictures around ever so slowly to view them from different angles. Imagine yourself as a landscape painter. How do you decide on your angle of vision, on your perspective, or on your color palette? We do this type of decision making in a seamless cycle of rethinking and reshaping our internal imagery.

As the challenges facing the globe become increasingly
complex, our frames of reference must be flexible, expansive, and adaptive. Consider the world water crisis: Thousands of people—mostly children—die every day from diseases caused by a lack of clean fresh water. Today, roughly 30 countries experience water stress or scarcity. By the year 2025, that number will be 56, meaning that 817 million people will be without adequate fresh water. Solving this crisis requires using multiple frames of reference and diverse methods of analysis that include geology, hydrology, economics, sociology, cultural history, politics, and law. By looking at a challenge from multiple points of view, we are more likely to arrive at a realistic, effective solution.

Learning in the Electronic Age

We are at the threshold of a worldwide revolution in learning. Just as the Berlin Wall fell in 1989, the wall of conventional schooling is collapsing before our eyes. A new electronic learning environment is replacing the linear, text-bound culture of conventional schools. This will be the proving ground of the 21st century mind.

In the age of print, people thought of knowledge as fixed and hierarchical, something that only great minds could change in a slow process of discovery. Not so in the age of electronic learning, where knowledge creation is fluid, fast, and far more democratic. The linear literacy of the age of print gave birth to the concept of accumulating knowledge systematically in archives, libraries, and databases. The age of electronic learning calls out for an updated approach. We need virtual libraries that host genuine knowledge and that enable learners of all ages to interact with one another in knowledge creation, as they currently do on Wikipedia.

In a 2008 issue of the Harvard Business Review, Bala lyer and Thomas H. Davenport published a provocative article that outlined Google's business strategy: Practice strategic patience, rule your own ecosystem, exercise architectural control, build innovation into organizational design, support inspiration with data, and create a culture "built to build." This
approach of continual innovation supports Google's mission "to organize the world's information and make it universally accessible and useful."

Today, we use Google to obtain information. Imagine being able to access organized learning in the same manner. In a concept I call the *LearningSphere*, a free and open-source Web-based portal and platform would enable learners to access organized inquiry, demanding courses of study, and communication capacities that would join people all over the world in mutual discovery.

Evolving technologies are making this concept more plausible. In a recent article, Gerald Huff and Bror Saxberg (2009) describe what they call a "full immersion" learning experience. Instead of thinking about the new learning and communication technologies as "technology," they suggest that in the future we will incorporate a whole array of technological options into how, when, and where we learn. We will cease to think of technology as something that has its own identity, but rather as an extension of our minds, in much the same way that books extend our minds without a lot of fanfare. According to Huff and Saxberg, immersive technologies—such as multitouch displays; telepresence (an immersive meeting experience that offers high video and audio clarity); 3-D environments; collaborative filtering (which can produce recommendations by comparing the similarity between your preferences and those of other people); natural language processing; intelligent software; and simulations—will transform teaching and learning by 2025.

**Technology Meets Socratic Inquiry**

In addition to having free access to knowledge and using immersive technologies, we also need a method of systematically applying knowledge to real-world challenges. Here’s where Socrates can help. He believed that learning came from within and that the best and most lasting way to bring latent knowledge to awareness was through the process of continual questioning and unconventional inquiry. For Socrates, answers were always steps on the way to deeper questions.
So imagine that a group of teachers and middle school students decides to tackle the question, What is justice? Young adolescents' discovery of injustice in the world is a crucial moment in their development. If adults offer only self-serving answers to this question, students can become cynical or despairing. But if adults treat the problem of injustice truthfully and openly, hope can emerge and grow strong over time.

As part of their discussion, let's say that the teachers and students have cocreated a middle school earth science curriculum titled Water for the World. This curriculum would be a blend of classroom, community, and online activities. Several nongovernmental organizations—such as Waterkeeper, the Earth Institute at Columbia University, and Water for People—might support the curriculum, which would meet national and state standards and include lessons, activities, games, quizzes, student-created portfolios, and learning benchmarks.

The goal of the curriculum would be to enable students from around the world to work together to address the water crisis in a concrete way. Students might help bore a freshwater well, propose a low-cost way of preventing groundwater pollution, or develop a local water treatment technique. Students and teachers would collaborate by talking with one another through Skype and posting research findings using collaborative filtering. Students would create simulations and games and use multitouch displays to demonstrate step-by-step how their projects would proceed. A student-created Web site would include a blog; a virtual reference room; a teachers' corner; a virtual living room where learners communicate with one another in all languages through natural language processing; and 3-D images of wells being bored in Africa, Mexico, and Texas.

In a classroom like this, something educationally revolutionary would happen: Students and adults would connect in a global, purposeful conversation that would make the world a better place. We would pry the Socratic dialogue from the hands of the past and lift it into the future to serve the hopes and dreams of all students everywhere.
The Future Is Here—Almost

Some of what constitutes this new approach to learning is already underway. Teachers and students already use the Web to create lessons, communicate, and share with others across the globe. Schools have Web-based curriculums, and many people already use Web 2.0 technology to reach thousands, if not millions, of learners.

But a model like the LearningSphere would add another dimension. Learning would take place both in and out of school. Teachers would no longer manage learning through the rigid enforcement of rote learning but would learn alongside their students, creatively adapting curriculum to their students' needs. Like any creative effort, this collective journey would include errors, lack of good information, and false starts—a process of which Socrates would approve. Because teachers are knowledgeable about the learning process, they could serve as capable guides for their students, all the while promoting the requisite 21st century thinking skills of critical reflection, empirical reasoning, collective intelligence, and metacognition.

Organizing this new learning model is the work of the 21st century. Just as the industrial age developed a particular form of organizational life, the electronic age is developing models of organizational life that are more atomic in their structure than they are brick and mortar. When Einstein shocked the world by suggesting that energy equals mass multiplied by the speed of light squared, he gave us a new way to think about our world.

There has never been a time in human history when the opportunity to create universally accessible knowledge has been more of a reality. And there has never been a time when education has meant more in terms of human survival and happiness.

What Would Socrates Do?

At the beginning of the 20th century, the world's population was 1.6 billion; at the beginning of the 21st century, it is roughly 6.6 billion. To meet the education needs of this rising tide of
humanity, we must think outside the box of conventional schooling.

To start, we must overhaul and redesign the current school system. We face this great transition with both hands tied behind our collective backs if we continue to pour money, time, and effort into an outdated system of education. Mass education belongs in the era of massive armies, massive industrial complexes, and massive attempts at social control. We have lost much talent since the 19th century by enforcing stifling education routines in the name of efficiency. Current high school dropout rates clearly indicate that our standardized testing regime and outdated curriculums are wasting the potential of our youth.

If we stop thinking of schools as buildings and start thinking of learning as occurring in many different places, we will free ourselves from the conventional education model that still dominates our thinking. Socrates did not teach in a conventional classroom; his classroom was wherever he and his students found themselves. His was the first "personal learning network," and he taught with the most enduring teaching tool of all time—the purposeful conversation. He called himself a citizen of the world because the questions he asked were universal.

Even though Socrates was a philosopher, he did not hide in an ivory tower. He used knowledge to challenge the status quo. I think Socrates would embrace the new learning era with all the energy he had. We need that same embrace today to move beyond the false dichotomies and empty arguments of our tired education disagreements and to joyously engage with the future.

References


Peter W. Cookson Jr. holds the Katsuyo Miho Scholarship in Peacemaking at Yale Divinity School. He is the author of Sacred Trust: An Education Bill of Rights (Corwin, forthcoming) and a board member of the Partnership for 21st Century Skills; peter.cookson@yale.edu.
K-12 COMPREHENSIVE EXAMINATION

PART I (Con’t)

3. CURRICULUM

CURRICULUM EXAM QUESTION

You are asked to prepare a critique of the following Educational Leadership professional journal article, “Teaching for the 21st Century - 21st Century Skills: The Challenges Ahead”. In so doing, be certain to include in your discussion the relationship of this article to current literature and related research on this topic. It is also important to employ the higher order thinking skills of analysis, synthesis and evaluation in writing your critique.
September 2009 | Volume 67 | Number 1
Teaching for the 21st Century

21st Century Skills: The Challenges Ahead
Andrew J. Rotherham and Daniel Willingham

To work, the 21st century skills movement will require keen attention to curriculum, teacher quality, and assessment.

A growing number of business leaders, politicians, and educators are united around the idea that students need "21st century skills" to be successful today. It's exciting to believe that we live in times that are so revolutionary that they demand new and different abilities. But in fact, the skills students need in the 21st century are not new.

Critical thinking and problem solving, for example, have been components of human progress throughout history, from the development of early tools, to agricultural advancements, to the invention of vaccines, to land and sea exploration. Such skills as information literacy and global awareness are not new, at least not among the elites in different societies. The need for mastery of different kinds of knowledge, ranging from facts to complex analysis? Not new either. In The Republic, Plato wrote about four distinct levels of intellect. Perhaps at the time, these
were considered "3rd century BCE skills"?

What's actually new is the extent to which changes in our economy and the world mean that collective and individual success depends on having such skills. Many U.S. students are taught these skills—those who are fortunate enough to attend highly effective schools or at least encounter great teachers—but it's a matter of chance rather than the deliberate design of our school system. Today we cannot afford a system in which receiving a high-quality education is akin to a game of bingo. If we are to have a more equitable and effective public education system, skills that have been the province of the few must become universal.

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 those 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.

What Will It Take?

The history of U.S. education reform should greatly concern everyone who wants schools to do a better job of teaching students to think. Many reform efforts, from reducing class size to improving reading instruction, have devolved into fads or been implemented with weak fidelity to their core intent. The 21st century skills movement faces the same risk.

To complicate the challenge, some of the rhetoric we have heard surrounding this movement suggests that with so much new knowledge being created, content no longer matters; that ways of knowing information are now much more important than information itself. Such notions contradict what we know about teaching and learning and raise concerns that the 21st century skills movement will end up being a weak intervention for the very students—low-income students and students of
color—who most need powerful schools as a matter of social equity.

The debate is not about content versus skills. There is no responsible constituency arguing against ensuring that students learn how to think in school. Rather, the issue is how to meet the challenges of delivering content and skills in a rich way that genuinely improves outcomes for students.

What will it take to ensure that the idea of "21st century skills"—or more precisely, the effort to ensure that all students, rather than just a privileged few, have access to a rich education that intentionally helps them learn these skills—is successful in improving schools? That effort requires three primary components. First, educators and policymakers must ensure that the instructional program is complete and that content is not shortchanged for an ephemeral pursuit of skills. Second, states, school districts, and schools need to revamp how they think about human capital in education—in particular how teachers are trained. Finally, we need new assessments that can accurately measure richer learning and more complex tasks.

For the 21st century skills effort to be effective, these three elements must be implemented in concert. Otherwise, the reform will be superficial and counter-productive.

Better Curriculum

People on all sides of this debate often speak of skills and knowledge as separate. They describe skills as akin to a function on a calculator: If your calculator can compute square roots, it can do so for any number; similarly, if a student has developed the ability to "think scientifically," he or she can do so with any content. In this formulation, domain knowledge is mainly important as grist for the mill—you need something to think about.

Skills and knowledge are not separate, however, but intertwined. In some cases, knowledge helps us recognize the underlying structure of a problem. For example, even young
children understand the logical implications of a rule like "If you finish your vegetables, you will get a cookie after dinner." They can draw the logical conclusion that a child who is denied a cookie after dinner must not have finished her vegetables. Without this familiar context, however, the same child will probably find it difficult to understand the logical form modus tollens, of which the cookie rule is an example. (If P, then Q. Q is false. Therefore, P is false.) Thus, it's inaccurate to conceive of logical thinking as a separate skill that can be applied across a variety of situations. Sometimes we fail to recognize that we have a particular thinking skill (such as applying modus tollens) unless it comes in the form of known content.

At other times, we know that we have a particular thinking skill, but domain knowledge is necessary if we are to use it. For example, a student might have learned that "thinking scientifically" requires understanding the importance of anomalous results in an experiment. If you're surprised by the results of an experiment, that suggests that your hypothesis was wrong and the data are telling you something interesting. But to be surprised, you must make a prediction in the first place—and you can only generate a prediction if you understand the domain in which you are working. Thus, without content knowledge we often cannot use thinking skills properly and effectively.

Why would misunderstanding the relationship of skills and knowledge lead to trouble? If you believe that skills and knowledge are separate, you are likely to draw two incorrect conclusions. First, because content is readily available in many locations but thinking skills reside in the learner's brain, it would seem clear that if we must choose between them, skills are essential, whereas content is merely desirable. Second, if skills are independent of content, we could reasonably conclude that we can develop these skills through the use of any content. For example, if students can learn how to think critically about science in the context of any scientific material, a teacher should select content that will engage students (for instance, the chemistry of candy), even if that content is not
central to the field. But all content is not equally important to mathematics, or to science, or to literature. To think critically, students need the knowledge that is central to the domain.

The importance of content in the development of thinking creates several challenges for the 21st century skills movement. The first is the temptation to emphasize advanced, conceptual thinking too early in training—an approach that has proven ineffective in numerous past reforms, such as the "New Math" of the 1960s (Loveless, 2002). Learning tends to follow a predictable path. When students first encounter new ideas, their knowledge is shallow and their understanding is bound to specific examples. They need exposure to varied examples before their understanding of a concept becomes more abstract and they can successfully apply that understanding to novel situations.

Another curricular challenge is that we don’t yet know how to teach self-direction, collaboration, creativity, and innovation the way we know how to teach long division. The plan of 21st century skills proponents seems to be to give students more experiences that will presumably develop these skills—for example, having them work in groups. But experience is not the same thing as practice. Experience means only that you use a skill; practice means that you try to improve by noticing what you are doing wrong and formulating strategies to do better. Practice also requires feedback, usually from someone more skilled than you are.

Because of these challenges, devising a 21st century skills curriculum requires more than paying lip service to content knowledge. Outlining the skills in detail and merely urging that content be taught, too, is a recipe for failure. We must plan to teach skills in the context of particular content knowledge and to treat both as equally important.

In addition, education leaders must be realistic about which skills are teachable. If we deem that such skills as collaboration and self-direction are essential, we should launch a concerted effort to study how they can be taught effectively.
rather than blithely assume that mandating their teaching will result in students learning them.

Better Teaching
Greater emphasis on skills also has important implications for teacher training. Our resolve to teach these skills to all students will not be enough. We must have a plan by which teachers can succeed where previous generations have failed.

Advocates of 21st century skills favor student-centered methods—for example, problem-based learning and project-based learning—that allow students to collaborate, work on authentic problems, and engage with the community. These approaches are widely acclaimed and can be found in any pedagogical methods textbook; teachers know about them and believe they're effective. And yet, teachers don't use them. Recent data show that most instructional time is composed of seatwork and whole-class instruction led by the teacher (National Institute of Child Health and Human Development Early Child Care Research Network, 2005). Even when class sizes are reduced, teachers do not change their teaching strategies or use these student-centered methods (Shapson, Wright, Eason, & Fitzgerald, 1980). Again, these are not new issues. John Goodlad (1984) reported the same finding in his landmark study published more than 20 years ago.

Why don't teachers use the methods that they believe are most effective? Even advocates of student-centered methods acknowledge that these methods pose classroom management problems for teachers. When students collaborate, one expects a certain amount of hubbub in the room, which could devolve into chaos in less-than-expert hands. These methods also demand that teachers be knowledgeable about a broad range of topics and are prepared to make in-the-moment decisions as the lesson plan progresses. Anyone who has watched a highly effective teacher lead a class by simultaneously engaging with content, classroom management, and the ongoing monitoring of student progress knows how intense and demanding this work is. It's a constant juggling act that involves keeping many balls
in the air.

Part of the 21st century skills movement's plan is the call for greater collaboration among teachers. Indeed, this is one of the plan's greatest strengths; we waste a valuable resource when we don't give teachers time to share their expertise. But where will schools find the release time for such collaboration? Will they hire more teachers or increase class size? How will they provide the technology infrastructure that will enable teachers to collaborate with more than just the teacher down the hall? Who will build and maintain and edit the Web sites, wikis, and so forth? These challenges raise thorny questions about whether the design of today's schools is compatible with the goals of the 21st century skills movement.

For change to move beyond administrators' offices and penetrate classrooms, we must understand that professional development is a massive undertaking. Most teachers don't need to be persuaded that project-based learning is a good idea—they already believe that. What teachers need is much more robust training and support than they receive today; including specific lesson plans that deal with the high cognitive demands and potential classroom management problems of using student-centered methods.

Unfortunately, there is a widespread belief that teachers already know how to do this if only we could unleash them from today's stifling standards and accountability metrics. This notion romanticizes student-centered methods, underestimates the challenge of implementing such methods, and ignores the lack of capacity in the field today.

Instead, staff development planners would do well to engage the best teachers available in an iterative process of planning, execution, feedback, and continued planning. This process, along with additional teacher training, will require significant time. And of course none of this will be successful without broader reforms in how teachers are recruited, selected, and deselected in an effort to address the whole picture of education's human capital challenge.
Better Tests

There is little point in investing heavily in curriculum and human capital without also investing in assessments to evaluate what is or is not being accomplished in the classroom. Fortunately, as Elena Silva (2008) noted in a recent report for Education Sector, the potential exists today to produce assessments that measure thinking skills and are also reliable and comparable between students and schools—elements integral to efforts to ensure accountability and equity. But efforts to assess these skills are still in their infancy; education faces enormous challenges in developing the ability to deliver these assessments at scale.

The first challenge is the cost. Although higher-level skills like critical thinking and analysis can be assessed with well-designed multiple-choice tests, a truly rich assessment system would go beyond multiple-choice testing and include measures that encourage greater creativity, show how students arrived at answers, and even allow for collaboration. Such measures, however, cost more money than policymakers have traditionally been willing to commit to assessment. And, at a time when complaining about testing is a national pastime and cynicism about assessment, albeit often uninformed, is on the rise, getting policymakers to commit substantially more resources to it is a difficult political challenge.

Producing enough high-quality assessments to meet the needs of a system as large and diverse as U.S. public schools would stretch the capacity of the assessment industry, and incentives do not exist today for many new entrants to become major players in that field. We would need a coordinated public, private, and philanthropic strategy—including an intensive research and development effort—to foster genuine change.

Substantial delivery challenges also remain. Delivering these assessments in a few settings, as is the case today, is hardly the same as delivering them at scale across a state—especially the larger states. Because most of these assessments will be technology-based, most schools’ information technology
systems will require a substantial upgrade.

None of these assessment challenges are insurmountable, but addressing them will require deliberate attention from policymakers and 21st century skills proponents, as well as a deviation from the path that policymaking is on today. Such an effort is essential. Why mount a national effort to change education if you have no way of knowing whether the change has been effective?

A Better, But Harder, Way

The point of our argument is not to say that teaching students how to think, work together better, or use new information more rigorously is not a worthy and attainable goal. Rather, we seek to call attention to the magnitude of the challenge and to sound a note of caution amidst the sirens calling our political leaders once again to the rocky shoals of past education reform failures. Without better curriculum, better teaching, and better tests, the emphasis on "21st century skills" will be a superficial one that will sacrifice long-term gains for the appearance of short-term progress.

Curriculum, teacher expertise, and assessment have all been weak links in past education reform efforts—a fact that should sober today’s skills proponents as they survey the task of dramatically improving all three. Efforts to create more formalized common standards would help address some of the challenges by focusing efforts in a common direction. But common standards will not, by themselves, be enough.

The past few decades have seen great progress in education reform in the United States—progress that has especially benefited less-advantaged students. Today's reformers can build on that progress only if they pay keen attention to the challenges associated with genuinely improving teaching and learning. If we ignore these challenges, the 21st century skills movement risks becoming another fad that ultimately changes little—or even worse, sets back the cause of creating dramatically more powerful schools for U.S. students, especially those who are underserved today.
References


Andrew J. Rotherham is Cofounder and Publisher of Education Sector and writes the blog Eduwonk.com; arotherham@educationsector.org. Daniel Willingham is Professor of Psychology at the University of Virginia and the author of *Why Don't Students Like School?* (Jossey-Bass, 2009); willingham@virginia.edu.
PART II

K-12 COMPREHENSIVE EXAM

(Answer Research & Statistics)

4. RESEARCH
   (Answer one question)

5. STATISTICS
   (Answer all questions)
PART II

4. RESEARCH – COMPREHENSIVE EXAM QUESTION

RESEARCH EXAM QUESTION

For the research section, choose one of the general topic areas listed below and design a research study that addresses the topic. As you explain the study, be sure to include each of the following critical elements:

- A statement of the “problem” that you intend to investigate.
  The problem statement should define the scope (magnitude) and the precise nature of the problem (dilemma, phenomenon of interest), as well as the usefulness of framing the problem in this form.

- The research questions that derive logically from the problem statement.

- A coherent research plan and appropriate methods of data collection.
  Identify and justify the research design; clearly describe the sample or subjects; list the procedures that will be used to select participants; describe what data will be collected and any proposed instruments; describe how reliability and validity will be established; describe the mechanisms for collecting the data and provide a brief description of proposed analyses.

Research Topic Choices:
Choose only one to answer from the broad topic areas below:

(1) Contribution of student advisories to student engagement and learning.
(2) How the creation of small learning communities in large high school settings influence teacher work and collegiality.
(3) Leadership characteristics and teacher empowerment, school climate and student outcomes.
5. STATISTICS – COMPREHENSIVE EXAM QUESTION

STATISTICS EXAM QUESTION

You must answer all four questions. Please use the following contextual information to assist you in answering each question. PLEASE READ VERY CAREFULLY THE DESCRIPTION OF THE STUDY AND THE DEFINITION OF ALL THE VARIABLES

STUDY Context: The data are based on a study of 66 countries that have all endorsed the United Nations Education for All Initiative. This initiative seeks to improve educational outcomes for all students with a particular emphasis on youth literacy and girls’ access to elementary and secondary education. Outputs 1, 2 and 3 are based on data for East, West and South Asia and Latin America and the Caribbean countries.

PLEASE NOTE THAT THE UNIT OF ANALYSES ARE COUNTRIES AND ALL THE DATA ARE COUNTRY LEVEL DATA. ALSO PLEASE READ EACH QUESTION CAREFULLY AND THE EXPLANATION OF OUTPUT TABLES THAT CONTINUE FROM ONE PAGE TO THE NEXT.

<table>
<thead>
<tr>
<th>Variable name as it appears in the SPSS Output</th>
<th>Description of the variable.</th>
</tr>
</thead>
<tbody>
<tr>
<td>PUPIL/Teacher Ratio 2001: EFA Goal 6 (putrat01)</td>
<td>The number of students to teachers-taken as an indicator of class size in the year 2001.</td>
</tr>
<tr>
<td>Status2</td>
<td>Region: East, West and South Asia; Latin America and the Caribbean Countries.</td>
</tr>
<tr>
<td>Per Pupil Ratio Primary 04</td>
<td>The pupil teacher ratio in primary /elementary schools in 2004- taken as an indicator of class size.</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Percent Trained Teachers</td>
<td>The percentage of teachers who have been trained to enter the teaching profession.</td>
</tr>
<tr>
<td>School Life Expectancy for Females in 2004</td>
<td>The number of years female students are expected to stay in school. The higher the number, the more years female students will complete schooling.</td>
</tr>
<tr>
<td>Gender Parity Index 2000-2004: EFA Goal 3</td>
<td>The extent to which there are equal numbers of boys and girls enrolled in school. The higher the index the more equality there is.</td>
</tr>
<tr>
<td>Pupil/Teacher Ratio 2001: EFA Goal 6</td>
<td>The number of students to teachers-taken as an indicator of class size in the year 2001.</td>
</tr>
<tr>
<td>Percent Trained Teachers 2001:EFA Goal 6</td>
<td>The percentage of teachers who have been trained to enter the teaching profession in 2001.</td>
</tr>
<tr>
<td>YOUTH Literacy Rate 2000-2004 Total: EFA Goal 3</td>
<td>The overall percentage of youth who are literate (can read and write) for the years 2001, 2002, 2003 and 2004.</td>
</tr>
</tbody>
</table>
STATISTICS EXAM QUESTIONS (Con’t)

You must answer all 4 (four) questions

**Question 1:** Are there differences in the pupil teacher ratio in 2001 between countries in East, West and South Asia and Latin America and the Caribbean Countries? (Output 1)

**Question 2:** Based on Output 2, what factors help to explain the school life expectancy for females? (Please NOTE THAT THE COEFFICIENT TABLE IS ON PAGE 1 AND 2 OF THIS OUTPUT).

**Question 3:** Which model best explains the youth literacy rate for the countries in this study? Please refer to Output 3. (PLEASE NOTE THAT IN OUTPUT 3 THE MODEL SUMMARY TABLE BEGINS AT THE BOTTOM OF PAGE 1 AND CONTINUES TO THE TOP OF PAGE 2. ALSO THE COEFFICIENT TABLE BEGINS ON PAGE 2 Bottom and CONTINUES TO THE TOP OF PAGE 3)

**Question 4:** What do you take away from your analyses of the three outputs that would be useful to help in the formulation of policy to improve the education of all children?
ONEWAY putrat01 BY status2
/STATISTICS DESCRIPTIVES
/MISSING ANALYSIS
/POSTHOC=TUKEY ALPHA(0.05).

Oneway

[DataSet5] E:\HongKong4.sav

Warnings
Post hoc tests are not performed for pupil/Teacher Ratio 2001: EFA Goal 6 because there are fewer than three groups.

Descriptives

<table>
<thead>
<tr>
<th>pupil/Teacher Ratio 2001: EFA Goal 6</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>East, West and South Asia</td>
<td>28</td>
<td>31.1071</td>
<td>11.49022</td>
<td>2.17145</td>
</tr>
<tr>
<td>Latin America &amp; the Caribbean Countries</td>
<td>38</td>
<td>22.4474</td>
<td>6.93872</td>
<td>1.12561</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>26.1212</td>
<td>10.04224</td>
<td>1.23611</td>
</tr>
</tbody>
</table>

Descriptives

<table>
<thead>
<tr>
<th>pupil/Teacher Ratio 2001: EFA Goal 6</th>
<th>95% Confidence Interval for Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lower Bound</td>
</tr>
<tr>
<td>East, West and South Asia</td>
<td>26.6517</td>
</tr>
<tr>
<td>Latin America &amp; the Caribbean Countries</td>
<td>20.1667</td>
</tr>
<tr>
<td>Total</td>
<td>23.6525</td>
</tr>
</tbody>
</table>

ANOVA

<table>
<thead>
<tr>
<th>pupil/Teacher Ratio 2001: EFA Goal 6</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>1208.957</td>
<td>1</td>
<td>1208.857</td>
<td>14.473</td>
<td>.000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>5346.073</td>
<td>64</td>
<td>83.532</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>6555.030</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
REGRESSION
/MISSING LISTWISE
/STATISTICS COEFF OUTS R ANOVA
/CRITERIA=PIN(.05) POUT(.10)
/NOORIGIN
/DEPENDENT ExpecF4
/METHOD=ENTER Teachra04 PPratio4.

Regression

[DataSet5] E:\HongKong4.sav

### Variables Entered/Removed

<table>
<thead>
<tr>
<th>Model</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Per Pupil Ratio Primary 04, Percent Trained Teachers&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.</td>
<td>Enter</td>
</tr>
</tbody>
</table>

<sup>a</sup> All requested variables entered.

### Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.636&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.405</td>
<td>.345</td>
<td>1.39371</td>
</tr>
</tbody>
</table>

<sup>a</sup> Predictors: (Constant), Per Pupil Ratio Primary 04, Percent Trained Teachers.

### ANOVA<sup>a</sup>

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>26.408</td>
<td>2</td>
<td>13.204</td>
<td>6.798</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>38.849</td>
<td>20</td>
<td>1.942</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>85.257</td>
<td>22</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> Predictors: (Constant), Per Pupil Ratio Primary 04, Percent Trained Teachers

<sup>b</sup> Dependent Variable: School Life Expectancy for Females in 2004

### Coefficients<sup>a</sup>

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unstandardized Coefficients</td>
<td>Standardized Coefficients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td></td>
<td>11.962</td>
<td>1.900</td>
</tr>
<tr>
<td></td>
<td>Percent Trained Teachers</td>
<td></td>
<td>.030</td>
<td>.019</td>
</tr>
</tbody>
</table>

<sup>a</sup> Dependent Variable: School Life Expectancy for Females in 2004
### Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>1</td>
<td>.074</td>
<td>.032</td>
</tr>
</tbody>
</table>

a. Dependent Variable: School Life Expectancy for Females in 2004
REGRESSION
/MISSING LISTWISE
/STATISTICS COEFF OUTS R ANOVA CHANGE
/Criteria=PIN(.05) POUT(.10)
/NOORIGIN
/DEPENDENT ylit00t
/METHOD=ENTER ypity00
/METHOD=ENTER putrat01
/METHOD=ENTER perfe01 trtea01.

Regression

[DataSet5] E:\HongKong4.sav

<table>
<thead>
<tr>
<th>Variables Entered/Removed</th>
<th>Variables Entered</th>
<th>Variables Removed</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Gender Parity Index 2000-2004: EFA Goal 3a</td>
<td></td>
<td></td>
<td>Enter</td>
</tr>
<tr>
<td>2 pupil/Teacher Ratio 2001: EFA Goal 6b</td>
<td></td>
<td></td>
<td>Enter</td>
</tr>
<tr>
<td>3 Percent Trained Teachers 2001: EFA Goal 6; Percent Female Teachers 2001: EFA Goal 6a</td>
<td></td>
<td></td>
<td>Enter</td>
</tr>
</tbody>
</table>

a. All requested variables entered.

b. Dependent Variable: Youth Literacy Rate 2000-2004 Total: EFA Goal 3

Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.856a</td>
<td>.733</td>
<td>.717</td>
<td>6.58187</td>
</tr>
<tr>
<td>2</td>
<td>.910b</td>
<td>.828</td>
<td>.807</td>
<td>5.43836</td>
</tr>
<tr>
<td>3</td>
<td>.951c</td>
<td>.904</td>
<td>.877</td>
<td>4.34343</td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Gender Parity Index 2000-2004: EFA Goal 3


### Model Summary

<table>
<thead>
<tr>
<th>Model</th>
<th>R Square Change</th>
<th>F Change</th>
<th>df1</th>
<th>df2</th>
<th>Sig. F Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.733</td>
<td>46.640</td>
<td>1</td>
<td>17</td>
<td>.000</td>
</tr>
<tr>
<td>2</td>
<td>.095</td>
<td>8.901</td>
<td>1</td>
<td>16</td>
<td>.009</td>
</tr>
<tr>
<td>3</td>
<td>.076</td>
<td>5.542</td>
<td>2</td>
<td>14</td>
<td>.017</td>
</tr>
</tbody>
</table>

### ANOVA

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Regression</td>
<td>2020.493</td>
<td>1</td>
<td>2020.493</td>
<td>46.640</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>736.456</td>
<td>17</td>
<td>43.321</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2756.952</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Regression</td>
<td>2283.740</td>
<td>2</td>
<td>1141.870</td>
<td>38.50b</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>473.212</td>
<td>16</td>
<td>29.576</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2756.952</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Regression</td>
<td>2492.836</td>
<td>4</td>
<td>623.209</td>
<td>33.03c</td>
</tr>
<tr>
<td></td>
<td>Residual</td>
<td>264.115</td>
<td>14</td>
<td>18.865</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2756.952</td>
<td>18</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a. Predictors: (Constant), Gender Parity Index 2000-2004: EFA Goal 3
d. Dependent Variable: Youth Literacy Rate 2000-2004 Total: EFA Goal 3

### Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>(Constant)</td>
<td></td>
<td>-40.685</td>
<td>19.467</td>
<td></td>
<td>-2.089</td>
<td>.052</td>
</tr>
<tr>
<td></td>
<td>Gender Parity Index 2000-2004: EFA Goal 3</td>
<td></td>
<td>135.979</td>
<td>19.911</td>
<td>.856</td>
<td>6.829</td>
<td>.000</td>
</tr>
<tr>
<td>2</td>
<td>(Constant)</td>
<td></td>
<td>6.573</td>
<td>23.045</td>
<td></td>
<td>.372</td>
<td>.715</td>
</tr>
<tr>
<td></td>
<td>Gender Parity Index 2000-2004: EFA Goal 3</td>
<td></td>
<td>97.402</td>
<td>20.925</td>
<td>.813</td>
<td>4.655</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>pupil/Teacher Ratio 2001: EFA Goal 6</td>
<td></td>
<td>-.416</td>
<td>.140</td>
<td>-.393</td>
<td>-2.963</td>
<td>.009</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Youth Literacy Rate 2000-2004 Total: EFA Goal 3
### Coefficients

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Constant)</td>
<td>-13.582</td>
<td>20.889</td>
</tr>
<tr>
<td>Gender Parity Index 2000-2004: EFA Goal 3</td>
<td>103.536</td>
<td>22.953</td>
</tr>
<tr>
<td>pupil/Teacher Ratio 2001: EFA Goal 6</td>
<td>-.364</td>
<td>.113</td>
</tr>
<tr>
<td>Percent Female Teachers 2001: EFA Goal 6</td>
<td>-.031</td>
<td>.105</td>
</tr>
<tr>
<td>Percent Trained Teachers 2001: EFA Goal 6</td>
<td>2.12</td>
<td>.064</td>
</tr>
</tbody>
</table>

a. Dependent Variable: Youth Literacy Rate 2000-2004 Total: EFA Goal 3

### Excluded Variables

<table>
<thead>
<tr>
<th>Model</th>
<th>Beta ln</th>
<th>t</th>
<th>Sig.</th>
<th>Partial Correlation</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-.393(^a)</td>
<td>-2.983</td>
<td>.009</td>
<td>-.598</td>
<td>.618</td>
</tr>
<tr>
<td></td>
<td>.030(^a)</td>
<td>.141</td>
<td>.889</td>
<td>.035</td>
<td>.381</td>
</tr>
<tr>
<td></td>
<td>.319(^a)</td>
<td>3.113</td>
<td>.007</td>
<td>.614</td>
<td>.993</td>
</tr>
<tr>
<td>2</td>
<td>-.026(^b)</td>
<td>-.149</td>
<td>.884</td>
<td>-.038</td>
<td>.376</td>
</tr>
<tr>
<td></td>
<td>.278(^b)</td>
<td>3.421</td>
<td>.004</td>
<td>.662</td>
<td>.971</td>
</tr>
</tbody>
</table>

a. Predictors in the Model: (Constant), Gender Parity Index 2000-2004: EFA Goal 3
c. Dependent Variable: Youth Literacy Rate 2000-2004 Total: EFA Goal 3