

The Elements of Learning 2.0: Amending Our Idea of Basic Skills

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Learning to collaborate and to solve ill-defined problems are to the 21st Century what industrial discipline was to the last hundred years, according to those who have studied what employers and society need. They need to be considered *basic skills* just as are reading, math, and science. And they are essential to establishing *Learning 2.0*, the next full version of education.

But wait! Simply mentioning *new* basic skills are fighting words in some quarters. Advocates of a common core of content knowledge bristle, huff, puff, and like [Diane Ravitch](#) say, “Inevitably, putting a priority on skills pushes subjects including history, literature, and the arts to the margins.” We’ve been there before with a century of educational fads, so the criticism says. Thus, it is worthwhile reviewing where the new skills imperative comes from.

Essentially, it comes from the same place that the old skills imperative came from: pressure on the education system to prepare children to live in a world that is rapidly changing, where the nature of employment and economic security is different, where citizenship and the civic life has changed, and where even the definitions of literacy are in flux.

In building our current education system a century ago, those known as the Administrative Progressives faced a similar problem, a change in society’s master concept. “The change that comes to mind first,” John Dewey wrote, “the one that overshadows and even controls all others, is the industrial one—the application of science resulting in great inventions that have utilized the forces of nature on a vast and inexpensive scale. The growth of a world-wide market as the object of production of vast manufacturing centers to supply this market, of cheap and rapid means of communication and the distribution of all its parts.”¹

Millions of Americans moved from farm to city to be joined by the largest influx of immigrants in the history of the country all bent on reaping the benefits of rapidly increasing industrial productivity. They built an education system, Learning 1.0, around those realities.

In the current age, whatever post-industrial society is ultimately called, we do not yet know for certain how to manage the new economy or society. If we did,

¹ Dewey, John. *The School and Society*. Chicago: University of Chicago Press, 1900, p. 5.

unemployment wouldn't be hovering just below 10 percent officially (it's actually much worse) and our politicians would be able to get things done rather than scream platitudes at one another. But we do know that the nature of employment has changed.

Fifteen years ago, economists Richard Murnane and Frank Levy set out to explore what skills were valued in the marketplace.² They looked at employers' personnel policies and screening tests for jobs for high school graduates that paid a living wage, those that in time would allow an employee to live independently, find a mate, and start a family. In addition to the hard skills—the ability to read and do math at the high school level—graduates eligible for these high paying jobs needed to know how to “solve semistructured problems where the hypotheses must be formed and tested,” and “to work in groups with persons of various backgrounds.”³ They would need to be able to communicate effectively orally and in writing.

Working in the computer age does not equate to specific instructional technology; it is about learning how to process, use, and evaluate information: “The concept of digital learning is different from instructional technology, which is usually a toolkit application that is predetermined and even institutionalized with little, if any, user discretion, choice, or leverage. It also tends to be top down, designer determined, administratively driven. In digital learning, outcomes typically are customizable by participants.”⁴

By the turn of the millennium, it was clear that jobs requiring routine manual thinking and skills were giving way to those involving both higher levels of knowledge but also some applied skills, such as expert thinking and complex communicating, which are not well captured by most current educational standards or taught in the conventional curriculum. Teamwork, for example, is taught mostly in extra curricular activities.

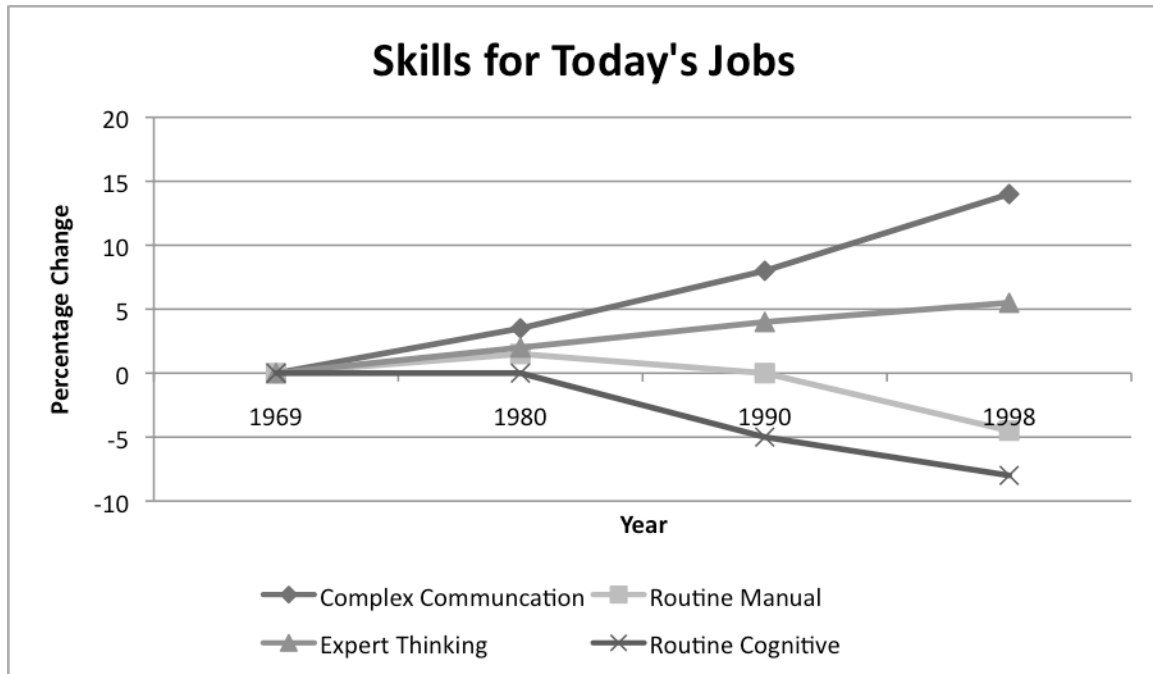
Expert thinking is not confined to white-collar jobs; indeed, its importance to blue-collar work has long been ignored, and the content of many of these jobs has drastically changed. Auto mechanics, for example, requires the use of computer diagnostics, a new skill, but the expert thinking part arises when the computers fail to solve the problem. Some 27 percent of expected job growth falls into non-routine, skilled work whose entry requires education beyond high school but not necessarily a four-year degree.⁵

² Murnane, Richard J., and Frank Levy. *Teaching the New Basic Skills: Principles for Educating Children to Thrive in a Changing Economy*. New York: The Free Press, 1996.

³ Murnane and Levy, p. 32.

⁴ Davidson, Cathy N., and David Theo Goldberg. *The Future of Thinking: Learning in a Digital Age*. Cambridge, MA: MIT Press, 2010, p. 5.

⁵ Harvard Graduate School of Education. *Pathways to Prosperity: Meeting the Challenge of Preparing Young Americans for the 21st Century*. Cambridge, MA: Author, 2011, p. 3.



Source: Trilling, Bernie, and Charles Fadel. *21st Century Skills: Learning for Life in Our Times*. San Francisco: Jossey-Bass, 2009, taken from Autor, Levy, and Murnane, 2003.

But how to do this? If we as a society want creativity, if we want working together, where do we teach it? How do we assess it? The current policy path links new basic skills with a new generation of tests that will be a part of the Common Core of Standards incorporated into the reauthorized federal Elementary and Secondary Education Act. Common standards, it is argued, will provide tremendous leverage over practice in schools and provide governments at all levels the ability to see which students, schools, systems, and states are making the best progress. Common standards will drive better curriculum, better teaching, and better tests. In June, California signed on with the Smarter Balanced assessment-building consortium that arguably will give the state a leg up on linking its tests with a contemporary version of the basics.

In addition, the Partnership for 21st Century Skills, an organization with heavy support from the tech and curriculum industries—Apple, Dell, Cisco, Pearson, McGraw Hill—has begun a substantive political effort to broaden the curriculum through incorporating skills into the common standards. The proposed framework for 21st Century skills is ambitious, but also unwieldy, calling for depth but creating an even longer laundry list of competencies. The new vision for learning includes the core subjects, which are expanded to include world languages, arts, economics, geography, history and government in addition to the 3Rs and science, particularly the scientific method. Then it adds global awareness; financial, economic, business, entrepreneurial literacy; civic literacy; health literacy; and environmental literacy. On top of that the framework adds what it calls learning and innovation skills, which are closer to the new basic skills that Murnane and Levy described: creativity and innovation, critical thinking and problem solving, and communication and

collaboration. Then come information, media, and technology skills and life and career skills, each with a competency list. If badly adopted, the laundry list could make high school even more deadly and superficial than it is now.

In addition, the tests and the Common Core face a very long developmental chain. A whole series of decisions have to fall the right way for tests and curriculum to emerge and be adopted. And all that happens before classrooms start to change. Meanwhile, opposition to the nationwide standards is beginning to grow. An odd coalition of conservative state's rightists and testing opponents is developing, and one can expect some of the 42 states that have adopted the Common Core to reverse course.

A Parallel Pathway: Teach First, Then Test

Consider, for a moment, a parallel policy pathway. Instead of using educational policy to produce new tests that are to drive instruction, why not turn the process upside down and create accessible forms of learning that involve the new basic skills? Let changes in learning drive the tests.

By reversing the process, we would adopt the developmental strategy of “permanent Beta testing” made famous at Google. Get changes in learning and on-the-ground evaluation first and build tests and curriculum based on the experience of thousands of users. Start from the bottom, not from the top. Cognitive psychologist [Daniel Willingham](#), whose *Why Don't Students Like School?* should be on everyone's reading list, argues that seeing what works requires some kind of assessment plan be in place, and that measuring 21st Century Skills is extremely difficult. Yet, there exist demonstration projects that carry with them both the capacity to evaluate and some experience developing instrumentation and professional practice. Three examples: study groups, project based learning, and the marriage of skill and knowledge teaching.

Study Groups

A proven approach to systemically increasing the capacity for students to work in groups is to make it easy to create and operate them. We know that students who study together learn more and are more highly motivated than those who study alone. In a well-known example, Uri Treisman, who was a teaching assistant at UC Berkeley, became aware of the high rate at which Black students were failing freshman calculus. As a part of his research about the causes of failure, Treisman found that African-American students almost always studied alone while Chinese students studied together, and they studied longer. The Chinese students averaged 14 hours of study a week, and they went beyond the problem sets. They “critiqued one another's work, correcting errors and suggesting innovative solutions,” as David Drew has written.⁶ In a practice that has been repeated many times with similar results, Treisman created a workshop for African-American students to study

⁶ Drew, David E. *Aptitude Revisited: Rethinking Math and Science Education for America's Next Century*. Baltimore, MD: The Johns Hopkins University Press, 1996.

together and within a year the students who were getting Ds were getting Cs or better.

The power of the study group extends to the virtual world. The capacity of students to collaborate is vastly increased by everything from Twitter to sophisticated classroom management applications such as Moodle and Blackboard. Open Study (www.openstudy.com), in part funded by the National Science Foundation, grew from a startup sponsored by Georgia Tech and Emory University. It bills itself as the country's largest study group.

Study groups are small, they are directly connected to the existing course structure and the curriculum, and they are subject to investigation both in terms of their effectiveness with conventional learning standards and about how well they operate as groups. They are a natural experiment in 21st Century skills.

Project Based Learning

Projects can be inspired or dorky, mind expanding or a waste of time. In places I have seen them used well, they increase student engagement and the intensity with which students work in school. Well-designed projects connect new skills to the conventional academic disciplines and standards.

Earlier, [I wrote](#) about a crime scene investigation project demonstrated by eager students at High Tech High in San Diego. [ConnectED, the California Center for College and Career, has created an integrated curriculum unit around the topic](#). The unit involves an introduction to deductive reasoning via Sherlock Holmes' *The Blue Carbuncle*, and FBI crime scene protocols. It involves ratios, proportions, linear equations, graphing, logarithmic equations, DNA structure, blood typing, and of course, Newton's Law of Cooling. (How long dead is the body?)

The final part of the unit involves the use of forensic evidence, concepts of justice applied in conventional court rooms and in high profile situations, such as war crimes trials. Students need to mass evidence, create chains of logic, and convince a jury. They study the Nuremberg trials and current alleged crimes against humanity.

All of this also links to real people with real jobs and offers the possibility of youth auditioning adult roles.

ConnectED's crime scene study unit was tested in 11 high schools before its publication, and is one of several dozen already developed. Building units of instruction this way allows their gradual refinement in much the same way that the Japanese tradition of lesson study allows teachers to gradually polish conventional math or science lesson.

Certainly, teaching this way is hard, or at least different from full-classroom direct instruction. The point has been made that teachers have been taught about project learning for 75 years, but few of them do it because the process is difficult. The teachers who teach with projects acknowledge the learning curve, but if public education seeks ways to move beyond the acquisition and storage model of learning, projects represent a good integrative technique.

I believe that the rise of learning technologies has changed the knowledge-skill relationship, or at least raised some interesting hypotheses about how it may have changed. I think it is an open question whether the auditioning of life roles—acting like a scientist—helps one gain knowledge. What I do know is that the current model of acquisition and storage as currently taught does not work for a lot of students.

I don't believe there is any magic in project-based learning or that all teachers can work in this mode. Projects take a long time, and it can be argued that knowledge transmission can be more efficiently accomplished through memorization and application to problems. But in project-based learning, the level of student engagement and ownership of their own learning strikes me. When I visit such schools or programs, I don't meet bored kids.

The case has been made that the evaluation techniques for new basic skills, such as creativity, are crude and underdeveloped. This is clearly the case, but one can certainly argue that the tests now being used and touted as measures of quality, have little relationship to knowledge acquisition. If we allow changes in learning and testing to grow alongside one another, and if we are somewhat scientific about the effort, we will develop better evaluation techniques of the things we think matter. For example, the [New Tech Network](#), headquartered in Napa, California, used a rubric that allows teachers to assess individual contributions to group projects and to offer critiques of ongoing projects. Teachers can learn from the history of these interactions: which worked, which didn't, which seemed to hold up over time?

Marry Knowledge of Practice and Skill Learning

There is breathlessness to the discussion of 21st Century skill discussions, and when concrete examples are raised, they often involve a gloss of video editing or other computer-connected skill. At both a skill and knowledge level, some of them are quite trivial. Although useful, they are probably no more important to the future of society than my learning touch-typing a half century ago.

As I read through the literature on 21st Century skills, I was taken that the people writing it are for the most part very good at conventional learning, and it was the knowledge they acquired that allowed them to engage in collaboration, problem solving, and innovation. They developed skills because they had knowledge. The buildup and synthesis of the Lego bricks of knowledge is an essential precursor to developing skills. One can Google facts, but knowledge is the stuff that gets stored in long term memory.

21st Century skills have not repealed cognitive psychology, but they have rearranged (Benjamin) Bloom's Taxonomy of Educational Objectives. Creation is at the top of the hierarchy, and application starts early. "This is different from the old taxonomy, which said, for example that you cannot apply until you comprehend, or that you

must understand before you can analyze,” explains Lorin Anderson, who with David Krathwohl convened a working group that spent five years revising the taxonomy.⁷

Old-fashioned skills, such as memorization, continue to count and count heavily. But we have at our disposal a growing number of learning technologies that go beyond flash cards and mnemonics.

It also means that 21st Century skills, such as communications through speech or writing, can be a part of any subject, that synthesis and problem solving can be a part of any quiz or exam.

Learning which techniques to apply when and with which students goes to the heart of teaching, and like any complex cognitive skill, teaching requires extensive practice, not simply repetition. It requires systematic and continued review of student work, not just test scores.

This is hardly ever done, and all sorts of excuses are given. Teachers are tired at the end of the day. They feel awkward looking at other classrooms. They don’t have the time to video themselves, watch the results, or look at the work of other teachers. But the bottom line is that getting skills is hard. It involves learning from failure as well as success, and it is tough minded as well as big hearted.

Advocacy of 21st Century skills does not mean that we abandon 20th Century knowledge, or how one learns it. We’d be farther ahead if we concentrated on developing the knowledge of practice rather than relying on standards and testing.

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⁷ Silva, Elana. *Measuring Skills for the 21st Century*. Washington, DC: Education Sector, 2008, p. 5. See also: Anderson, Lorin W., and David R. Krathwohl. *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. New York: Allyn-Bacon Longman, 2001.