EDUCATION REFORM FOR THE DIGITAL ERA

Edited by
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Chapters by
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Overcoming the Obstacles to Digital Learning

▪ *By Chester E. Finn, Jr. and Daniela R. Fairchild*

Digital learning is more than the latest addition to education reformers' to-do lists, filed along with teacher evaluations, charter schools, tenure reform, academic standards, and the like. It's fundamentally different: For digital learning to fulfill its enormous potential, a wholesale reshaping of the reform agenda itself is required, particularly in the realms of school finance and governance. But just as online education needs those reforms if it is to flourish, so does deep education reform need digital learning, which can provide valuable solutions to some of education's greatest challenges—beginning with the basic obsolescence of its familiar delivery system.

That system has not been dramatically altered for at least a century. Despite reformers' earnest struggles to modify and smooth its course, the obvious disrepair of the present arrangement, and the enormous resources applied to its renovation, our schools and teachers still follow an old, meandering, cobblestone pathway rather than a fast, modern superhighway. Plenty of individual stones have been replaced and in a few places the right-of-way runs straighter than it once did—think standards, accountability, school choice, teacher evaluations—but nothing has altered the essential path of our nation's education system.

Until now, that is. Today, American education has the potential to be completely rerouted and accelerated by digital learning. Indeed, truly boosting student achievement—as well as individualizing instruction and creating high-quality options for children and families among, within, and beyond schools—will depend to a considerable extent on how deftly our K–12 system can exploit this potential, both in its pure form (full-time online instruction) and in various "blended" combinations of digital and brick-and-mortar-based instruction.

Digital instruction enables the launch and scaling of major-league advances in the quality and variety of curricular content and the ways it is delivered to learners. It invites and makes possible transformative changes in the nature of a teacher's work and in the structure (and compensation) of the teaching profession. It holds unrivaled potential to transform education from a classroom-based activity confined to the hours of 8:00 to 2:30, Monday through Friday, thirty-six weeks a year, into a bona fide 24/7 opportunity that's accessible just about anywhere. Besides all that, it can help boost the productivity of our K–12 system and thus elicit more bang from ever-scarcer education bucks.

Making the most of these remarkable opportunities, however, hinges on our willingness—and capacity—to alter a host of ingrained practices. We dare not settle for patching a bumpy, twisty country lane. We need to build a new road.

Technology cannot keep its promise to accelerate the modernization and reform of K–12 education unless reformers and policymakers understand that potential, embrace it, and clear the obstacles that today block its realization.

There are more such obstacles than one might think—and each of them will prove hard to overcome, not least because they are deeply carved into our traditional K–12 system and now regarded as valuable protections or benefits by education's innumerable factions, bureaucracies, and interest groups. This is why the short history of digital learning up to this point is full of patches, detours, and work-arounds.

Such partial fixes make possible modest progress, at least in some places for some period of time, but one would be daft to view them as durable, full-bore solutions. Knocking down the real barriers to change will be a huge undertaking, however, and nothing on today's familiar reform agenda can get this job done. Which is to say, a serious effort to overcome the obstacles means reshaping that agenda, even redefining what we mean by "education reform." Indeed, the nascent revolution in digital learning is revealing the cracks and gaps in the reform agenda of the past quarter century—and pointing the way toward a new one that is apt to prove even more wrenching and challenging than what we've been working to achieve.

The barriers take three forms.

First and most familiar are self-absorbed and self-serving groups that do their utmost either to capture the potential of technology to advance their own interests or to shackle it in ways that keep it from harming those interests.

Second, also familiar but showing up here in new ways, are issues of organizational capacity within our public education system, a system that has enormous difficulty accommodating and assimilating change—and the more wrenching the change the greater the difficulty.

Third—and newest, most perplexing, most fundamental, and thus hardest to tackle—are the core governance and financing structures of our K–12 system itself. Though we've begun to recognize these as major impediments to important reforms within our current brick-and-mortar world, they turn out to be even more constraining—and damaging—to education in the online realm.

The five essays in this volume touch on all three kinds of obstacles. Let us take them up in turn.

Self-centered Interest Groups

The many adult interest groups that live off our public education system are already doing their best to co-opt digital learning for their own ends—and to ensure that nobody uses it to threaten their power, membership, or revenue base. Two such groups are especially powerful players in the politics and policies of public education.

First are local districts and their school boards, vigorously represented by the National School Board Association (NSBA). This crowd would stifle the openness and global reach of digital learning in the name of district empowerment and local monopoly. According to Ann Flynn, NSBA's director of education technology, online learning "should be something that school districts can control."[1] Such a cramped viewpoint has even been adopted by some smart reform thinkers. Writing recently in *Education Next*, for example, veteran thought leader (and digital-learning advocate) Paul Peterson notes that "if digital learning is to advance beyond the pilot stage, it needs to work within the current system of public education, not against it…Whether digital learning is blended into the classroom or offered online, or both, districts have to be part of the action."[2]

Yet leaving local districts and their boards in charge of digital instruction will retard innovation, entrepreneurship, collaboration, and smart competition, simultaneously stifling students' ability to find—and be taught by—the very best educators in the state, region, nation, or even world. It will raise costs, undermine efficiency, block rich instructional options, restrict school choice and parental influence, and strengthen the hand of other interest groups—including but not limited to already-too-powerful teacher unions.

For wherever one finds school districts and boards, one almost always finds unions equally determined to prevent digital learning from shrinking their ranks or weakening their power bases. In many places, they have secured legislation limiting the scope of digital learning or have written clauses into their contracts to counter its growth. In California, for example, the state teacher union's model contract requires that

> no employee shall be displaced because of distance learning or other educational technology. The use of distance education technology shall not be used to reduce, eliminate, or consolidate faculty positions within the district.[3]

In other places—perhaps more surreptitiously—teacher unions have ensured that class-size mandates (costly and dysfunctional as they are in the brick-and-mortar world) still apply to online schools. Yet staffing arrangements—how many and what sorts of people, with what skills and training and compensation—will be dramatically different for online learning than for traditional schools. In chapter one of this volume, Bryan C. Hassel and Emily Ayscue Hassel explain why—and what needs to change to maximize digital learning's potential in this realm. With the proliferation of high-quality online content, solid instruction in the "basics" will eventually become "flat"—available anywhere globally (and likely at no charge). Meaning that, yes, fewer teachers will be needed. But also that their effectiveness will matter even *more* than it does today, as the quality of a teacher will affect learning outcomes for many more students across schools, districts, states, and even nations. (The Hassels also explain how digital education will further professionalize teaching by limiting mindless administrative tasks, focusing teacher talent, and improving pay for the high-quality instructor.)

Those are the main interest groups, but they're not alone. Also worthy of note are textbook publishers and the myriad other companies with which schools and districts partner to deliver transportation, food, insurance, supplies, and much, much more. They're not evil (and some aren't even selfish in the ordinary sense), but they are all self-interested, and—if they prevail—will smother, slow, or distort the potential of online learning.

Human and Organizational Capacity

Over the past fifty years, the student-faculty ratio in America's K–12 schools has dropped from twenty-seven to one to fifteen to one; the student-to-staff ratio

(which includes cafeteria workers, central-office receptionists, and other non-teaching personnel) plummeted from fifty to one in the 1950s to ten to one today.[4] When all the pay stubs are tallied, we find over 3 million teachers and umpteen more "support staff" working in what is America's second-largest industry.[5] Yet education's bulked-up employment has barely touched overall student achievement, which has scarcely risen during this period. Instead, the added HR heft has contributed to the bureaucratization, lethargy, and routinization of the K–12 enterprise, buttressing its rigid procedures, internal fiefdoms, and tendency toward compliance rather than innovation—much less transformation. Reform ideas—no matter how sharp—struggle to pierce the thick bureaucracy. School-turnaround efforts offer a sobering case in point. As Andy Smarick has written, examples of failed turnaround efforts abound. National data for 2004–05 show that of the schools required to undergo restructuring under No Child Left Behind, less than 20 percent were able to exit "improvement status" two years later. State-level data mimic these dismal federal findings. Smarick writes:

> In 2008, 52 Ohio schools were forced to restructure because of persistent failure. Even after several years of significant attention, fewer than one in three had been able to reach established academic goals, and less than half showed any student performance gains.[6]

Our own research on school turnarounds is equally bleak.[7] Inertia, traditional routines, contracts, and procedural requirements dilute the potency of these turnaround efforts—and of education reform more generally.

In order to see real jumps in student achievement, results-linked quality control of curricula, educators, and programs needs to look dramatically different. Our current system is laden with input regulations like textbook mandates, certification requirements, and notches on teachers' professional-development belts. None of which has been shown to improve student achievement (and some of which have actually been shown to hinder it). In the digital-learning era, these become even more dangerous tokens of "quality," as they work to hamper innovation. As Rick Hess explains in chapter two:

> One of the great advantages of online learning is that it makes "unbundling" school provision possible—that is, it allows children to be served by providers from almost anywhere, in new and more customized ways. But taking advantage of all the opportunities online learning offers means that there is no longer one conventional "school" to hold accountable. Instead, students in a given

> building or district may be taking courses (or just sections of courses) from a variety of providers, each with varying approaches to technology, instruction, mastery, and so forth.

His essay goes on to outline three ways to police—and improve—quality in digital learning. But it's not just bloated personnel ranks and ineffective quality-control metrics that have held the system back. We reformers share in the blame with our habit of layering new policies upon old and shoving program after program into the current educational frame rather than replacing outmoded, ineffective, or inefficient initiatives with novel platforms and ideas. With that layering, of course, has come the education system's addiction to cash and its assumption that nothing can be done differently without additional resources.

In fact, it should cost taxpayers *fewer dollars* to educate each pupil in the online world—though various trade-offs will need to be made. According to analyses by Tamara Butler Battaglino, Matt Haldeman, and Eleanor Laurans, described in chapter three, full-time virtual schooling currently costs, on average, about $3,600 less per pupil than its traditional counterpart. The potential savings associated with "blended learning" are smaller but far from negligible. As digital learning evolves, its costs are apt to drop further. Once digital instruction is further vetted, innovated, and brought to scale, this bottom-line cost may drop even further. Which is not to say that the choices, priority adjustments, and trade-offs associated with it are obvious or easy, only that we face a rare opportunity and—considering our fiscal circumstances—likely need to wean American public education from its cash habit.

Fundamental Structural Flaws

Two nearly universal and deeply entrenched structural arrangements in American public education pose huge impediments to the success of digital learning. The painful truth is that this education revolution cannot occur under the customary arrangements for financing schools nor within our current governance system.

Consider, first, how we presently fund education: financing programs and bureaucratic structures via rigid and formulaic distribution, not paying for students or schools, much less for learning. This antiquated system stymies innovation, as Paul Hill explains in chapter four. And it doesn't make much sense in an era when students must be able to direct resources to the education providers of their choice.

But it doesn't have to be this way. Hill shows how we can leapfrog our system of school finance to fund education, not institutions; move money as students move; and pay for unconventional forms of instruction. (This rebooted system would also be able to *defund* those programs that are found wanting.) This new model would offer parents a choice of whole-school providers while also affording them a limited amount of "pocket money," with which they could purchase any number of tutoring or enrichment programs, from advanced math classes to piano lessons. As Hill writes, "This would allow some public funds to flow to new and innovative programs…Yet parents could not be led into making choices that compromised their children's core instruction."

Now consider our agricultural-era devotion to "local control" of public education and ask how this arrangement can possibly work well—indeed, what it even means—when the delivery system itself is unbound by district, municipal, or even state borders. Who is really "in charge" when students assemble their education from multiple providers based in many locations, some likely on the other side of the planet? Digital learning, like digital communications, lives on the Internet—often "in the cloud"—and knows no natural geographic or political boundaries. Sure, it can be inhibited by totalitarian regimes that fear websites or any communications that may loosen their grip. When left to flourish in the marketplace, however, digital learning will yield innovation, competition (affecting content, quality, delivery mechanisms, and price), and eventual economies of scale. And those will—and ought to—develop without regard to municipal boundaries.

To be sure, public officials have an obligation to exert curricular quality control—for which they in turn are accountable to voters and taxpayers—and must safeguard minors from "virtual menaces." But that is not the same as putting local districts in control of digital learning, as our current system expects. In chapter five, John Chubb spotlights the incapacities of our present K–12 education-governance system, calling instead for a state-based model. K–12 education controlled by local entities is rigid and change averse, Chubb concludes. What's more, few districts are large enough marketplaces to really foster innovation. States provide the scale necessary to support research and development, to allow for flexible programming, and to extend the reach of top-rate teachers. (Chubb then lays out ten concrete steps to make this new set-up a reality.)

Whew! Reshape the financing and governance of public education? On top of new HR arrangements for teachers and improved quality control of content? Yes, it's a tall order and a major reformulation of America's education-reform

agenda. It doesn't erase the need for rigorous standards, tough accountability, vastly improved data systems, better teacher evaluations (and training, etc.), stronger school leaders, and much else that reformers have been struggling to bring about. But it says, in effect, that far more than those reforms are needed in order to bring U.S. public education into the modern era.

The Charter School Warning Bell

For those still unconvinced, the charter school saga offers a cautionary tale. In the early days, antireform interest groups mangled charter legislation in myriad ways. As a consequence of their efforts, nearly half of states impose some kind of cap on the number of charters allowed in their districts.[8] Other states force charter schools to fit under extant union contracts.[9] Some restrict charter-authorizing powers to districts, a classic case of empowering foxes to look after chickens. Almost nowhere are charters properly funded. And in many states and communities, they remain shackled by far too many regulations.

We've seen how these co-optations and conditions weakened the realization of chartering's potential. And we can see, in retrospect, how the early promoters of charter schools failed—or neglected—to plant these schools in a salubrious policy environment.

If similar failures hamper digital learning, the loss will be still greater. For while charters (perhaps due to the constraints they've faced) remain a smallish subset of "different" schools that operate alongside the traditional system, digital learning has the potential to alter the system itself both fundamentally and irreversibly. It's no sideshow. It isn't even the center ring. It's the circus tent itself.

This volume lays out the most worrisome obstacles to smart and widespread implementation of digital learning: staffing, quality control, costs, financing structures, and school governance. It also supplies thoughtful recommendations for overcoming those obstacles—not because the nascent digital-learning movement is a public good unto itself but because of the good it can bring about for our children's education.

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Endnotes

1. Cited by Dylan Scott, "Can States and School Districts Cut Costs Through Digital Learning?" *Governing Magazine*, January 17, 2012, http://www.governing.com/blogs/view/can-states-school-districts-cut-costs-through-digital-learning.html.

2. Paul Peterson, "In the Digital World, Every District Can Compete With Every Other," *Education Next*, February 9, 2012, http://educationnext.org/in-the-digital-world-every-district-can-compete-with-every-other/.

3. Community College Council of the California Federation of Teachers, "A Framework for Contract Negotiations Related to Educational Technology Issues," http://www.cft.org/uploads/key/framework_final.pdf.

4. Thomas D. Snyder and Sally A. Dillow, *Digest of Education Statistics, 2010* (Washington, D.C.: National Center for Education Statistics, April 2011), http://nces.ed.gov/pubs2011/2011015.pdf; Steve Malanga, "Another Reason School Systems Are Going Broke...," *Public Sector Inc.* blog, December 6, 2011, http://www.publicsectorinc.com/forum/2011/12/another-reason-school-systems-are-going-broke.html.

5. C. Emily Feistritzer, *Profile of Teachers in the U.S. 2011* (Washington, D.C.: National Center on Education Information, 2011), http://www.ncei.com/Profile_Teachers_US_2011.pdf. Educational services, public and private, employed 13.5 million Americans in 2008. Information available

from the Bureau of Labor Statistics, "Career Guide to Industries, 2010–11 Edition: Education," http://www.bls.gov/oco/cg/cgs034.htm.

6. Andy Smarick, "The Turnaround Fallacy," *Education Next* 10, no. 1 (2010), http://education-next.org/the-turnaround-fallacy/.

7. David Stuit, *Are Bad Schools Immortal? The Scarcity of Turnarounds and Shutdowns in Both Charter District Sectors* (Washington, D.C.: Thomas B. Fordham Institute, December 2010), http://www.edexcellence.net/publications/are-bad-schools-immortal.html.

8. Julie Davis Bell, *Charter School Caps* (Washington, D.C.: National Conference of State Legislatures, December 2011), http://www.ncsl.org/documents/educ/CharterSchoolCaps.pdf.

9. Mitch Price, *Are Charter School Unions Worth the Bargain?* (Seattle, WA: Center on Reinventing Public Education, November 2011), http://www.crpe.org/cs/crpe/download/csr_files/CRPE_pub_Unions_Nov11-2.pdf.

CHAPTER ONE

Teachers in the Age of Digital Instruction

▪ *By Bryan C. Hassel and Emily Ayscue Hassel, Public Impact**

As digital learning has grown in prominence, a predictable debate has emerged: Teacher-union officials worry that online learning, educational software, video delivery, and other forms of technology-enabled instruction will be used primarily to replace teachers in a quest to save money. An article on the National Education Association's website entitled "Laptops are Not Teachers" quotes Idaho Education Association president Sherri Wood criticizing an Idaho education-reform law that will give high school students laptops beginning in 2015. The law "trades teachers for technology," she says. "You simply cannot replace a teacher with a laptop."[1]

Yet it's not only union officials fueling teachers' fears. Digital advocates and the media also stoke the fire. "Just as the Internet replaced telephone operators and the nightly news anchor as the default source of information," writes Gregory Ferenstein in the magazine *Fast Company*, "teachers may be next on the chopping block."[2]

We have little doubt that the digital future will transform education, but we don't believe it requires an either-or decision between technology and teachers. Rather, digital education needs *excellent* teachers *and* the teaching profession needs digital education.

As digital tools proliferate and improve, solid instruction in the basics will eventually become "flat"—available anywhere globally. The elements of excellent teaching that are most difficult for technology to replace will increasingly differentiate student outcomes.

* The authors thank Joe Ableidinger for research support on this chapter.

In the digital future, teacher effectiveness may matter even *more* than it does today, as these complex instructional tasks are left to the adults responsible for each student's learning. Teachers who nurture motivated, tenacious problem solvers while using new technologies to reach more children can become the fuel of local, state, and national economies. Schools will not need as many teachers as we know them. But excellent instructors, many in new roles, will need the right technology and instructional supporting teams to achieve excellence at scale, within budget, and potentially for much higher pay than today.[3] The selectivity and prevalence of these excellent teachers-in-charge who will leverage technology—and be leveraged by it—will be the distinguisher of learning outcomes among schools and nations.

In order to achieve this potential in the United States, myriad policies affecting teachers—from professional development to compensation—will need to be revamped. This paper outlines how.

The Digital Revolution and Excellent Teachers Need One Another

Even as the content of digital instruction improves, accountable adults will remain critical to student outcomes. Digital fare will eventually accomplish much of the diagnosis of learning levels and provision of matching instruction, particularly in core knowledge and skills, that today distinguish excellent teachers from peers. But successful teaching is much more than delivery of core instruction, no matter how effective. It also involves the following:

- motivating students to take on next challenges and persist despite barriers;
- helping students with time and task management and other habits critical to success;
- building children's social and emotional skills and fortitude;
- mentoring and modeling life skills;
- addressing personal and family situations that may impede learning;
- helping students dig deeper into material and develop higher-order thinking skills (analytical, conceptual, and creative); and
- taking responsibility for ensuring learning outcomes by making changes when a student's learning growth stalls—below or above standards.

These distinguishing aspects of teachers who produce outstanding learning results with more students are not ones that technology can fully replace. At

the same time, in order to become a profession in which excellent teachers are rewarded and may reach more students over time, the teaching profession needs the digital-learning revolution. Digital learning has the potential to transform teaching in three primary ways, detailed in the pages that follow:

- **Enabling excellent teachers to reach more students.** Great teachers will increasingly be able to teach more students in person as digital learning replaces portions of instruction in an individualized fashion and provides time-saving student data; reach students remotely via technology; and capture and share their performances and methods widely through video and smart software that individualizes learning.[4] Even among excellent teachers, various people will thrive in different roles.

- **Attracting and retaining more of these excellent teachers.** As excellent teachers reach more students, they will be able to earn more out of regular per-pupil funds. The combination of higher pay and career opportunities made possible by digital learning will, in turn, help teaching attract and keep the best performers.

- **Boosting effectiveness and job options for average teachers.** Average teachers will benefit as digital technology and the extended reach of their excellent peers take complex tasks off their to-do lists, enabling them to focus on the parts of teaching at which they can excel. Through technology, they can also obtain real-time data and advice about how to help each of their students succeed, saving time and improving performance. Digital learning makes it easier to personalize instruction, which many average teachers find difficult or impossible to achieve with whole classrooms of students with a wide array of needs. Some new roles will pay less, but many will also require hours far shorter than today's typical fifty-hour teacher workweek.[5]

To be sure, not all of today's teachers will benefit from these transformations. In all likelihood, these changes will mean that the nation needs fewer teachers as we now know them—fully and solely accountable for whole classrooms of children. Today's ineffective teachers can be replaced by more effective ones in this new digital-learning world, either through remote instruction or the extended reach of more effective teachers to more students. Those ineffective teachers who still wish to remain in education may find new roles available. But the new roles that are instructional, such as tutoring small groups, will be better filled by

today's average teachers, rather than the least effective ones. Some new roles, such as online-learning lab monitors who do not provide instructional support, may be appropriate for today's less effective teachers. But in many cases, new sector entrants who have digital hardware and software know-how will fill these roles.

The net effect is likely to be a smaller, but much stronger and more highly paid, teaching force coupled with new, lower-paid roles—many with appealing, shorter hours—that support the fully accountable teachers. This differentiated structure is similar to that which has emerged with changing roles and technology in other professions like law and medicine.

Employing digital technology to transform the teaching profession in ways that benefit students holds enormous promise. That promise will likely go unrealized, however, without significant changes in public policies and management systems, in the allocation of funds, in the technology infrastructure, and, perhaps most importantly, in the level of will and demand for better student outcomes. Here we outline a vision for how these changes can be realized.

Extending Great Teachers' Reach

We know the quality of instruction students receive makes a huge difference in their achievement. Having teachers in the top 25 percent of effectiveness versus the bottom 25 percent would enable the average low-income child to make up the typical achievement gap in just three to four years.[6] Consecutive excellent teachers also can help middling students leap ahead. Yet we also know that given the way schools generally work today, with one teacher assigned to each classroom, only about 25 percent of classes will have one of these top-tier teachers at a given time. The other 75 percent will not.

As we have argued elsewhere, one promising strategy to change those numbers is to extend the reach of excellent teachers to more students, paying these teachers more, and attracting and keeping more of them—while still remaining within budget.[7] States, districts, and schools are beginning to deploy more-comprehensive systems to determine teacher effectiveness. As those systems improve, education leaders will know with more certainty and in more subjects and grades which teachers are achieving the strongest results. Schools can move to identify the best teachers more rapidly, rather than waiting for systems that better allow for legally defensible dismissals.[8] With better

evaluation, the opportunity to leverage great teachers to help more students will grow significantly.[9]

Some ways of extending excellent teachers' reach do not require technology. For example, schools could shift a few more students into better teachers' classrooms or put teacher-leaders in charge of multiple classrooms. But the digital revolution can extend great teachers' reach much further, in three ways: replacing a portion of instructional work with digital tools, interacting with more students remotely by removing some noninstructional tasks, and instructing students "boundlessly" via video and smart software that personalizes learning.

New Roles for In-Person Teachers

Even in the digital age, in-person teachers remain critical. Because of the child-care function school plays in our economy, most children will continue to attend brick-and-mortar schools. Their in-person teachers, and other school personnel, will be responsible for motivating them, teaching them time management, addressing social and emotional issues that affect their learning, and making changes when their learning stalls. In-person teachers also will be best positioned, at least in the near future, to develop students' higher-order thinking: their ability to apply knowledge and skills to analyze challenging problems, grasp broader concepts, and devise new ideas and solutions.

But time is a critical constraint for this type of educator. With only so many hours in the day, even the best face severe limits on the number of students they can reach. The promise of digital technology in this context is its ability to *free excellent in-person teachers' time* using what we call "time-technology swaps."[10] In this model, digital instruction takes over a portion of great in-person teachers' instructional duties, such as delivering lectures and assessing students' mastery of standards. This frees teachers' time—allowing fewer (and better) in-person teachers to reach more students with the personalized, enriched portions of their instruction.[11]

These swaps involve fundamental restructuring of the school day: using digital instruction specifically for the purpose of freeing enough hours of great teachers' time to work with a significant number of additional students—not just layering available technology atop current education-delivery models. Students spend 25 percent or more time with digital instruction, most likely focused on knowledge and skill acquisition. Adults still supervise students during this time, but they do not need to be teachers as we know them. Indeed, many will not be.

Numerous schools have begun using digital instruction for time-technology swaps, many of them described in Innosight Institute's *Rise of K–12 Blended Learning* profiles.[12] Here are two examples:

- *Rocketship Education*. In this California-based charter school network's elementary schools, students spend 25 percent of their time in a "learning lab," receiving self-paced digital instruction and live tutoring monitored by paraprofessionals. Because this frees teachers' time, three teachers are able to reach a total of one hundred students, rather than just seventy-five, in rotating classes of twenty-five students at a time.
- *KIPP Empower*. In this Los Angeles K–8 charter school, part of the national KIPP network, teachers in each classroom rotate students among computer-based adaptive-learning programs, teacher-led small groups, and individualized instruction with teachers. Overall class sizes are twenty-eight or twenty-nine students per teacher (compared with about twenty in typical KIPP LA schools), but with half the class engaged in computer instruction at any given time, teacher-led groups number between fourteen and fifteen students for core subjects (reading, math, writing, and science).

Time-saving, Productivity-enhancing Tools

One way to free teachers' time is to off-load some instructional duties to digital instruction. Another is to find ways for digital tools to streamline noninstructional tasks that take teachers' time but are important for excellent student outcomes. According to data from the 2007–08 *Schools and Staffing Survey*, elementary and secondary teachers spend twenty-two and twenty-four hours per week, respectively, on noninstructional duties (things like administrative paperwork, etc.).[13] Could digital tools help reduce that load?[14] Here is a list of instructional and noninstructional duties and a sampling of tools designed to streamline them:

- *Compiling and analyzing student data.* New York City, working with the technology firm Wireless Generation, implemented the Achievement Reporting and Innovation System (ARIS) to put a wide array of data and analysis at teachers' fingertips.[15]
- *Personalizing instruction modes and levels of work.* School of One provides the math program at three New York City middle schools. School of One's "learning algorithm" recommends to teachers a daily schedule ("playlist") of learning activities tailored for each student, reducing teachers' lesson-planning load.[16]

- *Finding or creating lesson plans and materials.* BetterLesson is a free website that invites teachers to "find lesson plans, classroom materials and instructional resources from high-performing teachers."[17] Taking a different tack is TeachersPayTeachers, an open marketplace launched by a former NYC teacher, where teachers buy and sell original teaching materials. Subscription-based netTrekker enables teachers (and students) to search 300,000 "digital resources" that it says have been "vetted by high-performing teachers."[18] Since the quality of materials posted to such sites is likely to vary widely, one key to their success will be enabling the best to rise to the top based on user ratings or, better yet, efficacy with students.
- *Performing administrative tasks.* Numerous electronic "gradebooks" have emerged to track attendance, keep calendars, and share assignments and grades with students and parents. Examples include Engrade and LearnBoost.[19]

Beyond time-technology swaps, digital tools can also free great teachers' time in other ways. (See the sidebar "Time-saving, Productivity-enhancing Tools.")

Remote Instruction

Remote instruction comes in two flavors: "synchronous" and "asynchronous." In synchronous instruction, the teacher and the students are interacting with one another in real time via videoconference, video-chat, shared online "whiteboards," audio-conference, online text chat, or even just simple telephone calls. Cameras placed in classrooms can give remote teachers visual access to whole classes, enabling these educators to be aware of how students are responding to their instruction. As technology improves, this kind of interaction is likely to feel increasingly like natural, in-person interaction—especially as video conferencing becomes smoother and as three-dimensional holograms of teachers or "immersive" online environments, like those experienced in games, are used more frequently.[20]

In asynchronous instruction, teachers still interact with students, but not in real time. Instead, they provide written online feedback on assignments, answer students' questions via email, or post a response to an online discussion board for many students to see.

Remote instruction opens up numerous professional opportunities for teachers that are less likely or impossible in an all-in-person environment:

- *Living where you want to live.* One of the biggest challenges in providing great instruction to all students is that many children live in places with a limited

supply of good, or great, in-person teachers—with rural areas as the prime example. Remote instruction makes it possible for teachers to live where they want to live, while educating students where *they* live.

- *Choosing a work setting.* Remote teaching enables individual teachers to work from home, or pods of remote teachers to work in an office together as is common in other professions. Remote instruction also enables teachers to combine in-person teaching with remote duties. In Alabama's online school, for example, most of the faculty members have traditional teaching jobs during the day.[21]
- *Individualizing instruction.* Remote learning can increase the amount of personal individualized attention a teacher provides students. Distance paradoxically can make it easier for educators, who do not have the additional duties that an in-person teacher typically would, to focus on one student at a time. Innosight Institute's profile of Riverside Virtual School, for example, reports, "Overall, teachers say that they interact more with students as online teachers than when they are teaching a face-to-face course. Students also report having higher levels of engagement."[22]
- *Specializing.* As Rick Hess and others have argued, one promising way to improve the teaching profession is to "unbundle" the teaching role, enabling teachers to specialize in the aspects of teaching they do best—delivering engaging presentations, tutoring in small groups, or leading analytic discussion sections.[23] Focusing the time of great teachers on specific tasks linked directly to student achievement and relieving them of less significant duties can free their time to teach more students.
- *Leveraging time by managing or assisting other remote teachers.* An excellent remote teacher with managerial or coaching competencies could remain a teacher while also supervising or helping one, two, or more other teachers.[24] If teachers in this role are truly accountable managers rather than just unaccountable advisors, it will actually extend the reach of the excellent teacher's standards and practices—and create meaningful career paths for educators who want to remain teachers.[25]

Boundless Instruction

Remote instruction is limited by a scarce resource: the time of the teacher. Even if teaching remotely allows an instructor to reach more students, a person can work only so many hours in a day.

With boundless instruction, teachers capture their instructional prowess in a way that can then be shared widely, with a theoretically unlimited number of students. Two primary modes of boundless instruction are becoming increasingly common, each of which suggests new roles for great teachers:

- *"Mediagenic" superinstructors.* The ability to broadcast video lessons over the Internet makes it possible for teachers who are excellent content explainers to become star teachers, reaching a potentially boundless number of students. The most well-known of these efforts, undertaken by the Khan Academy, made 2,600 video lessons available online on a wide range of subjects; these have been viewed over 80 million times by people worldwide (as of October 2011).[26] Other examples include video course libraries made available by universities such as Carnegie Mellon and MIT and initiatives like Learning Match that enable individual teachers to test and then submit their own video lessons. We expect that video may expand to include holograms someday soon, given the rapid progression of holographic technology. The potential benefits to students are obvious: As this technology advances, no student should ever have to learn about the quadratic formula, or the causes of the Civil War, or the dynamics of supply and demand from anyone other than the very best explainers of those topics worldwide.
- *Application architects.* The digital explosion offers another set of opportunities for teachers: They can create or help design software applications that guide students through a series of "lessons," making it possible for them to master academic content without direct teacher interaction. In *Disrupting Class*, Clayton Christensen, Michael Horn, and Curtis Johnson write about Virtual Chem Lab, an online application that enables students to engage in simulated chemistry experiments. Virtual Chem Lab is used by 150,000 students and is one of many examples of applications created by instructors eager to extend themselves to a larger number of students.[27] In New York City's Quest to Learn School, teachers collaborate with video game designers from the Institute of Play to create game-based learning experiences that can be used both within Quest to Learn and also boundlessly.[28]

Attracting and Retaining the Best

Digital learning has the potential to create new career opportunities for excellent teachers. As they reach more students, they should be able to earn more—out of the per-pupil funding attached to a larger number of students. The chance of enhanced advancement and pay will, in turn, make the profession a more attractive long-term career for high performers. As a result, U.S. public education should have an easier time attracting and retaining top talent in teaching, ultimately making the profession a more welcoming place for high-achieving graduates to spend full careers. The United States won't need as many teachers; as in other industries, technology will do increasing portions of the work and enable other, lower-paid staff members to support both students and the excellent teachers in charge of their instruction.

Boosting Average Teachers' Effectiveness

In addition to giving dramatically more students access to excellent teachers, digital learning also has the potential to boost the effectiveness of average teachers—those who keep their students on track, but who struggle to close achievement gaps or help middling students leap ahead. We see several ways that digital learning could help these teachers achieve better outcomes. We keep this analysis brief, as this topic has been well examined by other commentators:[29]

- *Delivering initial knowledge and skill instruction.* The more students are learning through the "smart software" described above, the more time teachers will have to help students overcome learning barriers and to teach higher-order skills. Meanwhile, schools can ensure the accuracy and consistency of basic knowledge and skill instruction delivered digitally.
- *Generating real-time student data and lesson-plan advice.* Today's best teachers excel at diagnosing each student's needs and planning instruction accordingly. Digital technology holds the promise of providing other teachers with similar insight, by analyzing results and recommending next steps personalized to the student's needs.
- *Enhancing professional development.* Digital technology makes it possible for teachers to learn from videos of great teachers, obtain critical and timely feedback on their own video-recorded lessons, and connect with other teachers as mentors or peer-helpers. Some portion of excellent teachers' time freed in time-technology swaps also can be used to coach or manage peers.

Not There Yet

To realize the changes in the teaching profession discussed here, the digital landscape itself will need to improve in at least three ways. First, as the Digital Learning Now! signatories and others have said, providing universal low-cost access to broadband Internet for all K–12 teachers and students—during and beyond "school hours"—would greatly accelerate the nation's ability to start implementing these ideas.[30]

Second, digital users do not yet have platforms that help them find and deploy the best and best-fit among the explosion of digital resources. The lack of platforms that connect digital resources to varying curricula and individual child needs is a major barrier to personalizing learning. In all likelihood, the marketplace will increasingly provide multiple versions of such an integrative platform, but for now it remains an item on the "technology wish list" of the schools featured in *The Rise of K–12 Blended Learning*.[31]

Finally, digital instruction must become significantly better than some aspects of in-person instruction, ultimately matching excellent teachers. Measurement of digital learning effects on student outcomes is nascent, but research indicates only a small edge over average instruction for now.[32] Without significant improvements, the major educational benefit of digital learning will be allowing successful time-technology swaps to extend the reach of excellent live instructors. Instead, the two in tandem—excellent digital tools and excellent live teachers for all children—should be the goal of policy changes.

- *Enabling specialization.* As more of the work of teaching is handled by means of digital technology, teachers can increasingly specialize in their teaching strengths—such as particular subjects or parts of the teaching process. Some teachers who are average overall may be excellent specialists.
- *Introducing time-saving, productivity-enhancing tools.* Such tools can free teachers' time for understanding student data, planning lessons, or personalizing instruction. (See the sidebar "Time-saving, Productivity-enhancing Tools.")

Resculpting Policy and Management Systems

The changes described above won't happen automatically. Digital learning will have to improve significantly (see the sidebar "Not There Yet"). In addition, policies and management systems must change in order to make these new arrangements viable.[33] Here, we briefly explore policies that are particularly relevant to the

teacher role: those related to training and professional development, certification, class size, evaluation and supervision, compensation and related finance systems, employment arrangements, and unionization.

Training and Professional Development

Teacher training and professional development (PD) will need to change in two primary ways as digital learning becomes more prevalent.[34] First, digital learning will change *what teachers need to learn*. As teaching becomes more differentiated, so must teacher training and PD. Putting on a top-notch video-recorded teaching performance requires a competency and skill set different from those needed for, say, remote tutoring—and certainly different from those needed by an effective in-person educator.

Teacher-preparation programs and ongoing PD must address these new needs. But one factor will help lighten the training load: The passage of time will also involve a generational shift, with the ranks of teachers increasingly filled by "digital natives," who grew up using digital tools, rather than "digital immigrants," who did not.[35] Indeed, we can already see many signs of increasing technological proficiency among teachers. In 2000, the average state reported that in 28 percent of schools, more than half were "beginners" when it came to technology. By 2005, the percentage was down to 15, and one can only think it has continued to decline.[36]

Second, digital learning can change *how teachers receive training and PD*. In 2005, the average state reported that 34 and 35 percent of its schools delivered PD online or via video, respectively. By 2006, these percentages were up to 65 and 74. More recent data are unavailable, but it seems likely that these percentages have continued to increase. In the digital age, teachers' roles are likely to shift over time, as technology makes different modes of teaching possible, and as individuals advance their instructional careers. PD, too, needs to be dynamic, available "on demand" rather than in big dollops at the beginning of a teacher's career and during summers.[37]

Certification

Today's certification practices do little to screen out ineffective teachers, and they appear to prevent some high-potential candidates from entering the profession.[38] The digital age makes certification reform even more pressing for two reasons:

- *The need to teach across state lines.* The use of digital tools can extend teachers' reach nationally and internationally. This possibility heightens the importance of eliminating state-based certification barriers: No policy should block great teachers from reaching a given state's children, no matter where teachers reside or which license they hold. State policies need to be swiftly amended to fix this issue. If they are not, federal policymakers should step in: Under the interstate commerce clause, the emerging interstate economy for instruction allows for federal preemption of state laws that affect this national talent exchange. Just as federal law prevents individual states from restricting commerce across state lines in other industries, federal action could trump state policies that keep great teachers who reside elsewhere from instructing the state's children virtually.
- *The need to use noncertified personnel.* Under some state-certification laws, a licensed teacher must supervise students who are taking core courses, even if they are learning online. This restriction undermines the economics of using digital learning to free great teachers' time, pay them more, and save money. Without such restrictions, schools could employ less expensive nonlicensed personnel to monitor students, splitting cost savings between salaries for the fewer, better in-person teachers and the school. Unless paired with shared cost savings, digital instruction will not launch the kind of virtuous cycle of sustainable excellence described above, in which digital instruction enables excellent in-person teachers to reach more students, enables schools to pay them more for doing so, and thereby entices greater numbers of excellent teachers to enter and stay in the profession.

Class Size

Thirty-six states currently have some limit on class size.[39] These limits apply equally to the best and worst teachers. Digital learning bumps up against class-size restrictions in two ways. First, limiting the number of students that a remote instructor can serve would detract from one of the key potential advantages of this type of instruction: the ability of excellent teachers to reach more students. Second, even in brick-and-mortar schools, class-size restrictions can limit the advantages of digital learning. Schools are configuring students in myriad ways, having them, at different times, work independently, in small groups, in learning labs, and in traditional classroom-based settings. Without this flexibility, it would be difficult for these schools to blend digital and in-person learning. State

policymakers should eliminate simplistic across-the-board limits or, at the very least, build in the possibility of flexibility for schools that have an alternative model.

Evaluation and Supervision

The rise of digital learning presents both bad news and good news for teacher-evaluation reform. The bad news is that today's new evaluation systems are largely being built for a traditional one-teacher-one-classroom model, at exactly the time that this conventional mode seems poised to decline. The role changes described above create two challenges for teacher evaluation.

First, digital tools will make it increasingly possible to "unbundle" the teacher's role, so that multiple people (rather than a single teacher) contribute to a student's learning. Of course this is not completely new, but it is likely to accelerate in the digital age, as little Susie receives algebra instruction via video, has her homework assigned and graded by a remote teacher, and receives extra help from a classroom paraprofessional. In this multiperson context, how can each participant's "value-add" be identified?

This complexity means that, whatever arrangements emerge, policies should require that one adult be ultimately accountable for each student's learning in each measured subject. That adult could be in-person or remote. That adult may employ digital tools, enlist other adults, and otherwise mobilize resources on behalf of the child. But for the state's or district's teacher-evaluation system, the student "counts" for that teacher's evaluation. Accordingly, this accountable adult must have significant choice over resources—human and otherwise—used in the child's education as well as adequate data about performance of those resources, a topic to which we return in our conclusion.

Second, as teacher roles become more differentiated, a simplistic rating of each teacher as "highly effective," "effective," and so forth becomes less meaningful. Teachers themselves, their peers and supervisors, and students' parents will need to know not just how effective teachers are overall (already a tricky task), but how effective they are in specific roles within the teaching process. Teachers who are highly effective at leading a whole in-person classroom, for example, may be less effective at remote education and vice versa. Likewise, teachers who are experts at teaching about the Civil War may stumble when asked to explain the Progressive Era. Ideally, data and evaluation systems will become multidimensional, yielding insight not just about how effective teachers are, but

in what aspects of teaching they are effective.[40] Increasingly, evaluation systems will need to examine not just outcomes and easily observable practices, but the underlying competencies that determine individuals' fitness for different roles.[41] Developing these systems will take time, but will ultimately be more useful than less nuanced approaches.

The good news for teacher evaluation is that the digital age should make possible unprecedented levels of transparency in teaching (and data collection) that should, in turn, facilitate evaluation and developmental feedback for teachers. In today's "closed-door" classrooms, little of what goes on can truly be captured in a way that would enable a teacher's peers, supervisors, or coaches to see how he or she is teaching. Observations can help, but they are inevitably sporadic and somewhat artificial. The more teaching that happens virtually, the more observable it becomes—both live, and in retrospect.

Compensation and Related Finance Systems

Though new compensation structures will be needed, we do not here prescribe an alternative compensation system for the digital age. Organizations will want to engage different approaches that fit their circumstances. What works for a statewide public virtual school might not be best for a for-profit online-education provider, a cyber charter network, or a district that is blending digital and in-person learning.

Instead, we offer three observations:

- *The need for flexibility.* State policies or collective-bargaining agreements that mandate lockstep salary schedules and tie funding to specific positions must be set aside to enable teacher pay to reflect the sort of role differentiation described above. Of particular importance are three kinds of flexibility: (a) the ability to pay excellent teachers more for educating a larger number of students successfully; (b) the flexibility to employ people not on the teacher salary schedule to perform roles such as monitoring digital-learning labs, tutoring, or performing parts of remote instruction, rather than requiring the use of licensed teachers for such duties; and (c) the ability to make school funding flexible more generally, enabling schools to allocate funds to different kinds of staff and technology to meet students' needs. Item (a) is in part a matter of simple fairness to excellent teachers, but also a key to starting the potential virtuous cycle of expanded great teacher reach, leading to greater pay and career opportunities, leading to higher levels of retention and

attraction of new high-caliber entrants. Items (b) and (c) are vital to unlocking the funds needed to make (a) possible.

- *Evolving finance systems and teacher compensation.* Chapter four of this volume—"School Finance in the Digital Learning Era"—addresses how school-finance systems need to change in the digital age. If, following the suggestion of some proponents, finance for digital learning moves toward a system in which providers are paid (either in full or in part) only if their students succeed, then providers will need to design teacher-compensation systems to align incentives. Outcome-based funding can encourage effective use of both digital learning and the adults accountable for its success.
- *The market for teacher talent.* The rise of remote and boundless instruction opens up the possibility of a national, or international, market for teaching talent. Especially if finance systems shift to rewarding providers for results, excellent teachers—in-person and online—will become increasingly valuable financially, and they should be able to leverage that value into higher compensation for themselves. Whether they are providing remote instruction to specific groups of students, converting their teaching talent into boundlessly available resources like video recordings or smart software, or using digital instruction to extend their reach in-person, top teachers should have expanded earning opportunity. How all this will sort out in the marketplace is, of course, uncertain. The most well-known provider of video instruction, the Khan Academy, currently provides all its content free of charge and covers costs with philanthropy. In Korea, where teaching excellence is revered, superinstructors can earn six or seven figures.[42] Enabling great U.S. teachers to earn what they are worth to society may be necessary in order to scale up a sustainable national marketplace for great teachers.

Employment

The more divorced teaching becomes from a specific school site, the easier it becomes to imagine different kinds of employment arrangements for teachers. Some of these are implied in previous sections, but there are other possibilities as well:

- *Working for a virtual school or online education provider.* Already, an increasing number of teachers work for one of the state-run or charter virtual schools or private providers of online education, full time or in addition to their "day jobs" as in-person teachers. As these providers grow, they will create other

opportunities for teachers to contribute, such as by recording top-notch videos of content that can become part of providers' libraries.

- *Working as a provider of specialized instruction.* Online providers like Connections Academy and K12 offer the full range of content. But other providers are emerging to offer more specialized services, such as Presence Telecare, which uses videoconferencing to offer online speech therapy. Presence employs licensed speech therapists nationally who work from home on a flexible schedule. Similar services are likely to emerge across other specialties, including core academic-content areas. These services could hire teachers as employees or consultants, or could be organized, owned, and run by teachers themselves, just as in law, medicine, and other professions.[43]
- *Working as a designer.* Teachers will have increasing opportunities to contribute to "boundless" instructional resources such as smart software, either by developing it themselves or by working as an employee or contractor for developers.

Unions

Terry Moe and John Chubb (author of chapter five, "Overcoming the Governance Challenge in K–12 Online Learning) predict that unions will inevitably lose out as digital learning takes hold, because of lost geographic concentration and reduced number of teachers, both of which are key to union power.[44] While this is a plausible outcome, we see another possibility.

Whatever the effect of digital learning on the overall number of jobs in the education sector, there can be little doubt that technology will transform the field into a much wider array of differentiated roles in comparison to today's one-teacher-one-classroom model. Union leaders who grasp this reality and step in to support employees in this changing sector may keep their organizations viable. Those who do not adapt may face trouble as the employment structure shifts. Union relationships could enable predictable wages for a growing number of roles and portable benefits that employees may carry with them into new jobs. Education unions that provide benefits directly may attract free-agent employees who want security in a work environment where roles and jobs are changing and where not all labor is attached to specific schools in full-time, permanent positions. Motion picture and other entertainment-industry unions may provide starting-point models for the future of education: Stars are paid for their disproportionate

economic and entertainment value, but other professionals are paid predictable wages and have access to benefits. In these sectors, union rules set minimum pay for supporting roles without limiting pay for top-tier performers.

A Revitalized Teaching Profession, If We Have the Will

These potential changes bode well for the teaching profession, which has the chance to become, like other professions, an "opportunity culture" that gives teachers a wide array of ways to advance while still remaining teachers, and to be rewarded for their contributions.[45] They bode especially well for consistently excellent teachers, who stand to gain the most in terms of expanded opportunities and rewards, and whose ranks should increase because of the enhanced attractiveness of the job to high performers. But they also bode well for average teachers who, by taking advantage of the time-saving potential of digital tools and other potential benefits, will have much greater opportunity to contribute to excellence than they can in traditional classrooms.

This is not to say the changes bode well for *all* teachers. As the nation comes to need fewer instructors per pupil, school providers will be able to push out the very least effective teachers (if policy allows). These changes would be positive for students and the public, as schools should be able to achieve better results, within current budgets, by employing fewer, better teachers.

While digital learning will mean fewer traditional teachers, not all of these jobs will disappear: Some will be replaced by new roles, such as monitoring students during digital instruction time, providing small-group tutoring, and performing noninstructional duties. Remote and boundless instruction will open all kinds of jobs for people in technical fields, but also for people who can play specialized nonteaching roles online to help students as they work with the technology. Where today's teaching profession resembles the bygone age of the solo general-practitioner doctor carrying out all of the practice's tasks himself, tomorrow's is likely to look increasingly like the modern medical field: with a wide array of different professionals and paraprofessionals playing a range of roles that together add up to a coherent system of service delivery centered around patients. Similar changes occurred in the legal profession, enabling better lawyers to earn more by serving more clients with teams of junior associates, paralegals, and administrative assistants. All of this is so familiar today that it is easy to forget how recently these significant changes occurred.

Of course, this is easy to envision on paper. Without a strong demand from education providers to use digital learning effectively, uptake will be slower than it could be. Likewise, the significant changes in policy and management systems that are needed to usher in these new opportunities will not happen, or will happen much too slowly to keep up with the potential of technology.[46]

One way to create this demand would be to empower excellent teachers who have already proven they are driven to succeed. What if schools, districts, or even states gave willing individual excellent teachers the power and funding to integrate digital technology (and other human resources) into learning, in exchange for taking on a larger load of students? What if these great teachers gained control of a good portion of the funding generated by their expanded numbers of students? This power to purchase, use, and change digital and human resources, and to assess the options based on data and prior results, would allow the person accountable for students' results to determine curricular content and better ensure student achievement. What if not just one or a few excellent teachers gained that power, but thousands or tens of thousands?

Whether through that approach or some other, the nation's schools and policymakers will need the courage to dramatically change—and not just nibble away at the edges of—a profession that has remained static as other professions have advanced. Without that courage, our teachers and students—and our nation—will miss an enormous opportunity made possible by the advent of digital technology while other nations undoubtedly seize it.

Endnotes

1. Cited in Tim Walker, "Laptops Are Not Teachers," *NEA Today*, April 1, 2011, http://neatoday.org/2011/04/01/laptops-are-not-teachers/.

2. Gregory Ferenstein, "Teacher-Replacing Tech: Friend or Foe?" *Fast Company*, February 1, 2011, http://www.fastcompany.com/1722914/can-computers-replace-teachers.

3. Emily Ayscue Hassel and Bryan C. Hassel, *3X for All: Extending the Reach of Education's Best* (Chapel Hill, NC: Public Impact, 2009), http://www.publicimpact.com/images/stories/3x_for_all-public_impact.pdf.

4. See Hassel and Hassel, *3X for All*; Clayton M. Christensen, Michael B. Horn, and Curtis W. Johnson, *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns* (New York: McGraw-Hill, 2008); Terry M. Moe and John E. Chubb, *Liberating Learning: Technology, Politics, and the Future of American Education* (San Francisco: Jossey-Bass, 2009).

5. See Michael Horn, "Why Digital Learning Will Liberate Teachers," *Innosight Institute*, August 9, 2011, http://www.innosightinstitute.org/education-blog/why-digital-learning-will-liberate-teachers/; Alex Hernandez, "Blended Learning's Impact on Teacher Development," *Innosight Institute*, July 11, 2011, http://www.innosightinstitute.org/education-blog/blended-learnings-impact-on-teacher-development/; Tom Vander Ark, "10 Reasons Teachers Love Blended Learning," *Huffington Post*, July 11, 2011, http://www.huffingtonpost.com/tom-vander-ark/10-reasons-teachers-love-_b_894222.html. On rethinking teacher roles more generally to enable average teachers to contribute to excellence, see various writings of Frederick M. Hess and his colleagues, including "How to Get the Teachers We Want," *Education Next* 9, no. 3 (2009), http://educationnext.org/how-to-get-the-teachers-we-want/; Jane Coggshall, Molly Lasagna, and Sabrina Laine, *Toward the Structural Transformation of Schools: Innovations in Staffing* (Naperville, IL: Learning Point Associates, 2009), http://www.learningpt.org/expertise/educatorquality/resources/publications/InnovationsInStaffing.pdf; and Barnett Berry and the Teacher Solutions 2030 Team, *Teaching 2030: What We Must Do for Our Students and Our Public Schools* (New York: Teachers College Press, 2011).

6. For the data and calculations behind this conclusion, see Bryan C. Hassel and Emily Ayscue Hassel, *Opportunity at the Top: How America's Best Teachers Could Close the Gaps, Raise the Bar, and Keep Our Nation Great* (Chapel Hill, NC: Public Impact, 2010), notes 12 and 15, http://opportunityculture.org/images/stories/opportunity_report_web.pdf.

7. Hassel and Hassel, *3X for All*.

8. Emily Ayscue Hassel and Bryan C. Hassel, *Seizing Opportunity at the Top: How the U.S. Can Reach Every Student with an Excellent Teacher* (policy brief) (Chapel Hill, N.C.: Public Impact, 2011), http://opportunityculture.org/seizing_opportunity_policybrief-public_impact.pdf; and "Seizing Opportunity at the Top: How the U.S. Can Reach Every Student with an Excellent Teacher" (working paper), Public Impact, Chapel Hill, NC, 2011, http://opportunityculture.org/seizing_opportunity_fullreport-public_impact.pdf.

9. Digital learning may itself contribute to improved teacher evaluations by producing a stream of real-time information about individual students' learning, an improvement over today's end-of-year test-based systems.

10. For more on "time-technology swaps," see Public Impact, "Reaching More Students with Great Teaching: Summary Reach Extension Models," www.opportunityculture.org. See also Christensen, Horn, and Johnson's discussion of "disruptively deploying computers" in *Disrupting Class*; and Paul T. Hill, *Learning as We Go: Why School Choice Is Worth the Wait* (Stanford, CA: Hoover Institution Press, 2010), pp. 68–71.

11. In theory, students could spend time on digital learning at home. Though some schools are experimenting with such "homework flipping," it faces limits, as we have written elsewhere (e.g., "Khan Academy: Not Overhyped, Just Missing a Key Ingredient—Excellent Live Teachers," *Education Next* blog, June 13, 2011, http://educationnext.org/khan-academy-not-overhyped-just-missing-a-key-ingredient-%E2%80%93-excellent-live-teachers/). The 2004 National Assessment of Educational Progress survey of students found that 39 percent of high schoolers *do no homework*, and another 28 percent do an hour or less each night. M. Perie, R. Moran, A. D. Lutkus, *NAEP 2004 Trends in Academic Progress: Three Decades of Student Performance and Reading and Mathematics* (Washington, D.C.: U.S. Department of Education, Institute of Education Sciences,

and National Center for Education Statistics, 2005), p. 51. Thus most students do not have much homework time to flip. In addition, home access to broadband Internet remains spotty, especially for low-income students.

12. Heather Staker, *The Rise of K–12 Blended Learning: Profiles of Emerging Models* (Mountain View, CA: Innosight Institute, 2011).

13. National Center for Education Statistics, *2007–08 Schools and Staffing Survey*, table 6, http://nces.ed.gov/pubs2009/2009324/tables/sass0708_2009324_t12n_06.asp#f2.

14. Even without digital tools, schools could reduce the noninstructional time of great teachers and free them up to reach more students by reassigning noninstructional tasks to other staff. For a discussion of noninstructional time swaps, see Public Impact, "Reaching More Students with Great Teaching."

15. For more on ARIS, see Arthur VanderVeen, "Smarter Data Systems: The New York City Experience," *Quick & the Ed*, March 15, 2010, http://www.quickanded.com/2010/03/smarter-data-systems-the-new-york-city-experience.html.

16. See School of One's homepage at http://schoolofone.org.

17. See BetterLesson's homepage at http://betterlesson.org and KIPP:Share's homepage at https://share.kipp.org.

18. See netTrekker's homepage at http://www.nettrekker.com.

19. See engrade's homepage at http://www.engrade.com and LearnBoost's homepage at https://www.learnboost.com.

20. Holographic technology has improved significantly in the past decade, so that viewers in a room can see the images from any angle. Volumetric displays are used to present the image. Whole classrooms might become volumetric displays, or computers might be able to present small, personalized holographic images to students. See, for example, P. A. Blanche et al., "Holographic Three-Dimensional Telepresence Using Large-Area Photorefractive Polymer," Nature 468, no.7320 (2010), http://www.nature.com/nature/journal/v468/n7320/full/nature09521.html.

21. Staker, *Rise of K–12 Blended Learning*, p. 13.

22. Staker, *Rise of K–12 Blended Learning*, p. 128.

23. See note 5 above for citations. See also chapter two in this volume, "Quality Control in K-12 Digital Learning" by Frederick Hess.

24. Somewhat paradoxically, remote instruction may make it easier for supervisors and peers to monitor and assist teachers with their instruction by making teaching more transparent. There is not much of a "classroom door" to "close" in the online world.

25. This role could exist for in-person teachers, too. Some schools have "lead teachers," "mentors," and "coaches," but these positions rarely involve the accountable management we intend. Instituting this model within remote instruction may be easier, because organizational routines are less established (for now) in online education. Newly hired remote educators would sign up understanding they'd be working in teacher-led pods. For more discussion of extending the reach of great in-person teachers in this way, see Public Impact, "Reaching More Students with Great

Teaching."

26. See Khan Academy's homepage at http://www.khanacademy.org. Data on number of videos and views are as of October 14, 2011.

27. Christensen, Horn, and Johnson, *Disrupting Class*.

28. Staker, *Rise of K–12 Blended Learning*, p. 125. Note that software designers need not have been teachers previously, but the best of them, like excellent teachers, will have a strong grasp of what motivates children, as well as deep content knowledge.

29. See note 5 above for references.

30. Digital Learning Now!, *10 Elements of High Quality Digital Learning* (Tallahassee, FL: Foundation for Excellence in Education, 2010), p. 13, http://www.excelined.org/Docs/Digital%20Learning%20Now%20Report%20FINAL.pdf.

31. Staker, *Rise of K–12 Blended Learning*, p. 172.

32. U.S. Department of Education, Office of Planning, Evaluation, and Policy Development, *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies* (Washington, D.C.: U.S. Department of Education, 2010).

33. See Digital Learning Now!, *10 Elements of High Quality Digital Learning*.

34. For further discussion, see Hernandez, "Blended Learning's Impact on Teacher Development."

35. Marc Prensky, "Digital Natives, Digital Immigrants," *On the Horizon* 9, no. 5 (2001), http://www.marcprensky.com/writing/prensky%20-%20digital%20natives,%20digital%20immigrants%20-%20part1.pdf.

36. The figures are authors' tabulations from the table generated by *Education Week*, Education Counts online table builder, custom table run June 2011.

37. In many ways, this imperative is no different from what researchers said PD should be like even in the predigital age. Lucy Steiner, *Designing Effective Professional Development Experiences: What Do We Know?* (Naperville, IL: Learning Point Associates, 2004), http://www.tqsource.org/issueforums/plantoAction/resources/4_PDResearchPolicyAction/DesigningEffectivePD.pdf.

38. Dan D. Goldhaber and Dominic J. Brewer, "Does Teacher Certification Matter? High School Teacher Certification Status and Student Achievement," *Education and Policy Analysis* 22, no. 2 (2000): 129–45; Thomas J. Kane, Jonah E. Rockoff, and Douglas O. Staiger, "What Does Certification Tell Us About Teacher Effectiveness? Evidence from New York City," *Economics of Education Review* 27, no. 6 (2008): 615–31, http://www.gse.harvard.edu/news/features/kane/nycfellows-march2006.pdf; Dan Goldhaber, "The Mystery of Good Teaching," *Education Next* 2, no. 1 (2002): 50–55, http://educationnext.org/the-mystery-of-good-teaching/.

39. Kyle Zinth, *Maximum P-12 Class-Size Policies State Note* (Denver: Education Commission of the States, 2009), p. 1, http://www.ecs.org/clearinghouse/82/91/8291.pdf.

40. One step in this direction is the Southern Regional Education Board's *Standards for Quality Online Teaching* (Atlanta: Southern Regional Education Board, 2006), http://publications.sreb.org/2006/06T02_Standards_Online_Teaching.pdf. The International Association for K–12 Online

Learning (iNACOL) has endorsed this work as a standard for the industry.

41. For more on competencies as part of teacher evaluation, see Public Impact, *How Should States Define Teacher Effectiveness?* (Chapel Hill, NC: Public Impact, 2009), http://www.publicimpact.com/publications/PublicImpact-How_Should_States_Define_Teacher_Effectiveness.pdf. For competencies in general as predictors of work performance, see Lyle M. Spencer and Signe Spencer, *Competence at Work, Models for Superior Performance* (New York: John Wiley and Sons, 2003). For Singapore's use of competencies in its teacher evaluation system, see Lucy Steiner, *Using Competency-based Evaluation to Drive Teacher Excellence: Lessons from Singapore* (Chapel Hill, NC: Public Impact, 2010), http://www.publicimpact.com/images/singapore_lessons-publicimpact.pdf.

42. "Where a Teacher Can Make Millions," *Bloomberg Businessweek*, December 11, 2006, http://www.businessweek.com/magazine/content/06_50/b4013056.htm.

43. Education | Evolving, *Teachers in Professional Practice: An Inventory of New Opportunities for Teachers*, 2nd ed. (St. Paul, MN: Education | Evolving, 2006), http://www.educationevolving.org/pdf/Teachers_In_Pro_Practice_2ndED.pdf.

44. Moe and Chubb, *Liberating Learning*, p. 158.

45. Hassel and Hassel, *Opportunity at the Top*, p. 22.

46. Public Impact's working paper "Seizing Opportunity at the Top" outlines major federal and state policy options for "inducing demand," but these are beyond the scope of this paper.

CHAPTER TWO

Quality Control in K–12 Digital Learning: Three (Imperfect) Approaches

▪ *By Frederick M. Hess*

Digital learning poses an immense dilemma when it comes to ensuring quality. One of the great advantages of online learning is that it makes "unbundling" school provision possible—that is, it allows children to be served by providers from almost anywhere, in new and more customized ways. But taking advantage of all the opportunities online learning offers means that there is no longer one conventional "school" to hold accountable. Instead, students in a given building or district may be taking courses (or just sections of courses) from a variety of providers, each with varying approaches to technology, instruction, mastery, and so forth. (Students may also be benefiting from other providers of tutoring, out-of-school supplementation, and more.) To further complicate this picture (and add to its political volatility), many providers are likely to be profit-seeking ventures. Finding ways to define, monitor, and police quality in this brave new world is one of the central challenges in realizing the potential of digital learning.

The reformers who shaped our current system of schooling in the late nineteenth and early twentieth centuries drew from the "best practices" of their time. In doing so, they designed a centrally managed, one-size-fits-all system of more-or-less standardized schools staffed by teachers doing more-or-less standardized work. (It was not unlike the mass production and assembly line systems being devised at approximately the same time for industry.) The presumption was that roughly similar schools, school districts, and educators could simultaneously serve many different students without altering or tailoring their practices in major ways. What may have worked a hundred years ago, however, has now led to overburdened educators and institutions that have trouble doing anything very well.

Virtual schooling's greatest power is that it creates the opportunity to reconsider what is feasible. Digital learning makes it possible to deliver expertise over distances, permits instructors to specialize, allows schools to use staff in more targeted and cost-effective ways, and customizes the scope, sequence, and pacing of curriculum and instruction for particular children. All of these considerations facilitate the delivery of high-quality, high-impact instruction. At the same time, because it destandardizes and decentralizes educational delivery, digital education is far harder to bring under the yoke of the quality-control systems and metrics that have been devised for traditional school structures.

To realize the potential gains in cost efficiency, customization, instructional quality, pupil engagement, and—ultimately—student learning that the digital age makes possible will require policymakers and practitioners to find new ways to monitor and police quality. Absent the familiar panoply of credentials, staffing ratios, instructional hours, Carnegie units, and school days that now provide tangible assurance that a given school is "real" and legitimate, digital learning will struggle with finding acceptance.

Why Quality Control Matters

In their enthusiasm for virtual learning, reformers risk three key mistakes. First, technophiles can too readily succumb to the hope that virtual schooling is a rising tide that will inevitably sweep away all obstacles before it, despite any missteps with regard to quality control or incentives. "The power of technology today," write Terry Moe and John Chubb in *Liberating Learning: Technology, Politics, and the Future of American Education*, "simply cannot be overstated… Technology promises to change the fundamentals of how teaching and learning have taken place for centuries."[1] In *Saving Schools: From Horace Mann to Virtual Learning*, Paul Peterson suggests that "as technology improves, schools can match students to their ideal difficulty point, giving them the intrinsic satisfaction that comes with a genuine learning experience."[2]

Such sentiments eerily recall the enthusiastic claims once made for the transformative power of school choice. Twenty years ago, Moe and Chubb asserted that "reformers would do well to entertain the notion that choice is a panacea… It has the capacity all by itself to bring about the kind of transformation that, for years, reformers have been seeking to engineer in myriad other ways."[3] Developments like school choice and digital learning do indeed have the potential to be "disruptive" forces (in the terminology of Clay Christensen), but there is no

guarantee that they will play that role.[4] In the case of school choice, little or no quality control in too many states yielded a slew of mediocre and faltering charter schools. Moreover, excessive faith that excellence would inevitably win out led reformers to spend little time or energy on quality control—yielding middling performance and an industry filled with unexceptional providers committed to safeguarding their livelihood. Such results dampened public enthusiasm and the willingness of policymakers to support autonomy and opportunities to expand.

The second key mistake that reformers make is failing to acknowledge the implications of public attachment to familiar institutions and routines. Proponents of digital learning are right to point out that the current system is rife with failure. But the system is also familiar, and reaps the advantages of popular support, inertia, and the benefit of the doubt. Where children and schooling are concerned, the burden of proof is going to fall on the new and unfamiliar. Worrying about the perils of education technology is hardly new. (See the sidebar "Historic Tussles over Quality in Distance Education.") While today's skeptics fret about online instruction, it was once books and the printing press that were feared by educators, who agonized that students would learn the wrong things if left to read on their own. In the seventeenth century, Sir Roger L'Estrange (once a member of the English Parliament and translator of Aesop's fables) wondered "whether more mischief than advantage were not occasion'd to the Christian world by the invention of typography."[5] Newness and unfamiliarity create a high bar to clear when assuring parents and the public that technology-infused learning (whether it involves books or iPads) is not a "risky" departure from what they have known.

Reformers make a third key mistake when they overlook the fact that K–12 education is publicly run, funded, and regulated, and therefore inherently political. Public officials are risk averse—they want to ensure that public dollars and agencies avoid doing obviously corrupt or dangerous things. Those opposed to digital learning can slow or halt its spread if they can get voters (and public officials) worried about the risks involved. It is no surprise that union officials and other opponents of digital learning are eager to identify and highlight signs of malfeasance. When former governors Jeb Bush and Bob Wise rolled out their bipartisan Digital Learning Now! compact in late 2010, Sherri Wood, president of the Idaho Education Association, denounced the digital push in the Gem State: "It's about getting a piece of the money that goes to public schools. The big corporations want to make money off the backs of our children."[6] Such attacks tend to gain steam when examples of inept or corrupt provision abound, but are

Historic Tussles over Quality in Distance Education

Those who imagine that digital learning's challenges are unprecedented would do well to consider the (surprisingly) long history of distance education. The earliest use of distance education in any formal sense is probably Isaac Pitman's use of written correspondence to teach shorthand as early as 1840 in Bath, England. For the cost of a postage stamp, anyone could receive shorthand lessons by mail and have those lessons corrected and returned in the same fashion.[7]

Experiments with "correspondence schools" emerged as early as the 1870s, when formal courses were conducted via mail by educational institutions. Their instructors were paid by individual students per course. Starting in 1873, Illinois Wesleyan University experimented with distance-instruction degrees. A student could even earn a doctorate in philosophy without setting foot on campus. The distance-learning program received so much criticism, though—namely from the University Senate of the Methodist Church and from the North Central Association of Colleges and Secondary Schools—that the program was dead by 1906.[8] Meanwhile, in the 1880s, thirty-two professors from universities including Harvard and Johns Hopkins formed the Correspondence University of America—but it also failed to survive.

As more for-profit organizations entered the distance-education market, peoples' concerns about distance schools' practices and the quality of a correspondence degree intensified. In those early years, there were two noteworthy attempts to control quality. In 1915, the growing number of correspondence study options led to the formation of the National University Extension Association, which sought to establish uniform guidelines for distance-learning providers. These guidelines included course-transfer procedures and course-quality standards.[9] In 1926, a monitoring organization was established—the National Home Study Council (NHSC), later renamed the Distance Education and Training Council (DETC)—to identify high-quality providers in the distance-learning field. Today the DETC consists of around one hundred distance-learning institutions spread across twenty-one states and seven countries, including the military's distance-learning providers.

Concerns still abound, however, that these institutions, lacking the familiar routines and processes of brick-and-mortar colleges, may function as "diploma mills." While some traditional institutions may have low standards, it is at least evident that they exist. Not even that much can be taken for granted about entities that need not maintain traditional facilities and cannot boast a visible population of faculty and students. Policing the worth and meaning of the credentials they offer has proven a thorny challenge.

Seeking to highlight these problems in 2001, U.S. senator Susan Collins bought a BS in biology and an MS in medical biology from Lexington University for $1,515, without taking any courses. If anyone called to inquire about the validity of the degree, the institution assured her, it would provide confirmation of her academic record and

her 3.8 grade-point average.[10] According to former U.S. representative Michael Castle, practices of that kind have been "a heck of a lot simpler with the use of the Internet. The tracking of them and the prosecution of them is a heck of a lot harder."[11]

Those who are confident they have identified sure-fire methods for policing the quality of online learning would do well to remember that they are not the first to wrestle with these issues. Generations of policymakers and reformers have sought to juggle the exigencies of quality control with the desire not to smother or unduly inhibit more convenient, cheaper, or less conventional approaches to education.

less likely to do so when problems are minimized. Because these reforms are political, success depends in large part on making policymakers and the public comfortable with the proposed changes. That's where quality control comes in.

From Quality Schools to Quality Learning

Embracing the power of digital learning entails shifting from a focus on "schools" and "teachers" to one on "schooling" and "teaching." Education must no longer be understood as something done by holistic, uniform, and self-contained organizations but rather as a suite of services provided by a shifting web of providers—and provided differently in different circumstances to different pupils. (That's the point of customizing, after all.) Rather than having a faculty that teaches English, math, French, and so forth, schools may have multiple online providers for each subject—or for portions of a particular course.

For instance, one provider might help students with writing and composition, but not teach novels or literature. Another might specialize in offering rich, interactive instruction about pivotal historical periods, without offering a full-scale chronological course. Still others (for example, outfits like Rocketship Education or Edison Learning) might package content from multiple online providers and in-person school faculty to offer "blended" instruction.

Today, most "virtual charter schools" still constitute a fairly conventional "school unit," one that can be held accountable as a whole for aggregate student performance. However, as the unbundling of education proceeds, it will no longer be safe to presume that student outcomes reflect the performance of a "school" or even a "teacher." In an increasingly granular world, holding providers responsible for their outcomes requires devising ways to gauge the performance of each provider in turn, rather than simply documenting the aggregate results for children in a given classroom, school unit, or locale. Such a task is an enormous

challenge, and one far beyond the scope of our current abilities, understanding, or assessment technologies. While extremely promising, then, these unbundled providers offer unique quality-control challenges.

Schooling in a digital world calls upon both school personnel and families to make new kinds of choices. School leaders will need to decide whether a given course should be taught by an online provider, a school-based instructor, or some combination of the two—and whether to offer students a choice of one or more of these modalities. In those cases where more than one option is available, students and families will then have to make a choice. This new system differs from even our current school-choice models, which require only that parents decide which school they want John Jr. to attend. Instead, it resembles more the relationship between a shopkeeper and consumer: The shopkeeper decides which goods to put on the shelves, but the consumer decides which shop to frequent—and which goods to purchase while there.

Unfortunately, it is difficult to craft quality-control systems that reflect and adapt to the seismic shift that digital learning represents. The best that policymakers can do is to select among—or combine—three basic approaches, each with its own significant limitations:

- Input and process regulation
- Outcome-based accountability
- Market-based quality control

The alert reader will note that these are precisely the same choices available to policymakers seeking to hold any public service accountable.

Input regulation entails policymakers prescribing what entities must do to qualify as legitimate online providers. Outcome-based accountability relies on setting performance targets that providers must meet. And market-based quality control permits the universe of users to choose their preferred providers—and then trusts that market pressures will reward good providers and eventually shutter lousy ones.

These are not mutually exclusive options, but together they comprise the basic menu of choices for policing digital learning (or any other public function). The difficulty is that these approaches were devised for assessing conventional institutions, not the more fluid networks of providers and learners created by digital instruction. In the digital world—where new tools and technologies offer dramatic opportunities to rethink teaching and learning by disassembling a school,

classroom, or course into its component parts, and then delivering instruction in more customized ways—these quality-control approaches will no longer be a comfortable fit for providers. Rather, like a Sunday suit that a teen has outgrown, they will tear, pinch, and constrict.

Input Regulation

Input regulation has long been the norm in policing school quality. It entails monitoring and regulating the "ingredients" of schooling—who does the teaching, how many hours they teach, how many students are taught at one time, what materials are used, how much is spent, and so forth. This model was superbly suited to the circumstances and tastes of the nineteenth and early twentieth centuries. A century ago, it was lauded by enthusiasts of Frederick Taylor's "scientific management" for its rigor. Monitoring inputs and processes was viewed by progressive reformers of the time as the surest way to ensure that schools (like factories) were well run and efficient. And, in an era before computers and modern testing technology, it truly was a reasonable way to ensure a baseline of quality.

Input regulation requires that the school, school district, and/or state set and monitor rules detailing how and with what resources schools and educators should operate. Officials can decree that a classroom will have no more than twenty-four students, a teacher will hold a state teaching license, new math textbooks will be bought every six years, and so on. Rules of this sort ensure a minimal level of service, though none of them guarantees that students will be served well, much less that they will learn. The limitation is that, while officials can make sure schools do the things they're told, they cannot ensure they do them effectively or well. Ultimately, the compliance-oriented approach rewards obedience rather than excellence.

Traditional brick-and-mortar schools are relatively easy places to deploy this kind of quality control. It isn't hard for observers to check up on facilities, materials, and staff. A visible student body makes it possible to see whether students have books and are showing up on time. And a regimented, bureaucratic, and grade-ordered school system makes it possible to devise and record all manner of input statistics, from attendance rates to incidents of violence, that can be used to determine whether a given school is "good."

When it comes to digital learning, input regulation still holds considerable appeal, if only because its familiar, predictable strictures can mitigate some of the obvious risks posed by dubious providers. Skeptics of digital learning can be

excused for wondering about the invisible instructors providing instruction or about the number of students each might be teaching. The regulatory response is to insist that teachers have certain credentials and that class sizes be limited. Similarly, it is hardly unreasonable to fear that online courses may be too easy or entail little actual instruction. The regulatory response is to mandate a minimum number of instructional hours and tasks. Input regulation, in other words, does offer some protection against fraudulent operators.

Screening out fraudulent or dishonest operators is a low bar for ensuring quality, however. The obvious problem with input regulation is that policing inputs and processes can't ensure quality (much less efficiency). Indeed, its rigidities, norms, and compliance obligations tend to stifle innovation or efforts to adapt services to the needs of schools and students. Nor does traditional regulation make much sense in key domains of digital education. Consider the issue of teacher quality, for example. If online providers presumably have the opportunity to tap teachers and professionals around the world, what is gained by requiring potential instructors to hold a teaching credential from a particular state, a standard to which many virtual schools are currently held? Such restrictions prevent the use of collegiate faculty or out-of-state educators who might be attractive candidates. Class-size restrictions for digital providers—such as those in California—drive up costs while preventing even accomplished providers with terrific instructors from utilizing their best teachers as effectively as they might. (That's every bit as true for providers in brick-and-mortar schools, of course.)

Familiar routines and metrics grow more complex as schooling moves online, and they become really tangled once a mélange of hybrid models starts to operate. Blending online and traditional models offers the opportunity to reimagine the use of space, resources, and staff time, but doing so makes it increasingly complicated to devise and apply simple input metrics for monitoring quality.

Regardless of the merits of input regulation in general, there is one aspect of online learning for which it is indisputably appropriate: monitoring the finances of providers that are collecting public dollars. The charter school experience is instructive—and worrying. Nothing will more rapidly (and justifiably) undermine public confidence in digital learning than seeing charlatans using the medium to collect public dollars. A minimal requirement for provision ought to be a clean financial audit in which revenues, expenses, and profits are totally transparent. (For more on this topic, see chapter four, "School Finance in the Digital-Learning Era," by Paul T. Hill.)

Outcome-based Accountability

Frustration with input-driven regulation and quality control—specifically its rigidities, stifling red tape, and inattention to results—gave rise in the 1980s to the notion of "reinventing government" by focusing instead on outcomes. Public providers would be held accountable for results in return for more autonomy, flexibility, and control.

The appeal of this approach is obvious. In K–12 schooling, it has meant holding schools accountable for reading and math test scores and, more recently, using those results to compute value-added measures for schools and individual teachers. Test scores offer a crude but useful way to identify schools that are doing an awful job teaching basic skills, and value-added analyses of those test scores yield a method for identifying which schools (and potentially individual teachers) are better, and which are worse, at helping students master key domains.

The limitation of outcome metrics is that they accept the familiar schoolhouse (or classroom) as the unit of analysis. They focus on determining whether a school is good or not, even if the conventional school no longer exists. In cases where a dozen online providers are teaching math and the school is functioning more as their conduit than as the source of instruction—where learning is the result of a blend of school faculty, computer-assisted tutoring, and online delivery—school-level metrics obviously fail to gauge the relative performance of the various providers.

The type of metrics developed as part of No Child Left Behind (NCLB) offer little aid here, for the questions needing to be answered involve the quality of particular courses, units, or providers, not the performance of the school as a whole. Trying to judge the performance of a "school" or "teacher" via state assessment results makes little sense in the case of digital learning. What's needed is something more granular and more reflective of the unbundled vision of virtual schooling.

Conventional approaches to outcome accountability in K–12 education unravel when applied to online providers, which may teach material that transcends the assessed content, or content in disciplines that are not or cannot be tested, or only specific portions of an assessed course, or skills or capacities for which reliable assessments are lacking. For instance, New York City's School of One uses dozens of providers to offer components of its middle school math curriculum. Different providers offer instruction geared to different objectives. Yet the New York state assessment measures only how well students are faring on grade-level

math objectives. It lacks the fine granularity necessary to evaluate the individual providers of customized content. Similarly, online providers offering instruction in music or art history or a foreign language—courses that lack meaningful state assessments—cannot be readily judged using current outcome measures.

No Child Left Behind's experiment with supplemental education services (SES) offers a cautionary tale in this regard. SES permitted eligible students in persistently low-performing schools to enroll in after-school tutoring using federal Title I dollars that had traditionally flowed to the school district. Federal policymakers were committed to holding SES providers accountable for performance. They constructed an elaborate mechanism for doing so, with states required to approve potential providers and then evaluate their performance based on student achievement. Once providers were approved, local districts could contract with any number of them, and then parents would select the providers of their choice. But confusion about how to judge the quality of providers, a lack of useful data, and ineffectual state efforts to patrol quality combined to yield a potpourri of providers of dubious merit.

Worse, state assessments used for monitoring educational outcomes were not precise enough to detect the impact of thirty or so hours of tutoring, regardless of the provider. This result probably should have come as no surprise, but it threw a large wrench into the SES quality-control framework. In response, big SES providers asked to use their own assessment data to demonstrate their impact. But allowing providers to self-police in this fashion raised obvious concerns about the integrity and reliability of results.

Still and all, outcome-based accountability should not be dismissed altogether where digital learning is concerned. On the contrary, new technologies hold immense promise for this approach. The development of Common Core assessments makes it likely that, within a few years, math and English language arts performance will be measured by a uniform test across much of the nation.[12] Online assessment technology will make it possible to administer frequent, targeted tests and get immediate results. Such assessments could conceivably be designed for every major objective in a set of standards or a curriculum, enabling instructors to gauge whether and how quickly their pupils are mastering designated content. Such assessments could then enable states to measure online providers' quality: For online providers that augment classroom instruction by, for instance, addressing specific thorny concepts, the right gauge is not student performance on the end-of-grade assessment but on specific learning objectives. Targeted testing

of this kind would entail a fundamental shift in how states have learned to gather and report performance data in the NCLB era.

Tech impresario Tom Vander Ark has suggested a way of thinking about student mastery that draws upon the Boy Scout concept of the merit badge. Mastery of a given learning objective would be signified by completion of a designated assessment, and the student would claim the appropriate "badge." Vander Ark recommends that seat-time credit systems be replaced by assessment bundles modeled around these merit badges. "Take ratios and fractions as an example," he writes. "A merit badge would describe what students need to know and a combination of ways they can show it including content-embedded assessment (e.g., game score), performance assessment (e.g., project), adaptive assessment (e.g., online quiz), and an end of unit test."[13] This doesn't mean the assessments will be easy or cheap, however, and admittedly such a shift is not likely to occur soon. There remain plenty of preliminary challenges to overcome in determining which learning objectives ought to be identified and what constitutes an appropriate assessment.

Three challenges deserve particular attention: First, for the vast majority of courses taught in schools, reliable assessments don't even yet exist. Second, we have limited experience and expertise in designing assessments to track learning objectives rather than simply report on student performance on the whole of a course. Until partial-course metrics are available, outcome-based accountability is irrelevant to niche providers. Third, most high school assessments report whether students are proficient in the subject but not how much they learned from the course. This characteristic creates incentives for online providers to cream-skim, and works against providers that teach poorly performing students—since even if these students make gains they may not attain proficiency. Devising ways to measure both proficiency and value added is therefore essential.

Ultimately, outcome-based quality control for digital learning will turn upon the ability of reformers to devise and implement a far more complex and sophisticated approach to testing. If a student takes Algebra I from one provider but absorbs a handful of learning objectives from a second, the quality-control challenges are severe. First, it's necessary to have an assessment that demonstrates a student's mastery of the requisite material. Second, it is desirable to have some kind of value-added measure that reflects how much the student has actually learned. Third, it is important to have sufficiently specific items so that the performance of the two providers in question can be distinguished.

Of course, partitioning knowledge and skills into such discrete chunks may not finally be possible. (Whether it is desirable is another good question.) Even if partitioning proves feasible in some subjects or for some instruction, it's not clear that it can be done effectively in other subjects. If targeted assessments are beyond our capabilities to devise, then outcome accountability for digital learning will prove elusive.

In short, the value and reach of outcome-based accountability is hostage to the development of high-quality, granular assessments. Until new and satisfactory assessments are devised, outcome accountability will remain a limited tool. And it will remain a nonexistent option for all those courses in which assessments do not exist and are not yet being developed.

Market-based Quality Control

Market-based accountability can avoid some of the problems posed by centralized, outcome-based accountability and input-based regulation by permitting users of educational services to decide what best meets their educational needs. Markets presume that diverse users may benefit from diverse providers, and that the quality of providers ought to be measured in a variety of ways. Under market-based quality control, the ultimate gauge of quality is whether users choose a particular provider (thus, the notion of "voting with one's feet"). The degree to which competing for students enables meaningful quality control, however, depends on the degree to which parents and educators are discerning and demanding consumers of digital learning. Where outcome accountability fosters homogeneity in regard to essentials, a market approach creates room for heterogeneous providers to thrive. Markets leave room for new operators that may not fit within the strictures of input regulation and that may offer value or specialized services not easily captured by existing outcome accountability metrics.

Ultimately, markets can do three things that input and outcome accountability cannot when it comes to quality control. First, markets can protect against excessive homogenization of providers (and their educational products). Second, markets can extend quality control beyond the basic forces of regulation and testing. In cases where providers might evade regulation or manipulate test scores to their advantage, wary consumers are free to shift to other providers—along the way powerfully signaling their dissatisfaction. (Of course, this step depends on consumers having a reasonable sense of provider quality and the ability to act on

it.) Third, markets enable entrepreneurial educators to challenge existing schools (and other providers) and the reigning orthodoxies and habitual practices.

Market-based quality control also exhibits particular weaknesses, however, including the opportunities it offers to inept or unscrupulous providers—a problem that is familiar to any education observer who has followed the travails of problematic charter schools in states like Texas and Ohio. Some educators or parents will make poor choices or opt for low-quality providers, maybe because they don't know any better, maybe because they don't much care, or maybe because they'd rather engage with an easy or easy-to-satisfy program than a difficult one. It is wishful thinking to suppose that markets can prevent bad choices from being made. Markets permit consumers to satisfy their preferences, including preferences that strike observers as misguided. (Consider the millions who eat at fast food joints or buy "as-seen-on-TV" gizmos—choices many would deem poor ones.) The crucial thing in fostering an effective marketplace is that good and reliable information on provider quality be available for users. Otherwise, low-quality providers can hide their problems, inaccurately represent the quality of their service, and use aggressive and misleading marketing to woo clients.

How can markets ensure that users have good information on provider quality? The kinds of metrics used for outcome accountability can be useful here. But four additional kinds of measures can also prove useful in this realm:

- Professional, systematic ratings on customer satisfaction, something akin to the kind of information reported by sources like J. D. Powers and Associates. These make it easy for consumers to draw on the judgments of the universe of users.
- Scientific evaluation by credible third-parties, such as those offered by *Consumer Reports*. The idea is for experts to put new educational products through their paces and then score them on relevant dimensions of performance, as well as price.
- Expert evaluation of services like that provided by the British School Inspectorate. Unlike input accountability, this type of evaluation focuses on revealing processes and hard-to-measure outcomes. And, unlike the *Consumer Reports* model, such evaluations draw more explicitly on informed, subjective judgment and far less on laboratory-style experimentation.
- Data reflecting user experiences—essentially, drawing on the wisdom of crowds. TripAdvisor, eBay, and Amazon allow the public to readily access

quality rankings, while also letting users offer detailed accounts of their experiences with providers. Unlike professional rankings, these results do not aspire to be systematic or scientific; but for that reason they are especially well suited to flagging narrow or particular concerns.

It is not essential that all users access or employ these data; it is necessary only that enough do so that others can follow their lead, and that providers have reason to be responsive. In studying consumer behavior in other sectors, economists have suggested that the critical mass needed for such a "tipping point" is probably in the vicinity of between one-fifth and two-fifths of users. (In the case of technology, however, the influence of a small group of tech-savvy early adopters is legendary.)

One other weakness of market-based quality control in education rests on the fact that paper credentials, such as a certificate of mastery or a high school diploma, have some value—whether or not the recipient has actually learned anything. Education providers can satisfy customers by helping them acquire degrees or certificates that they covet, even if those credentials signify no actual educational attainments. This practice is particularly common in the "credit recovery" segment of the K–12 digital sector. In higher education, the term "diploma mill" has historically referred to institutions that provide a diploma in return for little or no demonstrated performance. The crude market equivalent is cash for diplomas. In most transactions, such a deal wouldn't make sense—few consumers would write a check for a car that lacks an engine. In education, however, there is some value to even a hollow credential.

Guarding against such chicanery will require some combination of external graduation exams (to demonstrate that students have learned the requisite content), other forms of outcome regulation, and potentially input regulation. However, it is again worth noting that there are no perfect solutions. The diploma-mill problem is one that accreditors have struggled with for decades with mixed success. They have tried to address it via input requirements that monitor whether institutions have the requisite number of books in their library, appropriately credentialed faculty, an acceptable student-teacher ratio, sufficient seat time, passable campus facilities, and so forth. The consequences of such regulation are particularly severe for online providers, as they force providers to assume a number of unnecessary costs or risk being denied accreditation.

It is not yet clear how savvy educators and parents will prove to be in the digital-learning marketplace. They will have some opportunity to observe online

instruction and monitor the outcomes, but the amount that they will be able to glean and their vigilance are not yet known (and are likely to vary tremendously). Reformers must also be wary that any efforts to monitor providers could fall prey to a modern-day Horace's Compromise, where students are free to coast in return for turning a blind eye to mediocre instruction; hard experience teaches that youths have typically been quite happy to embrace lax instruction if it means less work for them. Because participation in markets is ultimately a voluntary transaction, the risk that both sides might choose mediocrity is real, so long as even unearned credentials have value. Policymakers must either decide the risk is minimal or devise safeguards that counter or police such behaviors (such as insisting upon graduation exams that penalize students who have opted for insufficiently rigorous instruction).

Balancing the Three Quality-control Mechanisms in the Digital Era

Education posed enormous quality-control challenges even before the advent of digital learning. Any given approach to regulating inputs, basing accountability on outcomes, or trusting markets brings risks, imperfections, and unintended consequences. Though these negatives cannot be eradicated, the alternative—no quality control at all—is far worse. So we're well advised to recognize and acknowledge the problems with available tools and mechanisms and then do our best to monitor, minimize, and combat them.

Regulating inputs like class size, instructional time, and staff credentials offers some minimal assurance as to what digital providers are actually doing, but carries a high cost in terms of stifling potential innovation, customization, and cost-efficiency. Policing outcomes offers the opportunity to ensure that providers are delivering results that meet a given standard for pupil growth or achievement, but encourages gamesmanship and disputes over the right metrics, even as it deters providers whose service doesn't map neatly onto existing outcome measures. Markets offer diversity and scope for customization, but invite shoddy providers to profit, allow some families to be taken advantage of, and encourage online providers to focus more on marketing than on delivering a high-quality service.

The risks can be mitigated, if not eliminated, by thoughtful design and by combining these approaches judiciously. But there is no golden mean or foolproof formula. (See the sidebar "How Might Quality Control Work in Practice?") Various combinations mostly alleviate some concerns by posing new ones. Hence,

How Might Quality Control Work in Practice?

Presume that state policymakers wish to aggressively embrace digital learning but, for the reasons discussed earlier, are unwilling to leave questions of quality to consumer choice or to the market. What then? First, they could stipulate that for whole-school providers or providers of currently assessed courses (i.e., the instruction for which conventional measures of performance already exist), acceptable performance will be spelled out in terms of student outcomes. One challenge is that many state assessments may measure student proficiency in a subject without gauging student growth, even though the more relevant measure of provider quality is growth rather than an absolute level of achievement. Unless growth is taken into account, there is a huge incentive for digital providers to recruit high-achieving students (who will post terrific results) and to shy away from low-achievers (who may learn a lot but still not be proficient). Just as in the brick-and-mortar world, these challenges require the attention to unintended consequences that has too often eluded policymakers.

Second, for those providers offering courses or units for which such outcomes cannot (currently) be measured, policymakers leery of trusting the market have two options. One is to put forward a set of input regulations governing the time, manner, and nature of provision for at least this set of providers. The other is to permit these providers to proffer evidence of their own that documents their effectiveness, though policymakers would need to be confident that their education officials could distinguish acceptable evidence from unacceptable. To help this along, policymakers must opt to set up an input-driven process, but agree to provide a waiver from teacher credentials, hours of instruction, and class size for those providers that can prove to an independently constituted review board that their student outcomes pass muster.

Third, school and district officials would be empowered to contract with any provider that has met the state's approval criteria. They can opt for whole-course or more specialized providers, and can integrate them into their offerings as they wish.

Finally, families would make choices among the offerings, both the "schools" and the courses offered by those schools. As they do with Advanced Placement or vocational education, school officials will inevitably try to steer the choices that families make. But families, armed with multiple sources of information from online communities and philanthropically supported third parties, will ultimately choose from the array of options yielded by the state's approval process and the decisions of local, charter, and virtual school officials.

A bucolic vision? Certainly not. A messy, flawed system sure to be plagued by instances of mediocrity, rigidity, and bad decision making? Assuredly. But also a sensible, flexible framework that realistically and responsibly mixes and matches our three approaches.

given our scant experience with digital provision, it seems prudent to avoid sweeping national policies or requirements, at least at this stage.

While talk of assessment often trends toward the hypertechnical, the truth is that accountability and quality control are not technical exercises. Instead, they require fundamental judgments about how to weigh the risks and opportunities posed by mediocrity, red tape, standardized outcome measures, and markets. While the details of any approach will prove as crucial as they are variable, it is possible to discern the outlines of a blended approach that seems a sensible way forward for digital learning.

The first step is to create a relatively uncomplicated vendor-approval process that ensures minimal fiduciary and academic standards are being met. Providers should have to document to a designated public entity that their books are clean and to report basic metrics for services provided. For those providers that offer certain categories of services—especially services that directly impact student achievement—it's reasonable to have a state review process that features some kind of authorization and renewal.

Second, as providers deliver their wares—and as families choose among them and students engage with them—it is essential that some institution or institutions collect various kinds of data on performance. Data collection is apt to be a state responsibility but can easily be delegated to any number of third-party monitors, each of which would bring its own strengths and weaknesses. But whether a state agency acts directly or relies on others, a wide array of data needs to be collected, gains measured and analyzed, and findings made public in transparent fashion. Just as important is to gather and disseminate information on consumer satisfaction and expert reviews of programs and providers.

Third, families need to acquire a vested interest in cost-effectiveness and new opportunities by being given control over some discrete portion of spending. This step is essential if parents are to approach schooling as more than a unitary service and to start thinking about the quality of particular services, and if education officials are to enjoy the encouragement and support they need in order for them to revisit and change deep-seated routines.

Conclusion

In the end, creating an authentic and vibrant environment for high-quality online learning is about creating a new world of schooling that is hospitable to unbundling. That world will demand that we make pivotal shifts.

First, we must begin to think of education in terms of segmentation, not just whole schools. Second, we must begin to gauge educational quality in terms of cost-effectiveness as well as student achievement. Third, we must see that parents and educators benefit when they make choices that are cost-effective as well as educationally beneficial. Finally, we must provide both parents and educators with workable, comparable metrics by which to gauge both cost and effectiveness.

The challenges involved in effecting these shifts are simultaneously familiar and new. In a sense, they are essentially the same challenges—to be addressed by the same tools—that educators and policymakers have wrestled with for decades. But in their current incarnation, they can be met only with a degree of granularity, agility, and precision that is new to the world of K–12 schooling.

Moving into the digital-learning era, we are burdened by our deep-seated habit of regarding schooling as a unitary "thing" that happens in "a building" rather than a suite of discrete services that can be offered in many locations. This creates a tendency to define improvement as "better schools," and to discourage efforts to improve discrete services or components. Moreover, schooling in America is primarily a public service and thus subject to the demands of partisans and interest groups, an arrangement that conceals from both parents and educators the true costs of goods and services while giving them no incentive to emphasize cost-effectiveness. These long-standing realities combine to stifle new technologies, discourage labor-saving improvements, and diminish cost-consciousness. So it's no great surprise that technological innovation in schooling has consistently disappointed.

Changing that state of affairs means changing the rules that shape schooling. The most significant of these govern how schooling itself is provided, paid for, and evaluated. Reshaping those rules entails addressing the quadruple challenge described above. If the emphasis is on learning rather than mere credentialing, and especially if the aim is to encourage cost-effective learning, it's necessary to relax input regulations in exchange for a focus on accountability as measured by student outcomes and parental judgments. This step means eliminating caps on enrollment, rules that restrict class size and student-teacher ratios, geographic and regulatory barriers to what online courses students may take, and "school

site" definitions that limit blended models where a portion of student learning occurs outside of a traditional school building. It also requires clarifying outcome measures by gauging student progress based on demonstrated competency or gains rather than seat time.

Transformative improvement also requires stripping away conventional rules governing certification and licensure so that schools can use unconventional personnel in instructional roles, can extend the reach of effective teachers, and can tap instructional talent from far away. It requires allowing schools to redefine instructional roles and staffing, pay, evaluation, and scheduling.

Accountability rooted in student learning requires the construction of assessments that measure mastery of specific courses or, preferably, of particular units and skills. Freeing schools from the long-outdated nineteenth-century school calendar involves allowing students to take the requisite assessments at any point during the year.

Finally, enabling parents and educators to select individualized online services creates market opportunities for providers to specialize in and focus on meeting specific needs. Those needs might be for tutoring in specific learning objectives or skills or for a complete course of instruction. Making such a market viable requires funding models that allow fractional per-pupil funds to follow students to individual courses, and perhaps even to individual instructional units or kinds of support. If dollars flow only in chunks that reflect the entire allotment per student, or the entire allotment of a particular course, then it will be difficult for digital providers to thrive while delivering anything that's more finely grained.[14]

Quality control in education, to repeat, is an imperfect science, and every approach brings its own shortcomings. The search for the perfect quality-control mechanism is a futile one, just as a laissez-faire disregard for quality control is sure to yield practical disappointments and political backlash. The sensible course, when dealing with a public mission and billions in public funds, is to seek an arrangement that addresses concerns about malfeasance and mediocrity without stifling innovation—and that is able to grow and evolve as we learn and as technology and tools mature. A formidable task? Surely; because it is one that will ultimately determine whether the advent of digital learning revolutionizes American education or becomes just another layer of slate strapped to the roof of the nineteenth-century schoolhouse.

Endnotes

1. Terry M. Moe and John E. Chubb, *Liberating Learning: Technology, Politics, and the Future of American Education* (San Francisco: Jossey-Bass, 2009), pp. 71–72.

2. Paul E. Peterson, *Saving Schools: From Horace Mann to Virtual Learning* (Cambridge, MA: Belknap Press of Harvard University Press, 2010), p. 254.

3. John E. Chubb and Terry M. Moe, *Politics, Markets, and America's Schools* (Washington, D.C: Brookings Institution Press, 1990), p. 217.

4. Clayton Christensen, Michael Horn, and Curtis W. Johnson, *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns* (New York: McGraw-Hill, 2008).

5. Sir Roger L'Estrange, *A Rope for Pol, or, A Hue and Cry after Marchemont Nedham* (London: [n.p.], 1660).

6. Cited in Trip Gabriel, "More Pupils Are Learning Online, Fueling Debate on Quality," *New York Times*, April 5, 2011, http://www.nytimes.com/2011/04/06/education/06online.html?pagewanted=2&_r=1&sq=virtual%20learning&st=cse&scp=1.

7. Alfred Baker, *The Life of Sir Isaac Pitman (Inventor of Phonography)* (London: I. Pitman & Sons, Ltd., 1908).

8. William M. French, *America's Educational Tradition: An Interpretive History* (Boston: D. C. Heath and Company, 1964), p. 183.

9. *Proceedings of the National University Extension Conference* (Princeton, NJ: Princeton University Press, 1915).

10. Dan Carnevale, "Senators Call for a Crackdown on Online Diploma Mills," *Chronicle of Higher Education*, May 21, 2004, p. A33.

11. Dan Carnevale, "Taking Aim at Diploma Mills, Education Department Creates Online List of Accredited Colleges," *Chronicle of Higher Education*, February 2, 2005, p. A37.

12. The Common Core State Standards (CCSS) are common national standards, developed by a consortium of states, in English language arts and mathematics. As of July 2011, forty-five states have adopted these standards. To supplement them, two state consortia—the Partnership for the Assessment of Readiness for College and Careers (PARCC) and the SMARTER Balanced Assessment Consortium (SBAC)—are developing assessments aligned with the CCSS.

13. Tom Vander Ark, "Three Pivot Points to a Performance-Based Education System," Vander Ark Associates, February 25, 2010, http://www.varpartners.net/?p=1545.

14. For more on this topic, see chapter three, "The Cost of Online Learning," by Tamara Butler Battaglino, Matt Haldeman, and Eleanor Laurans, and chapter four, "School Finance in the Digital-Learning Era," by Paul T. Hill.

CHAPTER THREE

The Costs of Online Learning

▪ *By Tamara Butler Battaglino, Matt Haldeman, and Eleanor Laurans*

Online learning, in its many shapes and sizes, is quickly becoming a typical part of the classroom experience for many of our nation's K–12 students. As it grows, educators and policymakers across the country are beginning to ask the question: *What does online learning cost?* While the answer to this question is a key starting point, by itself it has limited value. Of course there are cheaper ways to teach students. The key question that will eventually have to be addressed is this: *Can online learning be better and less expensive?*

Ultimately, new technology-rich education models will need to be evaluated based on their productivity, that is, the results that they produce relative to the required investment. Unfortunately, within the nascent field of online learning, this information simply isn't yet available. While we embrace the need to understand and illuminate both costs and outcomes, our goal in this chapter is to explore the cost issue alone. We seek, to the extent possible, to compare the costs of digital education on various dimensions with the costs of traditional brick-and-mortar schooling in order to help lay the foundation for the ultimate lens on productivity.

This analysis is not straightforward, of course, because costs vary *within* digital education just as they do within brick-and-mortar schooling options. Educators and policymakers pursue online learning for different reasons and adopt different flavors of technology-rich models. Broadly speaking, today's policymakers and educators appear to pursue online-learning solutions for one or more of three primary reasons: to reduce overall costs (often in response to budget shortfalls); to increase the range of course offerings available to students (such as advanced or remedial classes or unusual subject areas); or, more radically, to use technology to rethink the traditional teaching-and-learning model (primarily reflecting a leader's instructional vision, but often linked to budgetary

considerations). Of course, resource allocation varies significantly across these categories. Some models explicitly look for savings, while others aim to free up resources from one area for use elsewhere.

We therefore caution readers against looking for one simple "price tag" for online learning, or assuming that savings necessarily translate into a lower overall cost per pupil. For schools that deliberately use technology to reduce costs in one category in order to free up resources to invest elsewhere, the "savings" are often an important component of the school's overall resource-allocation strategy. Still, current and future economic pressures could require both traditional brick-and-mortar and online schools to cut costs (or keep costs neutral) relative to today's per-pupil funding levels; this is possible, but further innovation in the field is required to ensure that robust student outcomes are not marginalized in the process.

With these important caveats in place, we explore the costs and resource-allocation strategies that have emerged in today's online-learning landscape. We present average cost figures for both virtual and blended models (for definitions, see "Types of Models," below). Our goal is to articulate the size and range of the critical cost drivers for online schools versus those for traditional brick-and-mortar schools, in order to understand how cost categories have the potential to change when technology is used in the classroom. The information presented here results from interviews with more than fifty entrepreneurs, policy experts, and school leaders. These interviews informed the set of estimates regarding the cost of virtual and blended schools across a number of categories. As is always the case in a nascent, ever-changing field, the figures for online learning are not definitive but represent at most a helpful starting point.

Before diving into the discussion of cost, it is worth sharing a few observations about the historic productivity of education technology. Long before our latest wave of online learning and digital innovations, school districts spent enormous sums to equip classrooms with televisions, personal computers, laser-disc systems, VCRs, and more. Decades and billions of dollars later, it is difficult to point to any evidence suggesting that technology has impacted student achievement, graduation rates, or other outcome measures. By contrast, while public education reform has remained frustratingly stagnant, technology has been arguably the major driving force of productivity improvement in many other parts of our economy. From investment banks to grocery stores to travel agencies, big and small businesses have used technology to accomplish more with less.

Why has technology had so little impact on our nation's public schools? Technology has been used predominantly to supplement the traditional model—a row of computers in the back of a classroom, or a smart board at the front. (For existing schools, the time and costs required to transition to the use of technology as anything but an add-on are often too difficult.) Meanwhile, the fundamental classroom structure (one teacher standing in front of a group of students) has remained the same for the past fifty-plus years. Given the lack of improved student outcomes, the addition of technology to classrooms has translated to the same output at greater cost—in other words, reduced productivity. In economics, this is known as Baumol's Disease: Too often, labor-intensive organizations increase expenses without improving productivity.[1]

As noted above, our hope is that any investment in classroom technology leads to an increase in student outcomes. The limited availability of reliable and consistent cost and outcomes data prevents robust conversations related to productivity. Particularly for those entrepreneurs who aim to use technology to rethink the classroom, an interesting debate has emerged in the field as to whether bold new models must demonstrate that they are at least cost neutral at their inception. One camp contends that cost pressures are what will ultimately drive wider-scale adoption, and so new models *must* be cheaper from day one. Others argue that the degree of innovation taking place in some classrooms today requires a temporary respite from focusing on cost. This approach seeks solutions designed to address the needs of students and teachers, with the business model left to be revisited once the appropriate solutions have been identified. Given current market dynamics and investments by philanthropic organizations, we will likely continue to see a range of innovation that includes both cost-neutral and resource-intensive solutions. We will likely also see some innovations accompanied by lower net costs. This variation is healthy for the field. Costs and resource allocation must continue to be an active topic for conversation as innovation and evaluation unfold.

Types of Models

A decade ago, the majority of online learning was 100 percent virtual in nature—i.e., carried out entirely outside of brick-and-mortar schools. Yet today, a wide range of online models currently exists. (In a recent report, authors Michael Horn and Heather Staker profile forty-eight unique approaches.[2]) For the purposes of examining costs, we will focus on two broad categories: virtual and blended.

Virtual

In virtual schools (examples include Florida Virtual, K12 Inc., and Connections Academy), all instruction takes place online. Students still interact with live teachers, listen to lectures, work on homework, ask questions, and more, but all activities occur at a distance, with interactions facilitated by technology.

Virtual options currently serve both full- and part-time students. The former often either (a) have significant travel schedules or other constraints on their ability to engage fully with in-classroom learning on a regular basis, or (b) are frustrated (for whatever reason) with their neighborhood schools. The part-time students often take one or more courses online to supplement the offerings available through their local brick-and-mortar schools; many schools, particularly smaller schools and those in rural areas, struggle to provide students with a wide range of course options (e.g., advanced or remedial courses not already offered, or specialized course topics). Although predominantly purchased by schools on behalf of their students, online instruction can be and is purchased by other agencies as well (e.g., prisons, hospitals, day-care centers, and military bases).

> *Example:* Florida Virtual School (FLVS) is the nation's first statewide, online public high school and currently offers options across all grade levels for both full-time and part-time students. Instruction takes place online; students select their courses and then complete assignments, quizzes, and tests at their own pace. Homeschooled students in and out of Florida can take online courses; Florida Virtual has also partnered with many school districts nationwide to provide online supplemental options for students. The school, for instance, offers more than a dozen online AP courses for high school juniors and seniors.

Blended

In blended schools, by comparison, students attend brick-and-mortar schools where they alternate between online and in-person instruction. (Examples include Carpe Diem, KIPP Empower LA, and Rocketship Education.) In many of these schools, educators regard technology as a tool used to personalize instruction that is integrated into the overall school model. In theory, though still in the early stages, technology can help to provide a range of content and modalities for each student depending upon his or her academic strengths, prior achievement, areas for development, interests, and learning styles. We examine two main types of blended models, *rotational* and *flex*.

Under the *rotational* model, students in some blended schools spend a specific amount of time (typically one or two periods a day) participating in online learning. The online-learning sessions are a defined portion of each school day, and students receive technology-enabled personalized instruction within those blocks of time.

Example: Rocketship Education is a California-based charter school network focused on parent empowerment, teacher development, and individualized learning. Rocketship combines traditional classroom teaching with individualized instruction through its "Learning Lab," in which students spend one-on-one time on computers utilizing adaptive educational programs and receive instruction in intensive tutor-led small groups to master basic reading and math skills. The Rocketship model generates approximately $500,000 annually in cost savings per school of 450 students, which can then be reallocated toward higher teacher salaries and professional development, among other things. Additionally, as a result of these cost savings, Rocketship schools are able to operate sustainably on traditional public school funding and without additional philanthropic funds.

Under the *flex* model, blended schools utilize a "workplace model," where students follow their own path online, checking in with an instructor when they have questions. The amount and nature of the time spent online varies by student and by day—and sometimes even by hour. The level of technology-enabled personalized instruction is driven by students' needs on any particular topic or day and is thus less predictable, so these models are often referred to as "flex" models.

Example: At Flex Academy, a full-time California-based blended school using the K12 Inc. curriculum, the educator-to-student ratio is about one to twenty-five (with a credentialed teacher-to-student ratio of approximately one to forty-two), but class size is typically five to eight students. Students often pursue online learning or work on projects with supervision by paraprofessionals, and spend only a portion of their time participating in face-to-face classes with credentialed teachers. Students progress through online curricula at their own pace, complete hands-on projects and science labs, and connect one-on-one or in small groups with instructors when they need specific concepts explained or when the teachers want to engage or inspire the students with a certain educational activity. Flex Academy parlays its labor-cost savings into more spending on curriculum and technology.

Resource-allocation Cost Categories

Historically, public school districts have had relatively little budget flexibility, because so much of their budgets is tied into multiyear contracts, tenured staff, and other fixed obligations. Recently, however, innovative technology-rich school models have begun to experiment with new ways to repurpose limited dollars. Many of these innovators are charter schools or vendors to traditional schools, which have the flexibility to pursue options unavailable to many traditional district schools.

While we frame such cost changes as "savings" below, many entrepreneurs in the field view online learning as an opportunity for reallocation of resources away from an existing category and toward a new strategy aligned with the school's overall vision, which may or may not yield net savings in the end. Rocketship Education, for instance, "saves" about $500,000 per school of 450 students per year by decreasing teacher and facilities costs relative to traditional elementary schools through its online Learning Lab. But as part of its model, the organization reinvests this money in talent development, academic deans, response to intervention, higher teacher salaries, and future scaling. Other virtual or blended schools have experimented with reallocating savings toward lowering student-teacher ratios, improving school facilities, and more.

Figure 3.1 outlines the variation in online-learning models. The average per-pupil figure of approximately $10,000, not including central administrative costs, combines all public school types (elementary, middle, and high school) across the United States, without regard to district or state variations.[3] The virtual-school number represents an estimate for full-time high school students. The blended figure represents middle school students, as some of the most promising blended models are middle schools. Additionally, as scale can be a critical factor in determining ongoing costs, our cost numbers reflect schools with enrollments of approximately five hundred full-time equivalent students.

As is evident in figure 3.1, the traditional school model spends over half of its budget on labor, with the majority of the remainder allocated to school operations. Content and technology costs combined are a tiny fraction of overall costs. A blended model, by comparison, has the potential to save approximately $1,100 per student (11 percent). By significantly reducing school-operations costs, a virtual school can potentially save approximately $3,600 per student, a savings of more than a third over a traditional school. These cost estimates reflect the current

variation in the field. They are not a guarantee of quality, given insufficient data on student outcomes associated with the range of models.

One important note: For online and blended students, costs are sometimes reallocated in different ways that do not mean savings from an overall systems standpoint. A virtual school, for instance, may not charge for certain services (i.e., special education services) that are provided by the home district. This does not represent savings from a system level; it simply means that costs are divided between the virtual school and a student's home district.

The cost figures outlined in figure 3.1 represent estimates gathered from available public documents and conversations with experts and vendors within the field. A wide variety of funding levels exists within online learning; for example, research on virtual-school funding reveals that virtual schools are operating on funding levels that range from below $4,000 per student to above $9,000 per student. Given this fluctuation, we also provide an estimate for variation within each figure (although outlier models at both the high and low ends do not necessarily fall within these bands).

Note once more that these figures outline current cost estimates within the field, as opposed to ideal or recommended expenditures. They do not speak to school quality or student outcomes, and are simply meant to provide a framework

Figure 3.1: Estimated Per-Pupil Expenditures

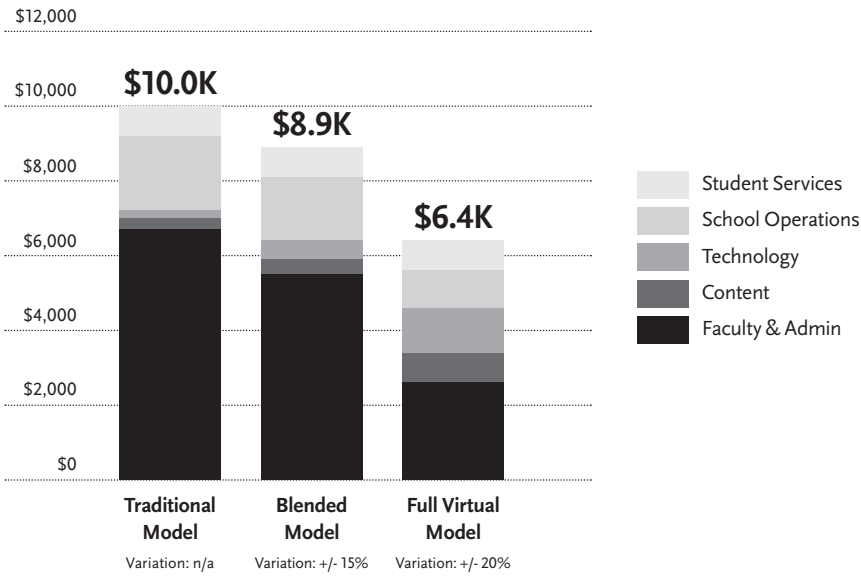

Table 3.1: Cost Bands for Virtual- and Blended-School Models

A. VIRTUAL MODEL			
Category	Cost estimate	Fluctuation	Cost levers
Labor (teachers and administrators)	$2,600	+/- 15%	▪ *Student-teacher ratio* ▪ *Teacher salary* ▪ *Professional-development delivery (virtual or in-person)*
Content acquisition	$800	+/- 50%	▪ *Content quality (level of personalization)* ▪ *Inclusion of content-management system*
Technology and infrastructure	$1,200	+/- 25%	▪ *Computer purchases or Internet subsidies for students* ▪ *Additional instructional hardware (i.e., webcam) for teachers*
School operations	$1,000	+/- 20%	▪ *Facility size (determined by whether teachers work remotely)* ▪ *Transportation (field trips and state testing)*
Student support	$800	+/- 0%	▪ *May potentially change depending on student mix, but a critical component of all schools*
Total	$6,400	$5,100–$7,700	

B. BLENDED MODEL			
Category	Cost estimate	Fluctuation	Cost levers
Labor (teachers and administrators)	$5,500	+/- 15%	▪ *Time spent in computer-facilitated learning* ▪ *Human capital during computer-facilitated learning* ▪ *Human capital model for remainder of school day*
Content acquisition	$400	+/- 50%	▪ *Content quality (level of personalization)* ▪ *Inclusion of content-management system*
Technology and infrastructure	$500	+/- 20%	▪ *Student-laptop ratio* ▪ *Wireless needs*
School operations	$1,700	+/- 5%	▪ *Potential small cost savings around facilities and transportation from staggering student schedules*
Student support	$800	+/- 0%	▪ *May potentially change depending on student mix, but a critical component of all schools*
Total	$8,900	$7,600–$10,200	

for important resource-allocation decisions at blended and virtual schools. Note, too, that state funding levels often drive the cost base for online learning; the ability and willingness of states to fund online learning sets the baseline for online costs. In this analysis, we attempt to separate costs and funding as much as possible.

The next few pages outline the five primary cost-driving categories that differentiate schools' resource-allocation strategies: labor, content acquisition, technology and infrastructure, school operations, and student-support services. Within each category, certain expenses are nonnegotiable, while others have the potential to be cost-savings levers. Table 3.1 outlines the important key cost considerations for each category (and is subject to the same caveats and conditions as noted above for figure 3.1).

Cost Driver 1: Labor

Labor (which typically makes up well over half of district budgets) represents the largest opportunity to rethink resource allocation and seek possible "savings." Not surprisingly, online schools vary widely in terms of human-capital structure, including student-teacher ratios, salaries, and more. At its most basic level, calculating labor costs per pupil is a simple equation with two variables: the number of instructors and the average costs associated with those instructors (recognizing that these may vary at different points in the school day). Reducing labor costs through the use of technology necessarily involves either decreasing the student-instructor ratio or reducing average instructor payout, typically by modifying the overall instructor mix—that is, combining the use of traditional teachers with other instructors such as paraprofessionals or aides.

Two related costs that are often overlooked in blended and virtual schools are professional development and IT costs. Training is a critical component for online schools, as most teachers (and other staff) must learn new skills that allow them to be effective within a new school model. Additionally, virtual-school and blended-school models often require additional IT support—and many such schools employ one or more IT support staffers.

Labor in the Virtual Model

As table 3.1 (on page 62) indicates, an average estimate for labor costs in the virtual model is $2,600 per student, with potential variation of about 15 percent in either direction. Along this range are virtual schools with labor models relatively

similar to those of traditional schools as well as virtual schools with models that significantly reduce labor costs. Among the former are virtual schools that maintain a ratio of one teacher to twenty-five students (similar to traditional districts) and pay virtual teachers according to the same pay schedules as teachers in brick-and-mortar schools, resulting in similar labor costs. At times, the decision to invest in comparable levels of instructional expenditures has been driven by statewide collective-bargaining agreements (required by state law) and at other times by school leaders' instructional vision (which could reflect a commitment to typical student-teacher ratios or varied approaches to staffing levels and structures).[4]

On the other end of the cost spectrum, virtual schools with lower labor costs typically either (a) increase student-teacher ratios, or (b) reduce teacher salaries by transitioning to a part-time or paraprofessional workforce. It is interesting to note that student-teacher ratios at virtual elementary schools are often significantly higher than at virtual middle schools or high schools that have additional support expenses such as guidance counselors and others. Elementary schools also often require that a parent or someone else play the role of a live "coach" who assists the virtual teacher. The cost of the parent "coach" is not included in the cost estimates for the elementary school alternatives, which is why we have focused our analysis on middle school blended models and high school full-time virtual models. As an additional cost-saving measure, online schools may resort to virtual professional instruction (i.e., professional development using a webcam and online forums), in this way saving money on teacher training and facilities.

Although these costs are often overlooked, virtual schools typically have a principal and other administrative supports. A virtual school may potentially see some administrative savings by eliminating an assistant principal position (for example), but the addition of necessary IT staff often cancels out any potential savings.

We observe some correlation between lower-cost labor models and lower overall per-pupil funding, but also see different labor models in schools operating within the same states with the same funding levels. Thus external factors explain some, but not all, of the variation in labor models.

Labor in the Blended Model

The blended-learning model typically has smaller labor savings than the virtual model, as blended schools inevitably have labor needs (i.e., lunch duty, detention)

that virtual schools do not have. These blended schools are also unlikely to experience any cost savings in terms of reduced administrative expenses. An estimate for blended-school labor costs is $5,500 per student, again fluctuating by approximately 10 to 15 percent on either end. Three drivers dictate labor costs at blended schools: time spent by students in computer-facilitated learning, the type of staff employed to supervise this computer-facilitated learning, and instructional staffing models for the remainder of the day:

- *Time spent in computer-facilitated learning.* Blended models vary dramatically in the percentage of the school day that students spend online. At schools like AdvancePath or Flex Academy that use a flex model, students spend the majority of their time online (or working on independent projects); those attending schools like KIPP Empower that use a rotational model spend only a period or two online daily.
- *Human capital during computer-facilitated learning.* Some school models have realized savings by employing lower-cost staff to monitor and support students while they use computers. At New York City's School of One, for instance, student-teachers or paraprofessionals (with lower average salaries) supervise online lessons, while certified teachers are used to deliver live instruction.
- *Human capital for the remainder of the day.* For many blended schools, the school day beyond the online portion is unchanged. However, some blended models have chosen to rethink the remainder of the day, often by repurposing funds that have been made available by lower-cost online portions of the day. For instance, some schools have significantly lower class size; others have moved to a longer school day.

Cost Driver 2: Content Acquisition and Development

Content costs in a traditional brick-and-mortar school are relatively small compared to total per-pupil spending; some districts spend less than $200 per student on instructional materials. However, the very definition of the word *content* changes significantly for virtual and blended schools. In a traditional school setting, content typically refers to the supporting materials used by teachers for face-to-face instruction: textbooks, workbooks, manipulatives, videos, instructional games, and more.

Online schools, by comparison, spend content dollars on tools that traditional schools typically do not use, such as data integration/management tools—which are often sophisticated (and expensive). Not surprisingly, costs in this category can vary tremendously. Some online schools spend even less on content than traditional schools, utilizing mostly open-source and teacher-created materials. Alternatively, other models have opted to spend millions of dollars on content development in order to produce unique, proprietary learning-management systems that are often used across multiple schools. There are three primary types of content, each used to differing degrees by full-time virtual programs and blended programs.

- *Open-source/teacher-created content.* This option is typically the least resource intensive; content is either posted online free of charge (e.g., web videos from Khan Academy) or developed by teachers who are paid a small fee. A free content-management system (e.g., Moodle) can be used to integrate teacher-created content. Although schools can minimize or reduce expenditures on content through this option, they may invest more in labor to manage and maintain these homegrown systems. These labor costs are often understated because they use existing staff time, but the opportunity costs associated with these efforts can be significant and should be considered.
- *Off-the-shelf online content.* Purchasing content requires expenditures on individual courses or bundles of courses. For online content, the major distinction is whether the course comes with a virtual instructor to assist students. Course pricing is typically about $75 per course without instructors, compared to between about $200 and $400 with instructors. (This is calculated per semester-long course, though courses can be bundled and/or priced on a per-seat basis as well.) The price of courses without instructors continues to decline; once developed, these courses can be delivered to almost any school for minimal cost and can be recycled over time. Courses with instructors, by comparison, appear to have more stable (and recurrent) costs, as scale does not materially impact the human-capital costs.
- *Large-scale development of content.* At costs of millions of dollars (both public and private), some districts, states, and school operators have chosen to hire large content-development teams to create courseware, proprietary learning-management systems, and more. Given the significant levels of up-front investment required, content development can make sense to the extent

that a district, state, or school operator expects to achieve significant scale of enrollments and to amortize the costs over time. (Our ongoing cost estimates consider only school content purchases; for more on the issue of "build versus buy," see the "Start-up, Size, and Scale" section below.)

Content Acquisition in the Virtual Model

Many full-time virtual schools choose one of the latter two options listed above, either purchasing off-the-shelf content or investing in large-scale development. We estimate that content costs for virtual schools average approximately $800 per FTE student, but these fluctuate significantly. Included in this estimate is the cost of courseware, a content-management system, and students' materials (this cost includes purchase and shipping). Our estimates (visible in table 3.1 on page 62) reflect a school that has chosen to purchase content rather than develop its own—which is increasingly common for virtual schools given the rise of the Common Core standards and wide variety of online-content vendors offering courseware to virtual schools. Given that labor costs are already included in our model, we also assume that the virtual school has chosen to purchase content offerings that do not provide access to an instructor, as virtual schools typically employ their own teachers. Although an individual course may cost about $75 per student, offerings for full-time virtual schools are typically priced on a per-seat (as opposed to per-course) basis, and access to a full suite of courses can cost as little as $200 per student.

Even for schools that purchase off-the-shelf content, however, price varies depending on the complexity of the product and level of services provided. More-expensive courses are often highly personalized; individual students receive different content in order to meet their learning needs more directly. For instance, for some content, results of student performance on integrated tests and quizzes fully or partially determine the content students receive. These vendors will also often mail students a range of physical materials, including textbooks and science equipment for experiments, as opposed to providing them with electronic materials.

Content Acquisition in the Blended Model

As at virtual schools, the cost of content at blended schools includes courseware, a content-management system, and student materials. Electronic or online content costs at blended schools are often lower than at virtual schools, however, simply because students spend less time engaged with online courseware. For blended

schools, we estimate a content cost of $400 per student (fluctuating by 50 percent), which assumes that a school purchases off-the-shelf products (this would be in addition to the cost of content for the off-line portion of the day). A handful of blended schools have chosen to develop their own online courses from a variety of open-source content, which drives down the cost of content. For instance, eC-ADEMY, a districtwide program within the Albuquerque Public Schools system, represents a low-cost approach; the school pays its teachers a small fee to develop their own courses. With the increase in open-source content, and a variety of free online options, some schools choose to reallocate content dollars to other areas.

One important cost trade-off (in terms of both labor and content) for a blended school is the amount of time that students spend online. More online time generally means fewer teachers, but also requires robust (and often relatively expensive) content to substitute for reduced teacher time. Typically, the shift toward more online instruction tends to produce net savings for the school, as reduced labor costs outweigh increased content costs.

Cost Driver 3: Technology and Infrastructure

Technology, often a minimal portion of a traditional school's budget (about $200 per pupil) is a far more significant expense for online schools. Infrastructure is often a critical roadblock as traditional brick-and-mortar school systems look to integrate blended and virtual options. For a traditional school looking to transition to blended learning, the key question is what infrastructure (i.e., hardware, software, connectivity) already exists. The answer could mean a difference in hundreds of thousands of dollars.

Technology in the Virtual Model

Technology costs have the potential to be a large portion of a virtual school's costs, with an average estimate of $1,200 per student. Regardless of the virtual-school model, schools must pay for teacher instructional devices (i.e., computers or tablets); infrastructure (i.e., connectivity, storage, and servers), which are often outsourced to vendors; and maintenance. Virtual schools may opt for additional expenses either to (a) offer their students instructional devices (each his or her own computer or tablet), as well as Internet connectivity subsidies; or (b) offer teachers additional teaching aids, such as webcams or document cameras.

Technology in the Blended Model

Technology is not necessarily a large cost for a blended school, with an average of $500 per student. Like virtual schools, however, blended schools must pay for teacher hardware, infrastructure, and maintenance. Some rotational blended schools do not need to pay more for technology than a traditional school with a robust computer lab. On the other hand, models like those used by Flex Academy or School of One demand a one-to-one student-to-computer ratio and wireless connectivity throughout the school building.

Cost Driver 4: School Operations

From transportation to custodians to food services, traditional schools spend significant amounts of money (typically about 15 to 25 percent of total budgets) on noninstructional operations. In some cases, virtual and blended schools have managed to reduce these costs to almost nothing; in other cases, they actually pay more within these categories.

School Operations in the Virtual Model

Virtual schools typically spend far less on school operations ($1,000 per student) than an average traditional school, and some less resource-intensive models have found ways to reduce these figures further. Virtual schools experience savings on custodians and food-service employees, but they do incur some operational costs. Virtual schools also have facilities costs; in most states, they are required to have a physical location for school administration and staff. Some virtual schools require teachers to work from a central location, while others allow them to work from home—a decision that obviously has implications for facilities costs borne by the taxpayer. And some resource-intensive virtual schools spend money on field trips, student get-togethers, and related transportation expenses.

School Operations in the Blended Model

In theory, blended schools have the potential to save money on both facilities and transportation, but few schools have begun to realize this potential. As a result, our cost estimate of $1,700 per student is only slightly lower than the average at traditional schools. A system of staggered student schedules could potentially reduce the needed building size or the number of students requiring transportation on a daily basis—although facilities and busing are typically managed at the district level, sometimes even for charter schools. Rocketship Education and

Carpe Diem are two of the pioneers in this area and have actually sought and/or built smaller facilities as a result of the online options they provide students.

Cost Driver 5: Student-support Services

Guidance counselors, special education teachers, and other student-support services (which typically cost up to about $800 per student in a traditional setting) cannot be ignored when considering the costs of online learning. At blended schools, these additional costs (mostly labor) are more easily aligned to the regular school day. At virtual schools, these support services can be significant expenses that require in-person visits.

Student-support Services in the Virtual Model

Student-support services are often overlooked in virtual-school cost models, but they can be a significant expense when factoring in the appropriate support ratios (counselors or teachers to students) and the associated travel costs for live support. Guidance counselors and special education teachers have a critical role within all schools (online and otherwise). Some virtual schools have sought to reduce expenses by combining roles (i.e., principals or teachers playing guidance roles as well), though limited data are available on the efficacy of the various models. The cost estimate we provide for virtual-school student supports is similar to the average for a traditional school, at roughly $800 per student per year, although it certainly varies depending on the student populations served. In reality, although many virtual schools provide student-support services at lower cost, this figure is representative of school models that are investing in meaningful levels of student supports to ensure the development of the entire student. We expect to observe continued innovation in the area of student supports in the short and long term.

Student-support Services in the Blended Model

Student-support services at blended schools are also likely to cost about the same as traditional support. We have assumed an estimate of approximately $800 per pupil, similar to the virtual-school costs described above. Blended-school models often find innovative ways to reallocate resources, but given the current state of the field, we have not assumed a reduction in student-support services. Again, this is an area where we expect to see ongoing innovation.

Start-up, Size, and Scale

Start-up costs are a critical component of virtual- and blended-school development—as of any major innovation in education (and other fields). Online learning offers new resource-allocation possibilities in the long term, but it is accompanied by a number of unique start-up costs, including content development and acquisition, hardware, software, storage, servers, and more. For a state or district looking to price out a new virtual or blended school, the costs associated with online learning before a single student enrolls can easily reach the millions.

Policymakers and school operators have three options in tackling start-up costs for virtual schools: (a) purchasing a complete turnkey solution from an outside provider (resulting in limited start-up costs incurred by the state or district and ongoing expenditures with one or more external vendor); (b) purchasing content, servers, and other products à la carte from outside vendors (some start-up costs and required ongoing vendor support); or (c) developing an entirely homegrown solution including content (high start-up costs incurred by the state or district, investment in internal capacity required to sustain operations on an ongoing basis). States and districts looking to develop an online school have to answer this ultimate "build versus buy" question: Should they spend millions in start-up costs tailoring a product to individual needs, or build on the experience and research of an established vendor? Ultimately, the build-versus-buy question hinges on two things: the vision for scale and the need for customization. States and districts that build their own online offering typically either expect sufficient enrollment to cover initial investments or are working to develop an innovative or customized model not currently offered by outside providers.

It is important to remember, though, that start-up costs don't have to be a barrier to developing online-school models. Today, states, districts, and school operators can benefit from organizations that have already developed effective models. In states such as Georgia, Wisconsin, and Pennsylvania, outside providers have set up virtual schools, bearing almost all up-front costs, in exchange for per-pupil funding typically between $5,000 and $7,000 (which includes a management fee of about 10 to 15 percent). In this arrangement, an outside vendor incurs the start-up costs and recoups the investment over time, reflected in higher annual operating costs for the state or district.

Aside from facilities (which are a significant start-up cost for blended schools), the initial costs for virtual and blended schools are reasonably similar. Course development and technology (hardware, connectivity, servers, etc.) are two large

cost buckets, but both can be acquired through leases from outside providers for an annual fee. Adequate planning time for the principal and school-leadership team is another critical investment for blended, virtual, and traditional schools. Often overlooked, professional development can also be a substantial additional cost for virtual and blended schools. Most traditional teacher training and preparation is geared toward traditional models of instruction, and retraining teachers (and rethinking instructor roles) is a new area that many schools are just beginning to tackle. Finally, recruiting and marketing to students, as well as community outreach, are often significant concerns for new, innovative school models that might potentially face skepticism from parents.

One important note: Almost all new virtual and blended schools to date have been start-ups; very few schools have attempted to convert from a traditional school to either a virtual or a blended model, although some exceptions do exist. For many schools, the barriers of converting are partially financial, but also cultural. A switch to a blended-learning (or virtual-learning) model requires expectation-setting and training for both students and teachers as they transition to a new mind-set and new roles.

Additionally, in virtual/blended education—as in any major innovation—there are "regulatory costs," i.e., add-on costs of complying with various rules and conditions and constraints. Whether fire-code regulations for a new blended-school building or a requirement limiting enrollment in a virtual school to residents of a single district, these regulatory costs must also be factored into any business model for online schools.

The Future of Online-learning Costs

Amidst the excitement and promise of new virtual- and blended-school models, it is easy to lose sight of the fact that online learning is an immature, still-developing sector. No discussion of the economics of online learning is complete without acknowledgment of the changes the field has experienced over the past decade—and the changes that are undoubtedly on the way over the next decade and beyond.

Growing supply (the number and capacity of vendors offering tools and services) plus increasing demand (willingness of states, districts, policymakers, students, and parents to experiment with new school models) suggests that online learning will continue to accelerate and new models will continue to proliferate. Interviews with states, districts, entrepreneurs, and vendors revealed a wide range

of possibilities for the future of online-learning costs. This section considers the future of our first two cost drivers, labor and content acquisition.

The Future of Labor Costs

The next decade will undoubtedly continue to encourage the redefinition of the teacher's role, a topic discussed briefly here and more fully explored in the first chapter of this volume. Traditional classroom teachers face extraordinary challenges—often a thirty-to-one student-teacher ratio and students with varying educational needs, interests, and learning styles in the same classroom. Teaching is multiple jobs rolled into one; schools of the future will likely continue to search for ways that technology can ease this challenge while boosting instructional effectiveness. Many entrepreneurs are beginning to break down the various elements of a teacher's day and look for points of opportunity for technology to take over certain of these components, freeing up teacher time to focus elsewhere, such as on direct student instruction.

How will technology redefine the role of teacher? First, online learning can redefine who can become a teacher and the range of potential roles for adults who support student learning. Traditional school environments require teachers who can work full time in a prescribed setting. Online learning provides teachers with flexibility regarding where and how long they work, which in turn creates the potential for flexible hours and salaries for teachers based on experience, interests, and expertise. And as technology disaggregates the role of the teacher, opportunities may arise for teachers with different levels of experience, training, and skill to take on different roles, with the possibility to differentiate teacher compensation based on those factors and teachers' relative importance in the school.

Second, online learning will likely continue to increase the amount of individual attention that teachers can provide to their students. Today's teachers must spend time planning content (and differentiation strategies) for the next school day, identifying individual needs, grading student assessments, and otherwise preparing for class. Online learning, however, has the potential to do some of that work for teachers, allowing teachers to spend more time spent with students.

Finally, online learning has the potential to redefine professional development for teachers. In theory, online learning requires many different types of instructional roles and should enable teachers to progress at different paces and take on different levels of responsibility (e.g., teaching virtually, in-person, or for small or large groups). The data generated by online learning will provide a wealth of information that can be used to tailor professional development to the unique

needs of individual teachers. Just as online learning can personalize instruction for students, digitally enabled professional development has the potential to do the same for teacher growth and learning.

The Future of Content Acquisition

For the past several decades, three large publishers have provided the nation's public schools with almost 80 percent of all traditional basal textbooks. The size of each of these firms offers them significant economies of scale in content development, sales distribution, and more.

Three key changes may potentially shift these market dynamics. First is a nascent but increasing trend toward decentralization, which is a result of the charter school movement and the rise of weighted student funding and technology-based content. A growing number of schools are gaining independence to make their own content-acquisition decisions. Second, electronic content has begun to make it possible for smaller companies to compete. Updating a textbook is a complicated, costly, multiyear affair, but the introduction of electronic content has the potential to make this process simpler, faster, and less resource intensive. Finally, the Common Core State Standards Initiative is expected to reduce barriers of entry even further, as less state-by-state customization will be necessary.

What will be the combined effect of these three changes moving forward? Content is increasingly becoming a commodity. As one interviewee explained, "If you can buy B-minus content for free, and B-plus content for very little, who's going to be willing to shell out for A-plus content?" As more players enter the market at a variety of price points, content-acquisition costs will almost certainly go down. An inevitable question then arises: How can schools effectively manage quality?

One potential solution for virtual and blended models is using modular content and analyzing student outcomes broken down to the individual-lesson level. Programs like Florida Virtual School and School of One have even begun to experiment with the concept of paying vendors based on student-skill acquisition (i.e., vendors get paid according to the number of students who can prove they have learned specific skills). The potential consequence is a new accountability system for vendors, and a cost-effective way for schools and districts to gauge the quality of new and existing products. Frederick Hess's discussion of quality control in the previous chapter of this volume explores this concept further.

Conclusion

The promise of online learning is twofold: More-effective uses of technology have the potential both to improve student outcomes and to create a more productive educational system. This chapter has worked out the current costs of both virtual and blended models—and has articulated where policymakers must ensure there are no barriers to innovation. It has not, however, systematically tackled the question of productivity (i.e., how to improve and maximize student achievement while keeping costs down). The focus on productivity is accompanied by multiple challenges. The first is today's dearth of high-quality data. Absent broadly accepted measures of student achievement (the "output" side of the productivity equation), calculating productivity is extremely difficult. Emerging policies—such as state and federal accountability statutes outlining universal reporting requirements around school finances, student achievement, and system performance—have the potential to lead to a greater focus on overall productivity.

A second challenge is the fundamental design of our K–12 delivery system. The near-monopoly enjoyed by most public school districts means that few districts are prodded to seek out and adopt higher-productivity solutions. Even hard-working and well-intentioned district officials rarely have the means available to them, or the associated flexibility, to reallocate resources to school models and vendors according to productivity. A private, for-profit company must deliver results and have a sustainable business model to compete, or risk going out of business.

We hope that in addition to outlining potential resource-allocation strategies for state and district policymakers and online-school operators, this chapter will encourage a focus on better outcome data to help identify the most productive and effective school models. Highlighting productivity is undoubtedly the first step toward rewarding productivity.

Endnotes

1. Paul Hill and Marguerite Roza, *Curing Baumol's Disease: In Search of Productivity Gains in K–12 Schooling* (Seattle, WA: Center on Reinventing Public Education, July 2010), http://www.crpe.org/cs/crpe/view/csr_pubs/343.

2. Michael B. Horn and Heather Staker, *The Rise of K-12 Blended Learning* (Mountain View, CA: Innosight Institute, January 2011), http://www.innosightinstitute.org/media-room/publications/education-publications/the-rise-of-k-12-blended-learning/.

3. U.S. Census Bureau, *Public Education Finances: 2009* (Washington, D.C.: U.S. Census Bureau, May 2011), http://www2.census.gov/govs/school/09f33pub.pdf; and National Center for Education Statistics, *Digest of Education Statistics, 2010* (Washington, D.C.: National Center for Education Statistics, 2011), http://nces.ed.gov/pubs2011/2011015.pdf.

4. For more on how the current school-governance arrangement affects virtual schools, see chapter five, "Overcoming the Governance Challenge in K–12 Online Learning," by John Chubb.

CHAPTER FOUR

School Finance in the Digital-Learning Era

▪ *By Paul T. Hill*

America's system for financing K–12 education is not neutral about innovation and the use of new technologies. Indeed, that system is stacked against them. To remedy this, our education-funding system needs to shift dramatically. Instead of today's model—which rigidly funds programs, staff positions, and administrative structures, instead of schools and students—we need an approach in which funding follows the student. At present, America's charter school finance structure provides the best prototype, but even it does not go far enough. An appropriate school-finance system must also be able to defund ineffective schools and provide space and incentives for online providers to bring their products to the marketplace.

Today's Online Learning Landscape

Futurists have written for decades about using technology to improve education by giving thousands (instead of dozens) of students access to the very best teachers and by deploying computer-based systems that allow students to learn at their own pace at any time of the day or night.[1] This vision is becoming a reality now, partly because fiscal limitations are forcing K–12 schools to employ fewer teachers and increase the productivity of those still on the payroll, an endeavor that can be aided by technology.[2]

Though the cycle of invention and refinement has just begun in technology-assisted instruction, several promising approaches are evident:

- Brief online courses (one hour or less) addressing key concepts in virtually all the science and mathematics disciplines that students are likely to encounter in K–12 schools.

- Computer-based instruction on basic topics (e.g., factoring or oxidation-reduction equations) that also tests students and provides teachers with feedback on what their pupils have learned and where they are stuck.
- Online courses that students can access at any time, repeating sections until they are able to pass a test that is embedded in the course software.
- Instructional-management programs that can direct struggling students to new ways of explaining the material, and that can direct abler students to more challenging materials or enrichment resources.
- Management programs that prescribe a new set of online materials for every student every day, and that suggest to teachers challenging questions they can pose to students to prompt the application of skills just learned.

Capacities like these open up vast possibilities for improved instructional delivery. Students who do not want to attend school can access entirely self-managed online learning. Self-managed "virtual" schools can match a student's interests, learning rate, and even work schedule. Students can also take advantage of blended or hybrid schooling that uses computer-based and online resources to deliver some coursework while also providing in-person teacher-student interaction, and relying on teachers to act as diagnosticians and mentors. These "blended" schools can also individualize instruction while assuring parents that a responsible adult is keeping an eye on their children.

There are many advantages to such uses of technology. The most important is that content can be individualized and rapidly adapted to meet individual students' needs, leading to the possibility of more rapid and consistent student growth. Similarly, equipment, web connections, and technology-vendor contracts can be managed more flexibly than live teachers. It is easier to replace a less effective technology-based program with a better one than it is to abandon a teacher who has worked hard but is no longer the best available.

Those advantages notwithstanding, plenty of policy and structural barriers stand in the way of widespread adoption of these promising technology applications. The thorniest and most entrenched of them is our approach to education funding.

The problem boils down to this: Our system doesn't fund schools, and certainly doesn't fund students. It funds districtwide programs, staff positions, and so forth. This structure makes it difficult, if not impossible, to move money from concrete facilities, established programs, and entrenched staff roles to new uses

like equipment, software, and remote instructional staff. Yet to encourage development and improvement of technology-based methods, we must find ways for public dollars to do just that—and to follow kids to online providers chosen by their parents, teachers, or themselves.

To date, a few states have found work-around solutions to make possible such funding arrangements, but these are fragile, clunky, and problematic, as I will show below. A much better approach is to start from scratch and create a new school-funding system—for digital learning and everything else, too—based on a simple principle: Make funding for education follow the child to any school or instructional program in which he or she enrolls. Subsequent sections will show how this principle can be put into practice and what else must be done to maximize benefits for students and the broader community.

This chapter details the problems with today's education-finance system, the ways in which it stymies innovation, and the limits of work-around solutions for funding digital learning. It then outlines a design for a new school-finance system that would enable online learning—and other promising innovations—to reach their full potential.

The Inflexibility of Our Current Public Funding System

In the twentieth century, as engineers worked to design buildings capable of surviving earthquakes, two competing camps emerged. The first constructed steel-frame buildings: These were strong and extremely rigid. The second erected buildings that flexed readily, had multiple independent structural supports, and dissipated energy in myriad ways. Under the right circumstances either of these approaches can work.

Public education in the United States is modeled on the second, flexible energy-dispersing approach. It is not a monolith but is instead comprised of many parts, each with its own means of support. When faced with external shocks, the whole structure is extremely good at bending and then returning to its previous shape.

Nobody deliberately engineered the system of mutually reinforcing structures. It arose over time starting in the 1950s, as courts decided civil rights suits. Congress created new services and entitlement programs for particular groups, state legislatures started small programs to solve emergent problems, school employees sought job protections and control over their work assignments,

Independent but Mutually Supporting Elements of the U.S. Public School System

Regulations governing use of funds. Government doesn't fund students or schools. Instead, it funds particular categories of activity like general instruction, extracurricular activities, programs for handicapped students, teacher in-service training, transportation, and building maintenance. The unit of accounting is the district, not the school or the student. Principals generally have budgets of $10,000–$50,000, and all other spending decisions are made at the federal, state, or district levels.

Central control of investments. Money for new materials and technology is controlled at the district level. Districts allocate as much as 10 percent of the total budget for teacher release time and training costs. But many separate bureaus control small amounts, and their initiatives are usually less significant and unrelated. These funds, moreover, cannot be used for alternative ways of improving teacher quality, e.g., higher salaries or signing bonuses for outstanding young teachers.

Regulations governing human resources. State licensing requirements establish entry requirements for teachers and principals. Once hired, teachers are assigned to schools according to the terms of collective-bargaining agreements. In most localities, the most senior teacher who applies for it fills a vacancy. Teachers' hours of work, daily minutes of contact with students, and obligations to attend meetings or perform other duties are usually spelled out by labor contracts.

Regulations governing instruction. Individual teachers and schools have some freedom to choose materials and teaching methods. However, state curriculum rules require coverage of a wide range of subjects, and also bound the use of time, controlling how much is spent on particular subjects and establishing the length of the school day and the school year. Finally, federal laws on education of the disabled and bilingual education also specify what child shall get what services under what conditions.

Regulations governing student assignment. Students are generally assigned to schools near their neighborhoods, and though districts allow transfers, these are possible only if the desired school has vacancies and if the change would not worsen racial imbalances in the sending and receiving schools. Because some families are trapped in schools they would rather not attend, principals and teachers are obligated to make a variety of accommodations and compromises. Rather than specialize in a particular approach to instruction and attract like-minded families, schools are limited by the wishes of parents who cannot send their children elsewhere.

universities sought gatekeeper status for potential teachers and administrators, and families sought advantages in the competition for the best school placements.

The American approach to funding education has emerged slowly and haphazardly, a product of such politics and advocacy efforts, not design. For example, the federal Elementary and Secondary Education Act included only a few programs when first enacted in 1965, but over time new funding streams and sets of regulations (for purposes spanning the gamut from teacher professional development to bilingual education) have proliferated.

The result is a labyrinth of rules and regulations connected to an ever-growing network of separate funding paths, each with its own "allowable uses" and reporting requirements. System challengers and other education innovators get locked in the maze of this funding structure, unable to break free.

The sidebar "Independent but Mutually Supporting Elements of the U.S. Public School System" sketches five of the main mutually supporting structures that deter and retard innovation. They do so by privileging some uses of funds over others and by making it difficult for funds to flow from one use to another. Thus people with ideas about how to do things differently—to introduce some actions that cost money and to substitute them for other current uses of funds—have great difficulty getting their ideas adopted, or even seriously tested. Outsiders, observing that U.S. schools have remained about the same despite revolutions in technology and economic life, conclude that education stasis is due to the lack of new ideas. But that is patently false. Individual teachers, principals, and technology innovators are coming up with them all the time—and often put them into small-scale practice. This the system will allow, but it does not allow widespread use of ideas that challenge its core.

Because funds cannot flow from established uses to new ones, good ideas can't be fully developed or persuasively demonstrated. Imaginative people who have ideas about uses of technology will suspect that applications they invent for K–12 education cannot be funded, so they will likely apply themselves in other realms instead.

The arrangements we have made are very costly. They discourage the experimentation that could uncover promising options and resist the analysis that would be required to show what is working and what is not. These deficiencies are built into our particular education system, but they are not endemic to education. As this paper will show, a very different system for funding schools is both possible and desirable. But breaking free from K–12 education's current labyrinthine system requires a fundamental restructuring, which—as Hill, Roza, and Harvey

conclude in their 2008 report on how to finance productive schools—is possible if the following criteria are met:

- No particular use of money is required, and no institution is guaranteed funding. Money and people can flow from schools, administrative structures, instructional programs, and independent providers that are less productive to those that are more productive.
- Potential innovators are encouraged to invest time and money developing new approaches.
- Fair comparisons can be made between new and dominant approaches.
- Performance improvement is the focus of accountability.[3]

None of these criteria is met under today's system.

Marginal Uses of Technology under Today's Funding System

Today's funding arrangements for public education were not designed with technological options in mind. They assume that a student will attend a specific school, in which teacher salaries and other costs are paid by the school district. Strictly speaking, schools are not funded at all but resourced: School leaders get very little money to spend on their own because the district both decides how to spend the money *and* how to allocate teachers, administrators, and other resources to the schools. Money flows to schools on a rough per-pupil basis, but in a lumpy way, e.g., one additional teacher for every twenty pupils. A school can lose one student (or as many as nineteen) and not lose any resources. In the rare case in which a student might take some courses at another school or outside the district (e.g., at a community college), the district, not the school, covers the extra costs out of a central fund.

These arrangements do not absolutely bar the emergence of innovative uses of technology. But they do limit the number of options students have to do any of the following:

- Take all their courses from virtual schools offered by online providers located anywhere in the world.
- Enroll in hybrid or blended schools in which they spend some time in face-to-face contact with teachers and other students, and take some courses online.

- Mix and match courses and other experiences purchased from different providers (e.g., literature, math, and science online, all from different vendors, and piano lessons from a neighborhood instructor).

Limits on Virtual Schools' Access to Funds

The virtual school that provides all the instruction a child needs to gain credit for a year's learning is the least challenging to the existing finance system because all the money goes to one place and because it is clear who is accountable for results. But our financing system still creates barriers to the full exploitation of this possibility.

Funding any form of online schooling is complicated by the myriad funding sources presently available to schools: state-based funding for schools, state categorical-program funding, federal categorical-program funding, and local-source funding. States or school districts could bundle together funds from these different sources and distribute them to full-time virtual schools. However, that would require concerted action among levels of government that would have to give up their separate revenue streams or their ability to impose rules.

As table 4.1 shows, virtual schools run under different auspices—e.g., by the state, by a local school district, or by an entity holding a public charter—now have access to different sources of taxpayer funds. Each of the kinds of virtual school in table 4.1 has its own implications for public costs, the solvency of full-time virtual schools, and their ability to compete with existing public schools.

Still, table 4.1 is a best-case analysis, which assumes that agencies that now control funds would part with them as students moved to virtual schools. Funds can be available but, in practice, the public agency holding them can still manage not to transfer them to a virtual school.

As the table reflects, public funding can (but doesn't necessarily) come to virtual schools via

- special state appropriations (as is the case with the Utah Electronic High School) that do not involve transfers of funds from one school to another and do not draw on locally raised levy funds;[4]
- transfers of federal categorical-program funds as students eligible for services take courses at virtual schools;
- transfers of per capita state funding; and
- transfers of local levy funds (available only to district-run virtual schools).

Table 4.1: Funding Sources Now Available to Different Kinds of Virtual Schools

	Special state appropriations	Federal categorical-program funds	State per capita student funding	Local per capita student funding
State-run virtual schools	*Available*	*Available*	*Varies by state*	*Not available*
District-run virtual schools	*Not available*	*Available*	*Available*	*Available*
Statewide virtual charter schools	*Not available*	*Varies by state*	*Available*	*Not available*
Local virtual charter schools	*Not available*	*Varies by state*	*Available*	*Varies by state*
Out-of-state virtual schools and vendors	*Not available*	*Not available*	*Not available*	*Not available*

At present, public funds are channeled through state or local education agencies, so that only schools run or chartered by public agencies can receive public funding. Further, it is very difficult to transfer public funds to out-of-state or foreign vendors—public or otherwise. Local school districts that operate or authorize virtual schools can (but don't always) provide services funded by federal categorical programs (like Title I) to the students who attend them.

Blended Schools' Access to Funds

It is more difficult to get public funds to blended or hybrid schools that provide some instruction via computer and some via in-person teaching. Even if states and school districts permitted money to flow to virtual schools in the ways summarized in table 4.1, the funding status of blended schools would be precarious. States and districts could decide that these schools were attracting too many students and drawing too much money out of their conventional schools, and either close the hybrid schools or cripple them via regulation. (The same can happen to charters authorized by school districts.)

At present, the most secure channel of public funds into blended or hybrid schools is the charter school route. If state law allows hybrid charter schools, they can be authorized by entities other than school districts. Independent authorizers are not responsible for district-run schools and therefore have no incentive to inhibit the flow of students and funds to hybrid schools.

In general, hybrid charter schools have access to the same sources of public funds as their purely brick-and-mortar counterparts. In states that provide more funding for pupils attending district-run schools than for those attending charters (in other words, *most* states), unequal funding almost certainly dampens the growth of the charter-based hybrid-school sector.

Access to Funds for Parent-Assembled Instruction

Today, no arrangement provides public financial support for parents who wish to assemble unique mixes of instructional experiences for their children. Parents might persuade their child's school to pay for an online course or a course provided by another institution. But schools control the funds and have no incentive, other than the desire to satisfy a parent, to make such arrangements.

District-run schools are sometimes willing to allow a student to take free courses from a state online school, and parents are always free to invest their own money in supplemental courses. However, neither of these arrangements funds independently provided courses equally with courses provided by state or local entities.

Except for parents whose children are eligible for Title I supplemental education services, families that buy particular supplemental courses for their children are on their own. Like homeschoolers—and the vendors who provide online courses for them—they do not receive public funding. Nor do students who enroll on their own without the approval of a school district or charter school, except in states where the statewide virtual school is funded by direct appropriations.

Thus the deck is stacked against learning options that make creative use of technology. It is, however, possible to describe a simple, feasible, alternative finance system that could fund innovative learning options equitably.

What a Technology-friendly Funding System Would Look Like

What would a public funding system that promotes digital learning and innovation look like? In general terms, the system we need would be designed to provide taxpayer support for the best possible instruction to students by any means that can work. Unlike the existing system, which provides a lot of money to educate children but tries to do so within extensive constraints imposed by laws, regulations, court orders, labor contracts, and school-board politics, an alternative system would put priority on educating children as effectively as possible with the money available, with as few constraints as possible.[5]

A technology-friendly funding system would need to

- fund education, not institutions;
- move money as students move;
- pay for unconventional forms of instruction; and
- withhold funding for ineffective programs without chilling innovation.

Fund Education, Not Institutions

Under an innovation-friendly alternative funding system, federal and state governments would not mandate particular uses of funds, or support particular programs, administrative structures, or salary scales. An innovation-friendly funding system would tie money directly to individual students' education.

Of course there would be some constraints on the use of funds—they would need to pay for instruction, not unrelated purchases, and to support only schools and organizations that practice nondiscrimination, do not advocate violent overthrow of the government, and account honestly for funds. (Different forms of performance management, which might protect students from wasting their time and taxpayers' money, and provide evidence of productive use of public funds, are discussed below.)

Supporting forms of digital learning with public funds means allocating a specific amount for every child and distributing money to districts, schools, and instruction providers solely on the basis of enrollment. States and localities could opt to "weight" pupil-based funding by allocating more for one group of children than for another (e.g., providing more than the average amount of money to support education of students with disabilities or English language learners or those in high-risk communities).

If states and localities combined all the money they now spend on K–12 education and divided it up by enrollment, with the same or weighted fraction of the total assigned to each child, and distributed dollars to schools in the same way, they could eliminate the barriers to innovation and improvement inherent in current funding systems and simultaneously force a dramatic reduction in costly administrative structures. Money would not be held centrally to preserve particular schools or programs, but would go wherever children are educated. This would allow new uses of funds, an essential precondition to innovation and widespread use of digital learning.

The federal government could reinforce the movement toward pupil-based funding by making its major grant funds pupil-specific. It could do that by sharply defining student-eligibility criteria for such programs as Title I and special education, then requiring that states divide the money received from any such program equitably among all eligible recipients in the state, and allocate it as extra money to the schools those children attend. Thus federal programs could still increase spending on designated beneficiaries without privileging particular uses or creating bureaucracies.[6]

Move Money as Students Move

Funding students (and not programs) is a step in the right direction, but it is not enough. States must also make sure that all funds move from one district, school, or instruction provider to another as students transfer. This arrangement requires a choice system: Students could move whenever their parents identified a more suitable school or set of instructional programs, or as ineffective schools were closed and students shifted to more effective ones.

Rudimentary versions of such a system exist already in forty-one states, to fund charter schools. Funds follow students directly to the schools they attend, and are taken away from schools out of which pupils transfer. Unlike waiver policies that offer limited escape from constraints of the dominant system, charter laws cut the Gordian knot. They ensure that schools don't have to negotiate their freedoms one by one but instead start with most of them guaranteed.

Still, state charter laws are imperfect in many ways, including their narrow reach: They apply only to students who enroll in such schools; all other students are still in district schools where funds are tied up, hidden, and inflexible. Many states, moreover, leave some funding behind in district-run public schools even when pupils transfer to charter schools. Depending on state and charter laws and local policies, charter students either do or don't benefit from public funds allocated for federal programs, transportation, and facilities. And charter students often don't benefit from locally raised funds (e.g., from property tax levies).

However, the basic charter paradigm—funding based on enrollment; school control over spending, staffing, and use of time; and a structure that includes family and teacher choice, lottery admissions, and oversight by an authorizer whose only powers are allowing schools to open and closing them for nonperformance—is a useful frame for at least part of a system that funds technology innovation.

A technology-friendly funding system would have to apply to all students wherever they receive their education, and whether just one provider or several serve them. Funds available for a child's education must include all the taxpayer funds available to support students' education. To make this happen, some government entity would need to assemble all of the funds available from all sources for K–12 education in a locality, keep an account for every student, and faithfully allocate the contents of the account to whatever school or education program a student attends. In theory, school districts could perform this function, though their track record of fiscal opaqueness and preference for schools they run directly suggests that some other entity would be better.

Ideally, a new kind of public entity, possibly a county or regional finance office of the state government, would assemble and disburse all funds. It would also account for funds on a pupil basis. Every student would have an account that showed what funding from all sources was available for his or her education, and to what schools and vendors it had been disbursed.

Each student's account would, in a sense, constitute a "backpack" of funding that the student would carry along to any eligible school or instructional programs in which he or she enrolls. The contents of the backpack would be flexible dollars, not coupons whose use is restricted to a particular course or service.

If a family decided to rely on one school or instructional provider for all of a child's education, all of the money would go to that school or provider. However, students might also enroll in courses provided by different organizations, in which case the funds would be divided. Students and families would then be free to shop for the best combination of courses and experiences their backpack funds could cover. Providers would compete with one another to offer services that were of high quality, effective, and reasonably priced.

Every school or independent instructional provider would have to post its prices for particular courses. No school could charge tuition in excess of the full amount in a potential student's backpack. Schools and other providers could also offer partial instructional programs, and students and their families could mix and match to the limit of the funds in the backpack. (See below for possible safeguards against misuse of backpack funds.)

This backpack-based funding would impact existing schools' budgets immediately, creating incentives for schools to avoid losing students to other educational institutions or instructional providers.

School districts might choose to tax affiliated schools for central services provided. However, if school leaders find themselves losing students and money to charter schools and other providers of instruction, they are likely to consider either demanding changes in district policy or petitioning an independent authorizer for charter status. This would force movement of school districts toward the "portfolio model"—in which the district manages a diverse portfolio of schools.[7] Under this model, districts would enter charter-like arrangements with affiliated schools, hold schools accountable only for student performance, seek new models and providers of schools to replace low-performing district schools, and foster development of multiple independent providers of services that schools need.[8]

Innovators (educators and social service professionals with new ideas) would also be encouraged by the certainty that they could get full funding for every student enrolled in their school or program.

Pay for Unconventional Forms of Instruction

A technology-friendly funding system must have low barriers to entry and allow new entrants to be paid for every student who uses their services. Backpack funding helps here, because innovators can be paid even if they serve only a few students. Full exploitation of technology requires more. Innovators should be able to receive public funding for even a partial instructional program (e.g., one course, or part of a course), both to provide students broader opportunities and to create cash flow for promising but small-scale operators.

For free movement of funds to promote experimentation and innovation, it must be possible for students to enroll in schools that are configured in novel ways. Technology opens up myriad possibilities: students using a computer-based system to receive individual instruction, students linking to a set of lectures and other presentation materials along with literally thousands of other students, students learning through a mix of technology-delivered and teacher-delivered approaches. All of these kinds of learning experiences should be eligible to receive support from the public funds in student backpacks, notwithstanding current rules about teacher certification, class sizes, mandatory hours of school attendance, etc.

Students must be able to join online courses provided by schools other than the ones they normally attend and take advantage of courses that combine experiential learning (e.g., participation in workplaces, arts events, or social services) with online materials that prepare students for those experiences and

assess learning. Students could purchase any combination of courses and learning experiences that their backpack funds could afford. (See the sidebar "What This Means for Capital Costs" for more on how funds previously earmarked for facilities and maintenance could be included in the backpack.)

Student-based backpack funding would also provide a mechanism whereby online providers with new ideas about instruction could test their products and build customer interest. Growing use of their services could help entrepreneurs accumulate enough funds to expand their current services dramatically or to develop a broad enough set of materials to create an online school.

Schools and instruction providers should not be punished for being efficient. Blended schools might save money on teachers. Virtual schools and providers of more limited instructional programs could, if they attract enough students, pay far less to educate each additional student than they receive from student backpacks. These results are desirable because they can attract investment; even if providers are nonprofits, the low marginal costs of online instruction can enable continual investment in new and improved resources.

Backpack-based funding is the core of a public-financing strategy for technology-based instruction. A fully innovation-friendly system needs a mechanism for encouraging innovators who have ideas about particular aspects of a school to join with others to create a whole school. In today's innovation-hostile environment, few can afford to take the necessary risks. Even if the system were more open to new ideas, grave uncertainty about whether any K–12 education idea can ever turn a profit limits venture capital investment.

Thus states, districts, and foundations interested in exploiting the full potential of online learning might need to invest directly in development and testing of new instructional technologies. One emerging example is New York City's iZone, which provides up-front funding for schools to develop or adopt new instructional modules. Another is the U.S. Department of Education's ARPA-ED (Advanced Research Projects Agency for Education) proposal, which, if funded, would "aggressively pursue technological breakthroughs that have the potential to transform teaching and learning the way the Internet, GPS, and robotics… have transformed commerce, travel, warfare, and the way we live our daily lives."[9] States could create their own versions of ARPA-ED or share in the cost and benefits of a national institution.

The idea of state and local government investment in new instructional resources is nothing new. States and localities now invest in teacher training,

What This Means for Capital Costs

To create a level playing field for competition among all schools and instructional programs, states would need to include funds now set aside for facilities construction and maintenance. States now fund separate line items for construction and building maintenance, and these are not counted in calculations of schools' operating costs. Thus even if online schools' operating costs were equitably funded, traditional schools would get a significant extra subsidy in the form of funds for construction and maintenance.

In a time when innovation is necessary, and the cost structures of different forms of schooling differ dramatically, a special subsidy for bricks and mortar is counterproductive. It defrays the costs borne by brick-and-mortar schools, while ignoring the investment costs of online schools, which must pay for computers, methods development, and back-office administration out of their operating costs.

Under this arrangement, a school—whether charter or district run, traditional, hybrid, or online—would pay whatever capital costs it encountered. Schools and instructional-program providers with high costs for equipment, research and development, and oversight could cover these costs with funds from student backpacks. And schools paying high rents could meet their costs. In the long run, this arrangement would probably lead conventional schools to reduce their costs by renting less space and refusing to pay for expensive amenities like theatres and swimming pools.

Even with a level playing field, it is not obvious that schools without facilities costs would come to dominate the market: Parents might prefer the custodial and socializing functions that conventional or hybrid schools offer, especially if those schools, by efficient use of their space, could also afford to give students access to technology options.

professional-development programs, development of new curricula, and methods of student assessment. All such investments are meant to benefit children, but they also benefit other parties—the teachers who use new skills to make higher salaries, the vendors who sell professional development services, etc. In the same way, development of innovative instructional programs and organizations ready to provide new options for families is in the public interest and is an appropriate use of taxpayer funds.

Withhold Funding for Ineffective Programs without Chilling Innovation

A funding system that is open to innovative uses of technology must also have a mechanism for deciding which schools and instructional programs are eligible for the funds traveling in students' backpacks. As long as public money is involved,

scandalous misuse can destroy any financing scheme. A financing system must include arrangements to withhold or withdraw funds from ineffective providers.

For whole schools, including hybrid and virtual schools, chartering provides a useable framework for performance management. Charter authorizers can close low-performing charter schools or refuse to renew their authorization, and they can evaluate hybrid and virtual charters on grounds similar to those used for conventional schools.

No one thinks today's authorizers are doing these jobs well; oversight of hybrid and virtual schools would strain them further. However, an authorizer as the gatekeeper for public funding of independently provided instruction is indispensable. Any other form of public accountability would inevitably focus on inputs and thereby put the brakes on innovation. This is not the first, nor will it be the last, Fordham-sponsored research to argue that competent and unbiased charter authorization is a necessary element of an innovative and performance-oriented public education system.

However, chartering keeps schools in the role as gatekeepers to publicly funded digital education. Even if parents chose the schools their children attended, it remains the case that the options available to students, and the opportunities for entrepreneurs, are limited by the imaginations and tastes of school operators.

Is there a way to eliminate the middleman, so that families can make their own choices among online courses and other resources?

Of course parents could be given full access to their children's backpacks and allowed to purchase any form of instruction they wanted from any source. Children's education would then depend on the quality of their parents' choices. In the long run, parents might learn to choose well, and the supply of good options could rise to meet the demand.

This possibility calls up the ghosts of the voucher debate: Would parents be able to appropriate public funds in any way they wanted? Would vendors be able to take advantage of customers' naïveté and lack of performance information and make money selling shoddy products? If students or parents made bad purchases, so that students did not learn what they needed in order to graduate or succeed in higher education and work, would the public be forced to pay again for instruction the student should have gotten the first time?

These questions are too persistent to ignore; moreover, if ignored, they could become causes for political opposition or litigation. Though it is not possible to eliminate every risk in any situation, even one where uses of public funds are

tightly controlled, it is possible to reduce the risks through a few key measures. But as will be readily apparent, each of these risk-minimizing actions would either heighten costs imposed on the government or reduce the diversity and boldness of options available to parents.

Risk reducers that might be attached to the funding of parent-guided choices include

- tracking and reporting on the quality of services provided and outcomes produced by all eligible vendors;
- limiting parents' choices to certain "qualified" vendors;
- maintaining a list of ineligible (low-performing) vendors;
- paying only after children have completed courses and demonstrated benefits, thus withholding payment from ineffective vendors (pay for performance);
- limiting the amount of money parents can dispose of; and
- limiting parents' choices only to supplementary or enrichment programs (which could be online or brick-and-mortar).[10]

All of these risk reducers create new functions for government or for government-supported independent institutions. They also create new hazards of their own.

The first risk reducer, providing performance information, is the least intrusive, but it imposes heavy monitoring and analysis burdens on government. State and local governments historically underfund and underperform this function. Moreover, it creates opportunities for maneuvering and controversy about data and evidence, which can be turned against new and innovative providers. State contracts with independent analytical institutions might stabilize the function and reduce the conflicts of interest experienced by state and local education agencies.

The second risk reducer, allowing only qualified vendors, also engages government in making judgments, and creates opportunities for well-organized vendors to resist new and unfamiliar ones. This remedy might protect parents and students from disastrous options, but it cannot guarantee quality and can protect well-organized vendors from desirable competition. Again, state-supported independent accrediting agencies or inspectors might be more objective, but they could also be susceptible to capture by interest groups and proponents of particular tastes in instruction.

The third, maintaining a list of ineligible vendors, would allow people with innovative ideas to compete for students and money. Government could exclude vendors with bad track records, but it could not exclude anyone whose track record was not yet established. This would punish frauds and bad performers, but only after some children had been demonstrably hurt by them. The difference between this approach to risk reduction and the allowance of only "qualified" vendors illustrates the dilemma that the designer of any public funding must face: whether to risk chilling innovation or to allow harm to a few people in the name of encouraging innovation.

The fourth, implementing a policy of pay for performance, would allow transfers of public funds only after students had demonstrated, in independently administered tests, that they had met specific learning objectives. Providers—including conventional public and charter schools—would be paid only after the fact. This arrangement would require a major investment in public oversight in order to track student enrollment in particular courses and assess results. New instructional models could be funded only if appropriate end-of course tests were available.

Overall, pay for performance would create a harsh environment for all education providers. Conventional, virtual, and hybrid schools might spend money on a student's instruction for a whole course or semester yet receive nothing in return. Online vendors of all kinds, who have little control over their students' effort or persistence, could be even more at risk. In general, this approach would limit the unproductive use of public funds and quickly destroy any vendor that could not demonstrate good results. It would favor providers with deep pockets, e.g., district-run schools and online vendors supported by large foundations. Performance-based payment as defined here could create a lethal environment for smaller-scale innovators.

The fifth and sixth risk reducers, limiting the amount of money parents can dispose of and limiting parents' choices only to supplementary or enrichment programs, are promising if taken together. Parents could choose any whole-school provider, but would also control a limited amount of backpack money and could use it to pay for tutoring and enrichment programs. This would allow some public funds to flow to new and innovative programs. Vendors could gain the support they need to develop and market their ideas to the point that charter- or district-run schools might adopt them. Yet parents could not be led into making choices that compromised their children's core instruction.

A combination of the fifth and sixth risk reducers would create a cafeteria plan for extracurricular activities and supplementary learning (either online or in-person).[11] Under this plan, parents could get a publicly funded debit card to pay for enrichment activities—everything from remedial tutoring to SAT prep. Amounts on the debit card could vary: Disadvantaged children, or those who would otherwise be eligible for extra tutoring or be required to attend catch-up courses or summer school, could get larger amounts than students without special needs.

This arrangement would eliminate the need for government to vet every online provider or to negotiate with vendors about costs. Costs would be regulated by the amounts available on the debit cards, and parents would have incentives to avoid vendors that required all of their available funds for one service.[12]

When it comes to risk reduction, designers of technology-friendly funding systems can choose their poison. Any option introduces some risk that funds will be misused, children won't learn as needed, or innovators will be denied government funds. Based on the foregoing analysis, some combination of tracking vendors so the lowest performers can be eliminated, limiting parents' choices to whole schools (including virtual and blended schools), and freeing parents to choose supplemental services seems most promising.

Conclusion

A funding system can't cause innovation: It can only interfere with it, or let it happen. Whether innovation occurs, at what pace, and to what ultimate benefit, depend on factors other than public funding. But a system like the one described here would make promising breakthroughs, especially in the digital realm, much more likely—and much more likely to scale rapidly.

A lot depends on whether K–12 education can compete successfully for the attention of the most imaginative people, those who are working on online learning, game structures, and information architecture. To date, K–12 education has been a less remunerative field than adult education and training, business simulation, and game sales. However, many developers remain personally motivated to work on K–12 applications. The right public policy environment, and smart philanthropic-investment strategies, could speed up innovation and create new opportunities for America's children.[13]

Endnotes

1. For a much more complete account of the possible advantages of technology-enhanced instruction, see chapter one, "Teachers in the Age of Digital Instruction," by Bryan C. Hassel and Emily Ayscue Hassel.

2. See, for example, Paul T. Hill and Marguerite Roza, *Curing Baumol's Disease: In Search of Productivity Gains in K–12 Schooling* (Seattle, WA: Center on Reinventing Public Education, 2010), http://www.crpe.org/cs/crpe/view/csr_pubs/343.

3. Paul T. Hill, Marguerite Roza, and James Harvey, *Facing the Future: Financing Productive Schools* (Seattle, WA: Center on Reinventing Public Education, 2008), http://www.crpe.org/cs/crpe/view/csr_pubs/251.

4. The state-run school receives its own separate appropriation from the legislature, and management can ask for increases as enrollment expands. Students who attend brick-and-mortar schools and use the online school for only part of their instruction are still included in their conventional schools' attendance figures for purposes of state funding.

5. For a more detailed discussion, see chapter three, "The Costs of Online Learning," by Tamara Butler Battaglino, Matt Haldeman, and Eleanor Laurans.

6. The Hoover Institution's Koret Task Force has recommended a transformation of the federal role in education that is consistent with this proposal. A forthcoming paper by Grover Whitehurst (Hoover Institution Press) addresses this topic.

7. Paul T. Hill et al., *Portfolio School Districts for Big Cities: An Interim Report* (Seattle, WA: Center on Reinventing Public Education, 2009), http://www.crpe.org/cs/crpe/view/csr_pubs/295.

8. Paul T. Hill and Christine Campbell, *Growing Number of Districts Seek Bold Change with Portfolio Strategy* (Seattle, WA: Center on Reinventing Public Education, 2011), http://www.crpe.org/cs/crpe/view/csr_pubs/446.

9. U.S. Department of Education, "Winning the Future: The Role of ARPA-ED," March 2011, http://www.ed.gov/sites/default/files/arpa-ed-background.pdf.

10. In chapter two, Rick Hess identifies three possible quality-control mechanisms for online learning: input and process regulation; outcome-based accountability; and market-based quality control. As Hess observes, input and process regulation can stifle innovation and efforts to adapt instruction to individual students' needs. Consistent with this observation, the options provided here focus on outcome and market-based mechanisms.

11. For an explanation of the cafeteria-plan idea, in this case applied to teacher benefits, see Noah Wepman, Marguerite Roza, and Cristina Sepe, *The Promise of Cafeteria-Style Benefits for Districts and Teachers* (Seattle, WA: Center on Reinventing Public Education, December 2010), http://www.crpe.org/cs/crpe/view/csr_pubs/377.

12. Should parents be allowed to supplement the amounts on the debit card with their own funds? This is a perennial question associated with any voucher scheme. Supplementation would allow experimentation with a wider range of services, but it would also allow some vendors to serve only the more affluent parents. It is, however, difficult to see how parents could be pre-

vented from buying supplements with their own money.

13. See Kim Smith, *Innovation in Public Education: Problems and Opportunities* (San Francisco: NewSchools Venture Fund, 2011), http://www.newschools.org/files/innovation-in-education.pdf.

CHAPTER FIVE

Overcoming the Governance Challenge in K–12 Online Learning

▪ *By John E. Chubb*

Technological innovation has thus far had little impact on K–12 education. Public schools, their classrooms, and their methods of instruction work much the same today as they have for decades. Experts have predicted for some time that technology would transform schooling. But no transformation was wrought by television, computers, interactive whiteboards, or even the Internet. The reason for this is surely not a lack of need for improvement: Weak achievement in American schools is a longstanding issue. Nor is it a lack of suitable technology: Online learning and computer-based instruction have promising track records of raising achievement in K–12 schools as well as in higher education, where technology is already used extensively. The reason is the capacity of the public school system to resist innovation.

If policymakers want to see faster technological innovation in K–12 education—innovation that works to the clear benefit of students—they will need to take a hard look at how the public education system has managed to forestall innovation for so many years. They will need to consider how that system is structured, governed, and controlled. In the end, public schools are government bodies. They make decisions about technology as they do everything else: through the political process. That is where the resistance centers—and where it so often succeeds. Hence that is where policymakers will need to bring change.

An Alternative Model

There is nothing *inherently* sclerotic about K–12 education. It is a nearly $600 billion industry, a potentially attractive market for investors betting on technology. It is far larger than higher education, where students are already making

extensive use of technology and where private investment has been huge. Like those in tertiary education, primary and secondary students could also benefit from what technology and online learning have to offer right now. Gobs more investment and years of innovation are not even necessary to reap rewards. But, as currently controlled, public education cannot and will not adopt the changes that technology stands ready to provide. Its current organization is sclerotic.

Consider a quick comparison between K–12 and America's esteemed higher education system: In 2007–08, the most recent year for which federal data are available, 4.3 million undergraduates took at least one online course.[1] That represents over 20 percent of all undergraduates at the time. In the same year, 1.03 million K–12 students took a course online.[2] That represents just 2 percent of all students. In other words, postsecondary students are more than ten times as likely to take an online course as K–12 students. This probability is even higher—about forty times—if we take multiple course enrollments into account.

Yet online technology is arguably more valuable in the K–12 space than in postsecondary education. K–12 schools are far more limited than colleges and universities in what they can offer via traditional classrooms. Many are too small, with too few specialized teachers, to offer all the courses that students may want or need. Cases in point: upper-level science courses, the full range of foreign languages, and the complete repertoire of Advanced Placement classes. Public schools, particularly in inner cities, also face daunting challenges serving diverse student bodies, with many pupils reading well below grade level and others anxious for acceleration. Online programs allow schools to customize instruction to individual student needs. They also offer students one-on-one tutoring by teachers working remotely. And they boast features that are particularly attractive to younger learners: animation, simulation, adaptive assessment and instruction, voice recognition, personal avatars, gaming environments, and more. In sum, technology can bring many instructional tools to the student that a regular classroom teacher simply cannot.[3] These tools may be especially powerful in lifting the achievement of special-needs students or unleashing the potential of gifted students. A typical college-age student of eighteen to twenty-five years or an adult learner returning to higher education may also benefit from innovative technologies. But the case is much stronger for students in K–12.

When technology is used, it boosts student achievement. A 2009 review of fifty studies of online learning, including both K–12 and higher education, concluded that achievement in online courses was *better* than achievement in

face-to-face courses. It also found that "blended" courses, those offering online instruction coupled with face-to-face discussion, might be better still.[4] The latter finding is especially important because most K–12 families have childcare needs as well as education needs and will therefore continue to prefer a place-based education for their children, with technology a major part but not the whole of the experience.

Despite these benefits, technology and online education play a very small part today in K–12 education, particularly when compared with higher education, where the use of online learning is determined by the incentives of the competitive market, subject to regulation by the government. The use of online education in K–12 is determined in opposite fashion—by government regulation, subject to a little pressure from the market.

Fundamentally, higher education is a buzzing, competitive marketplace of public and nonprofit and for-profit private institutions. It is, to be sure, subsidized in various ways by state and federal government, but it ultimately depends on the voluntary enrollment of students. By contrast, nearly all of K–12 education consists of government-owned and -operated public institutions, with little competition among schools or choice for students and families. There the political process determines the education that is provided.

The proliferation of technology-based instruction in postsecondary education was not dictated by government policy. State legislatures did not require online learning or dictate the conditions under which it needed to be offered. Individual professors were free to experiment with the structure of courses offered fully online or through mixtures of face-to-face and virtual instruction. Companies like Blackboard, the leading learning-management system, and Moodle, an open-source competitor, brought rapid technological innovation to the online environment—again, not in response to policy but in response to the preferences of students, professors, and colleges. Companies emerged not only to provide technology and content—the traditional roles of education firms—but to compete as educational institutions.

No one knows what the most effective models of online instruction will be in higher education. And policymakers now would never try to specify them; the models are always changing. Higher education looks first to the market to determine what is most effective and efficient. States writing K–12 online-education policy should similarly aim to promote innovation. They should offer incentives and flexibility for providers of online and blended models to invest in

new approaches. They should offer opportunities for students to choose among them. The market must then be overseen. But that is a different and more manageable role for policymakers than attempting to prescribe how educators should use technology.

The Politics of Resistance

Technology could do for K–12 education what it has done for virtually every other industry throughout history: make people and their industries more productive. Sometimes this happens by substituting technology for labor—a computer or other technology does what once required numerous people to do, such as presenting a full curriculum. Sometimes it happens by giving labor the ability to do what it could not practically have done before—for example, analyzing mountains of student data in real time. However, technology always requires change, sometimes wrenching change, and thus affects the people within the industry: They must learn new skills—and are at risk of losing jobs. Consequently, people within industries faced with new technology tend to resist it.

In competitive industries, such resistance typically proves futile. Firms that adopt technology improve and take customers from those that fail to adopt and adapt. In K–12 public education, however, where competition is largely absent, resistance can succeed at least for a good while. In 2009, Terry Moe and I argued that the resistance would eventually—in twenty to thirty years—be undone.[5] Online education would slowly seep into K–12 schools. It would find niches where resistance was weakest, places like credit recovery for failing students, dropout recovery for students who have already left school, and Advanced Placement classes for students that some schools simply lack resources to serve. As more students work online, teaching forces would slowly shrink, more teachers would find work teaching online, and—this is the critical point—organized opposition from the school workforce, in the form of teacher unions, would weaken as unions lost members, resources, and power. Harvard business professor Clayton Christensen forecast a similar triumph of technology in K–12 education, but for reasons having more to do with economic than political forces.[6]

It seems inevitable that in time, technology and online learning will come to play a sizable role in public schools. But without the driving force of competition, this could be a very long time coming. At present, online education plays an almost trivial role in K–12 education. In 2010–11, roughly 250,000 public school students were involved in full-time online education, nearly all through

virtual charter schools, not through the regular public school systems.[7] That is 0.45 percent of public school enrollments. To be sure, full-time online education may not be right for many students. It requires a great commitment from parents, in particular. But the parents of two million students already homeschool their children and could take advantage of online support.[8] *Full-time* online education is approaching 10 percent of all college students.[9] The paltry full-time numbers in K–12 are a mark of institutional resistance.

Indeed, while thirty-eight states now authorize online charter schools, half of all enrollments are concentrated in a handful of states that do not restrict the size of the schools or handicap them financially.[10] In 2010, for example, Massachusetts authorized online charter schools but restricted their service to five hundred students, at least 25 percent of whom must reside in one "home" district and no more than 2 percent of whom can reside in any other one district—effectively limiting enrollment to a single district. What online school will survive with the few students it can enroll from a single district? What sense does it make in any of these states that limit access to say that students in one district can experience some of the benefits of the online-education universe and students in another district must experience other benefits? The Internet obviously imposes no such limits, nor do the course providers. And what of the twenty-three states that allow no online charter schools at all?[11] What is their argument against learning online full time?

State governments have tried to offer their own alternatives to the online charter school. As of fall 2011, forty states ran their own virtual schools. In all, they had 536,272 semester-course enrollments.[12] The enrollments are largely to fill holes in face-to-face public school programs—AP, credit recovery, and supplementary or specialized courses. The students are almost all part time, taking a course here or there. The courses are not integrated, by and large, into robust blended-learning models back on the home campus. If the semester enrollments were converted into full-time student equivalents, the number of students served would be less than 45,000.[13] Scant progress—as the politics of resistance would predict.

But progress need not be so slow. Resistance to technological innovation is abetted by one feature of the current public education system, above all others. That is the exclusive authority granted to local school districts to determine how students are educated. Except for the right that forty states and the District of Columbia grant students to opt out of their local school districts in favor of a charter school, school districts throughout the United States enjoy what amounts

to monopoly power in their local school markets. School districts have the right to determine which schools students attend, what curricula they receive, and how much access they have to online education. School districts are disciplined by the political process—school-board elections and decision making—but those politics are notoriously vulnerable to pressures from district vested interests, in favor of the status quo.

The district model of governance has been much debated (look to Fordham's recent paper series "Rethinking Education Governance for the Twenty-First Century" for more). But the issue is different when the subject is online education. School districts lack the scale, in most instances, to create comprehensive online institutions—ones that offer complete K–12 curricula, expert online instructors in all subjects and courses, vibrant online social networks, cutting-edge technology, and access to the best instructional resources in the world. Such institutions require capital, research and development, and expertise far beyond what any school district can accumulate. They also require enough students—hundreds of thousands, not thousands—to support the cost of investment and operation. School districts can be terrific customers for online institutions, purchasing the best that an online industry has to offer. But school districts can never become that industry.

If districts are left exclusively in charge of online learning, they will not become the online providers that technology has the capacity to offer. They simply lack the scale to do this. They will also remain slow adopters or customers, because of the threat that technology poses to the status quo, and especially to jobs. The politics of local school systems make it too easy for established district interests to block rapid change.[14] So for reasons on both the supply side—the lack of scale to become high-quality online providers—and the demand side—the political biases in favor of the status quo—school districts should not have exclusive control over student access to online education.

Then who should? The argument here is that access should be controlled by the states. Policymakers at the state level have available to them practical, even research-based, measures they could adopt to govern and finance a vibrant public market in online education. A series of steps for state policymakers is outlined below. These steps are recommended not only on their education merits. They make sense politically. State control will buffer the political resistance that heretofore has slowed innovation.

Step 1: Set K–12 Online-Learning Policy at the State Level

Currently, state policymakers face strong pressures from interests tied to the welfare of local school districts. These pressures have thus far succeeded in limiting the number of states that permit online charter schools, holding funding for online schools well below funding for brick-and-mortar schools, and otherwise protecting districts from level-playing-field competition for students. However, states *have* demonstrated that political coalitions will support more ambitious change. During the governorship of Jeb Bush, for example, Florida adopted a law giving all high school students the right to take any course online from the Florida Virtual School (FLVS), which would receive pro rata funding from the sending school district upon students' successful completion of a course. In less than a decade, the program has become a huge hit, with students logging 260,000 half-credit course enrollments in 2010–11—nearly half of all state virtual-school enrollments nationwide.[15] The program's popularity has changed the politics, building support among the countless families whose children now enjoy the choice.

Much as the politics of brick-and-mortar charter schools have changed in the twenty years since Minnesota authorized the first charter school in 1991, so will the politics of online education. In the early days of charter schools, before two million children were enrolled in them, opponents—largely school districts and unions—had a relatively easy time hamstringing charter schools if not blocking them altogether. Supporters were far more likely to be Republicans than Democrats. Today, charter schools retain some of the traditional opposition, but they have become mainstays of urban education and enjoy the support of the nation's leading Democrat, President Obama. Online education will experience the same rise in support as it expands—though even more so than brick-and-mortar charter schools. Online education has a part-time as well as a full-time potential constituency. Tens of millions of students could one day participate.

The key is for a state to take the first step, limiting the exclusive control of school districts over online education. States will hear the objections of districts and unions loud and clear. But states will also hear from the families of students who may benefit uniquely from online education: rural folks without access to full and advanced curricula, urban students stuck in failing schools, advanced students without access to acceleration, students who have been bullied and are at risk of dropping out, athletes and performing artists who want more flexibility for practice, and special-needs students who want more opportunity to work at their own pace. These students, along with "mainstream" kids simply interested

in experiencing what technology has to offer, will number in the tens of millions nationwide. Most will be part-time online pupils, some will be full-time. All will provide a growing constituency for preserving the right to choose—online. They will be joined by growing numbers of teachers, technologists, and businesses anxious to develop online solutions.

States are urged to take primary responsibility for creating the system that will govern and finance online public education. On the education merits, districts simply cannot handle this role. Politics makes the role even less tenable. Districts will object to the loss of control. But they should be able competitors in a system where students and families can choose among various online providers. District facilities are close to student homes and may offer blended options that are especially appealing. The state is not taking students and resources away from school districts; the state is rather creating a system that asks districts to earn the allegiance of students rather than being guaranteed it.

To be sure, state control is not a panacea for what ails school districts. The political opposition, though bound to weaken, is still there. Some states are quite small and will not by themselves become adequate online markets. States may decide not to open their markets to providers across state lines or internationally. But states are a superior locus to school districts for policymaking.

And states are superior to the only other available option, the federal government. In Washington, the political combatants are the same as at the lower levels, providing no guarantee of promarket policies. The federal government lacks the constitutional authority to establish the range of rules necessary to create one effective national system of public online learning. The federal government also has had no success with the intricate issues that individual states will be called upon to address. The federal government can become an important partner to the states; for example, it can provide flexibility in education-grant programs such as Title I to allow students to receive federal support while pursuing instruction online. But the federal government ultimately funds less than 10 percent of public education, and is in no position to call all the shots for digital public education nationwide.

Step 2: Create a Public Market for K–12 Online Learning

Notwithstanding the political forces that may work to the contrary, states should set policies for online learning that promote the development of a competitive market. Policies should encourage widespread student participation in online programs. Policies should attract multiple providers of online content and

instruction. Policies should provide funding ample to reward private investment in better products and services. Policies should not discriminate between for-profit and nonprofit providers. Online education offers policymakers an opportunity to channel the beneficial forces of the marketplace into education in a practical and powerful way—more than is possible in brick-and-mortar education.

The online environment allows many providers to compete for student enrollments—providers throughout a state or across the nation, or even around the world. In the brick-and-mortar world, students can choose only among schools within commuting distance of their homes. In the online world, there is no limit to the number of providers or schools from which a student could choose. If the student market is large—and it's already up to fifty-five million in the U.S. today[16]—providers will proliferate. State policymakers should rely on this market to produce the innovation that schools and students require. The state should then govern the market, as described below, to ensure that it drives toward the desired outcomes.[17]

Step 3: Provide Students the Right to Choose Online Learning *Full Time*

States should give students the right to choose online instruction as a full-time source of their public education. Just as states (and the federal government) have developed policies over the last two decades that afford many students and families the right to choose among brick-and-mortar schools, states should now develop policies to extend that right to full-time online learning—another form of "school."

Students should be guaranteed specifically the right to choose any full-time virtual school *in the state*, whether operated as a charter or run directly by a state agency. States should not limit the choice of full-time schools to those based in a student's home district (as Massachusetts has effectively done) or contiguous counties (as California has done). These restrictions on choice serve no educational value and limit the development of vigorous markets.

Full-time online education is not likely to occupy a large part of the K–12 education market—certainly nothing approaching the 10 percent market share in full-time online higher education. Young students require adult supervision. If they are taking classes online from home or other nonschool settings, parents or guardians must be present at least through students' early teen years, if not through high school. Working parents cannot provide this supervision; they

require schools that can. As a practical matter, therefore, most parents will not be able to have their children educated online from home. Learning is also a social process; many families will prefer to include the face-to-face peer and teacher relationships found in brick-and-mortar schools. Nonetheless, states should ensure that high-quality full-time online schools develop. They are important to the students who attend them, and they are a potentially valuable source of part-time online instruction, for which demand will continue to grow.

The online world holds the possibility of virtual-school environments that are much more than just collections of online courses or tutorials. Virtual communities provide extensive opportunities for student participation and interaction over the Internet. Some students may find social interaction and academic participation easier in a virtual setting. Online teachers and advisors can interact with students in many constructive ways besides lecturing or grading student work (using Skype and interactive whiteboards, text messaging, and more). As virtual schools evolve, they promise better experiences for students who use their services only part time, as well as for students who are enrolled full time. The best online schools today provide students with a well-rounded education experience that goes beyond just taking courses. More important, the future holds the possibility of more innovation—with technology, educators, and students combining in new ways to improve the learning experience.

Policymakers hold the key to this future. If policymakers permit the development of sizable potential student markets, entrepreneurs will invest in the innovations necessary to create engaging and effective full-time online-school environments. These environments will likely benefit not only full-time online students but millions of students who want to enroll part time. States should value such innovation. But to promote it, states cannot leave full-time online education restricted to district-bounded schools or others subject to within-state geographic limits. Entrepreneurs will not invest district by district in full-time online schools, each governed by different district standards and with enrollments of only a few hundred students. Providers will sell individual courses to small district-operated online schools, but that service falls far short of the promise of comprehensive virtual schooling. To maximize innovation and quality, states should permit full-time online schools to admit students from anywhere within a state and to innovate and improve through economies of scale.

Step 4: Provide Students the Right to Choose Online Learning *Part Time*

While full-time online schooling has generated massive political resistance and heated controversy, that innovation pales in revolutionary potential when compared with its part-time complement.[18] This is hardly intuitive. Public schools have been battling, after all, to keep "their" students and, of course, their funding in their home schools and out of full-time virtual schools. Traditional public schools argue that they can provide the online alternatives that students need, whether on a full-time or part-time basis. Where is the potential for a major shake-up in teaching and technology in that solution?

Part of the answer is obvious. Tens of millions of public school students are candidates for online education as part of their place-based or brick-and-mortar education. It is very easy to imagine high school students opting to take some of their courses online, some face to face, and some through a "blend" of the two. Every course in the high school catalog is a candidate for online instruction—not just specialty courses like Advanced Placement, world language, or credit recovery. Many middle school students would also have the maturity and self-discipline to take courses completely online. At the elementary level, it is easy to imagine all students benefiting from differentiated online instruction to help develop their reading and math skills, beyond what whole-classroom instruction can accomplish. The market share for online learning could easily reach 20 or 25 percent of all instructional time across all grade levels if part-time or supplementary online instruction were permitted to grow in response to student need and demand. That is a revolutionary market.

The key question is *if* part-time online instruction will be permitted to grow. Policymakers have everything to say about that answer. At present, school districts largely control how much online learning occurs on a part-time basis. There are exceptions. The state of Florida effectively took control out of district hands when it guaranteed high school student access to FLVS. A few states have required that students take one online course (or two) to receive a high school diploma. But districts generally exercise tight control over access to online instruction, unless a student chooses to leave for a full-time online school—which relatively few students have chosen to do. Districts have used their control to offer the meager selection of courses, focused, as already noted, on "extras" like AP and credit recovery. Most public school students experience little or no online instruction.

State policymakers can and should limit district authority over part-time access. Online instruction makes it possible to unbundle education in a way that was once almost unthinkable. In the days when education could be delivered only face to face (correspondence schools notwithstanding), students could not practically choose to take science and math in their home high school, English in another high school, and perhaps history at the local college. While some states have guaranteed students the right to choose courses from state or community colleges, the demand for such options has not been great: Physical separation has made choice among place-based courses impractical. The Internet changes all of this. Students now can easily take some courses at their home schools via traditional classroom instruction, others on computers while present at their home schools, and still others at their actual homes.

The revolutionary potential lies in giving students the *right* to do so. States should complement the guarantee of student access to full-time online schools with a guarantee of part-time access as well. The precise form of this guarantee will require careful consideration. Unlike guaranteeing full-time access—in which an online school assumes complete responsibility for the student—guaranteeing part-time access requires consideration of how two or more schools or providers share responsibility for a student. The sharing has educational, operational, and financial dimensions. It will also likely differ with the age or grade level of the students.

For high school students, the state should guarantee the right to choose online instruction for any course eligible for credit toward high school graduation, and the right to choose the online provider, subject to the provider satisfying essential financial and educational standards. (Middle school students eligible for high school coursework should also be permitted to participate.) High school students should be permitted to take as few or as many of their courses from online providers as they wish, including their entire curriculum. This guarantee would shift control over access to the gamut of high school courses from schools to students and their families. It would quickly open up a market of online providers competing for the choices of students.

For the schools' part, states should require all high school students to designate a "base school," or school of record. In most cases, this school would be a brick-and-mortar institution, but it could also be a full-time virtual school that must also offer part-time access to other online providers. The base school would be responsible for the student's records, credit accumulation, graduation,

extracurricular activities, and overall welfare. It would be paid, as described below, for its services beyond the teaching of courses. More important, the base school would be a fierce competitor for the student's course-taking choices. If the base school were brick-and-mortar, it would become the natural site for blended-learning options. Base schools would have incentive to work with online providers to devise instructional models that blend face-to-face support with online instruction. Base schools would also be free to offer their own courses composed of whatever mix of traditional classroom instruction and nontraditional experiences they wish. Students would no longer be required to take what their base schools were offering, but there is ample reason to believe these schools would compete successfully.

Part-time choice becomes more problematic below the high school level. In brick-and-mortar elementary schools, students do not follow a course schedule. Different subjects occupy different amounts of time, often depending on the aptitude and progress of students. Curricula often integrate standards across subjects, such as using history and science materials to teach reading. In this environment, it is not straightforward to guarantee students access to part-time online instruction. If a student opts out of the regular classroom to take math, for example, online, what does he miss while he's gone—reading?—and to what does he return—more math?

In middle school, the same problem can present itself if schools teach integrated curricula or if they give classroom teachers responsibility for multiple subjects. A movement afoot in many urban school systems is the replacement of middle schools with schools running from Kindergarten through eighth grade. The idea is to return students in grades six through eight to the care of one or two teachers, as in elementary school, rather than have students change classes and teachers seven times a day as in high school. Teachers also need the flexibility to devote the requisite time to different subjects—something not provided within a rigid day composed of forty-five minutes per subject. To the extent that middle schools operate like elementary schools, they also present a problem guaranteeing students the right to take individual courses online.

At the same time, schools serving students in Kindergarten through eighth grade could be doing much more than they are to use technology and online instruction to improve teaching and learning. Such students should not be stuck in schools unwilling to move into the digital age. Policymakers should therefore provide some form of guaranteed choice to these students and their families. States

should already be guaranteeing access to full-time online schools to students in Kindergarten through eighth grade. To complement this, states should guarantee students the right to limited online instruction. A modest initial recommendation would be one hour per day for students up to grade five and two hours per day for grades six through eight. If the market is statewide, providers will have ample incentive to determine what mix of core skills, academic subjects, and "extras" like world language or music would be most attractive to young students. The advent of new online options would also encourage base schools to work with providers to create more blended options on the school site. Whatever disruption might be caused at the outset by young students and their families opting out of traditional classrooms would likely be accommodated in due course by more innovative options in base schools.

The recommendations in this step are absolutely vital to unleashing the full potential of education technology. To date, states have been far more willing to give students the right to choose alternative education *full* time—brick-and-mortar and virtual charter schools—than part time. But without the part-time option, most students will not have access, and the traditional system will not face sufficient pressure to innovate. Policymakers will have to grant this right with great care, nonetheless.

Subsequent steps outline how the right to choose online education part time as well as full time can be protected from market failures. A core protection should be understood up front. The base school that students must designate should remain accountable to the state for the student's overall progress and performance. It is likely that base schools will be encouraged through competition to offer blended programs that most students will use for most of the school day. But to the extent that students opt to take courses or subjects elsewhere—from state-approved providers, as described below—base schools will need to acknowledge and accommodate student accomplishments wherever they are made.

There are precedents for this expectation already. A number of states give students the right to take courses at local community colleges and universities without district approval. The federal Title 1 program gives parents in failing schools the right to choose private tutoring at district expense. In both cases, the home school still remains accountable for overall student performance. The rules for online learning that states are urged to adopt continue to have a single school—district, charter, traditional, blended, or online—responsible for each student's overall welfare.

Step 5: Authorize Statewide Online Charter Schools, Overseen by Statewide Charter Authorizers

Once states provide students the right to choose online education, whether full or part time, they face a new major obligation. Policymakers will need to determine who is eligible to provide online education. In making this determination, these leaders should be mindful of the importance of creating competitive markets for high-quality online education. In particular, that means ensuring that the markets guard against monopoly power. School districts should not control who competes for "their" students. Nor should any new entity, such as a state-run virtual school—which states may want to support as one among many statewide providers.[19]

A proven vehicle for authorizing multiple alternative providers of public education is the public charter school. Forty states and the District of Columbia now authorize charter schools in some fashion. About 5,600 charter schools now dot the nation, attended by two million students.[20] And policymakers have twenty years of experience with them in operation. About half of the states that permit charter schools also allow them to offer education online, to varying portions of a state's students. About 217,000 students now attend online charter schools, and provide at least a decade of evidence of what works and what doesn't.[21] The charter sector has also produced many of the more innovative models of blended instruction. Policymakers would be wise to build on the foundation of charter schools to provide online-education options for the growing numbers of students who will seek them.

Online charter schools should be authorized according to the best practices that have emerged through practical experience with charter schools of all kinds. Comprehensive guidelines offered by the National Association of Charter School Authorizers (NACSA) provide policymakers an excellent start.[22] NACSA provides guidance for initial authorization, ongoing oversight, and renewal of charters, in the online as well as brick-and-mortar context.

These practical guidelines should be supplemented with state policies that strengthen charter laws—especially helping them generate more effective competition. States should provide for multiple authorizers of online charter schools—a best practice for brick-and-mortar charters as well. School districts may be permitted to authorize charter schools, but statewide entities should be, too. Examples include the state board of education (as in Massachusetts and California), a special state charter board (as in D.C.), state universities (as in New York

and Michigan), or other state-based nonprofit organizations (as in Ohio and Minnesota).

The funding and staffing of these entities must be adequate to the task of effective supervision.[23] States should place no cap on the number of students who may enroll in any single full-time online charter school. States should place no cap on the number of full-time online charter schools that may operate in a state, or on the number of students statewide who may enroll in full-time online charter schools. The market should determine the number of schools in a state and their most effective size.

Online charter schools must assume the full responsibility for students who declare them their base school, or school of record. This means that, in addition to handling all student records and overall student progress, online charter schools must be responsible for all student services such as special education, gifted and talented programs, and English language learning.

As schools of record or base schools, online charter schools should not be limited to serving only their full-time students. They should be permitted to serve part-time students, too. Like all public schools, online charter schools will serve students with the right to take online courses outside of their schools of record. While students enrolled in full-time online charter schools may be inclined to take all of their online courses from that school, organized expressly to teach online, students may want the variety offered by multiple providers. Online charter schools should be able to compensate for the part-time loss of their students by serving part-time students from other schools. In addition, the state should want students in traditional brick-and-mortar schools to have access to the specialized expertise of online charter schools for their part-time online experience.

Finally, online charter schools should be able to contract for their full education program from for-profit providers. The reality of online learning is that sophisticated technology and interactive content can require substantial investment. At present, almost all elementary and secondary online courses and comprehensive programs are products of private businesses. K12 Inc. provides the program for over a quarter of all students in online charter schools.[24] Connections Academy, owned by the multinational education giant Pearson, powers another large percentage. Technology companies like Blackboard certainly make it possible for schools and districts to create and post their own online courses. Higher education uses this functionality extensively. The future is also likely to see more free content online.

Nevertheless, state law should ensure that online schools have access to high-quality content and technology, whether provided for profit or not. This means that online charter schools should be permitted to contract for their programs from for-profit providers—as is common today. It also means that states should permit private companies that satisfy all other requirements for online charter schools to hold charters and operate online charter schools directly. This is a controversial recommendation, to be sure. These private firms are able to act as charter governing boards in only a few states at present—Arizona and Texas among them.[25] But the large role that business will inevitably play in providing online instruction makes it logical to consider businesses to run online charter schools directly. All providers, for-profit or not, must also be subject to strong accountability measures to ensure that the privilege of serving this new public market is not abused.[26]

Step 6: License Supplementary Online Providers

The authorization of online charter schools goes a long way toward providing choice in online education for students and competition for traditional schools. Online charter schools may also become significant providers of part-time online education. But states must consider other providers of online education if they wish to create competitive markets. In step 4, states are urged to guarantee students access to part-time online education. But from which providers may those students choose?

Today, school districts decide which online providers their students may use. Districts also decide what courses are even eligible for online instruction. This means that high school students often cannot take *core* courses online. And their choices of supplementary courses—like AP, world language, and credit recovery—are limited to the district's chosen providers. If a student wants to take a supplementary course from, say, K12 Inc., but the district has contracted solely with Connections, the student would be out of luck.

This arrangement protects a district from any course competition that it may not want. It also makes complete sense given the current organization of public education. Besides charter schools, the school district is the only state-authorized grantor of diplomas and provider of transcripts. Subject to state standards, the school district is responsible for determining whether a student earns credit for a high school course or a passing grade for a lower-level subject. If a student takes a class outside of the district school, the district alone is responsible for deciding

whether the course should count toward the student's diploma. The district is currently the only authority recognized by the state to decide what counts. If a student wants credit for learning a world language, for example, through Rosetta Stone, but the district recognizes only Berlitz, the district prevails. And prevail it should. Students cannot be the arbiters of their own academic progress.

But there is also a problem with this arrangement. In a world where state policy is attempting to provide choice for students and stimulate competition among providers, school districts should not be left to decide from which providers students will be awarded credit. Districts simply have too much incentive to limit students to instruction by their own teachers. Fewer students enrolled in district classes means less need for district teachers and potentially painful layoffs. Students will be better served if district schools must earn student enrollments through high-quality teaching and innovative uses of technology. These same arguments apply to traditional brick-and-mortar charter schools, which could also be reluctant to release students for external online instruction.

If districts (or traditional charters) are not the gatekeeper for student credit, who is? The most logical candidate is the state's charter-school-authorizing authority. This authority already approves and supervises online charter schools. To fulfill that responsibility, the charter authorizer must have expertise in online programs and providers. Most online charter schools today deliver programs provided fully by online-education companies. Charter authorizers must know these companies and their services to carry out their duties competently. No state agency is likely to know more about online-education providers than authorizers of online charter schools. States are also urged to allow online charter schools to provide part-time online instruction. If a charter authorizer is capable of judging an online charter school, based on a company provider, as a part-time online provider, the authorizer should be able to judge the company provider independently as well.

States should expand the responsibility of charter authorizers, then, to include oversight of part-time online providers, as well as online charter schools. Charter authorizers would be responsible for approving, reapproving, and supervising all part-time providers not otherwise approved by the state. Thus charter authorizers would not have to approve online courses offered across district lines by school districts. Authorizers would not need to approve colleges and universities otherwise eligible to provide courses to public school students for credit. Nor would charter authorizers would have authority over online providers that school

districts choose at their discretion. Charter authorizers would approve providers seeking to offer part-time instruction to students choosing options not sponsored by their base public schools.

To be clear, in the role as licensers of part-time online providers, charter authorizers are not taking on any role in supervising online instruction or other elements of accountability in district schools. District schools and public charter schools—traditional, online, and blended—remain subject to state accountability requirements such as proficiency testing and standard graduation conditions. Base schools, regardless of their form of organization, retain responsibility for overall judgments of student progress, grade-level progression (if it remains relevant), and the awarding of diplomas. The main contribution of the authorization of online providers is the assurance that courses or subjects taken from a provider meet state standards and should therefore be given credit in the base school—contingent on passage of examinations, as described below.

So limited, the added responsibility for charter authorizers is not likely to become a great burden for them. The focus would be mostly on companies already providing comprehensive services to online charter schools under authorizer oversight, or providing courses to school districts that have already done significant vetting. Authorizers could issue term-limited licenses to companies to offer credit-bearing courses to students in any school district in a state. Much like online charter schools, part-time providers would need to provide annual reports and be reviewed periodically for renewal of their licenses.

A word of caution here: Some states already have approval processes for online providers. The processes are often painfully slow, dragged down by course-by-course scrutiny, and infrequent review cycles. They are subject to the same political pressures that resist competition from alternative providers of all kinds. But none of these review processes is currently in the hands of charter authorizers; state education departments normally preside. If charter authorizers apply their own best practices to this new area of responsibility, and if multiple authorizers take up the task, pitfalls of past approval systems may be avoided. Charter authorizers are not perfect, to be sure, but they have the collective experience to make them the best bet for state policymakers to license online providers effectively.

Step 7: Fund All Learning Opportunities Equally Per Pupil

Funding is critical to the success of any education system. It is especially so in a system that aims to capitalize on the forces of the market. Public education today

is not market driven except in limited ways—competition from charter schools and private schools and among school districts.[27] The new system, however, aims to spur private investment and direct public dollars toward educational choices that survive and indeed benefit from vigorous competition among providers. America's higher education system has demonstrated both the interest in education among private investors and the potential of education institutions of all types to innovate and compete. Public education could generate its own positive dynamic—if it allows funds to find their most productive uses. Money, then, would clearly matter.

In designing a funding system to accommodate online learning, states should aim first and foremost to allow all dollars to follow the student.[28] Funding should be neutral with respect to where and how the student receives equivalent education value. The funding system should not care whether the value was received in a brick-and-mortar school, a blended environment, or a full-time online charter school. Education value should be measured in education outcomes and not in education inputs. If a student passes a class taught fully online, the provider should be paid the same as if the student earned the pass in a traditional classroom.

This point is a matter of controversy, as some would argue that technology should reduce the cost of education. In chapter three of this volume, Tamara Butler Battaglino, Matt Haldeman, and Eleanor Laurans estimate that a full-time virtual school can represent a savings of more than a third over a traditional school. But, as they also caution, savings should not arise simply because policymakers decide arbitrarily to pay online providers less money than brick-and-mortar providers. Such price determinations would require countless decisions, for which policymakers have insufficient information, about how technology is "best" used in education. Setting prices for online versus brick-and-mortar education would stifle innovations in online learning and in creative combinations or blends of technology and face-to-face instruction. Policymakers should leave it to schools and providers to decide the best mix of educators and technology. Policymakers should fund all options at the same level, allow them to compete for students, and let the market reveal what savings are possible. Granted, the savings will not be as evident as they are in markets like higher education, where providers can set prices—e.g., tuition. But providers can and should be required to provide reports on their spending, including profits, to reveal to policymakers over time what savings are possible.

Specifically, then, how should the new system be funded? Rules must be established for online charter schools and online courses. The latter is a novel area of funding and regulation. Online charter schools should be funded at the full per-pupil average spending level of students' home districts. All funding to which a student is entitled—local, state, and federal—should travel with him or her to a full-time online charter school. (This same principle should be applied to the funding of all schools, as most public schools will eventually become some mix of traditional teaching and technology. Schools should not be denied state or federal funds as they adopt more online instruction.) The "cost" of full-time online schooling can vary, depending on the inputs to it, particularly the intensity of online teacher support. Online schooling certainly enjoys certain savings over traditional education—student facilities, transportation, and food. But online education also comes at significant unique cost—online content and software development, computers, and servers.[29] Online education also employs numerous teachers and advisors, not to mention far more technology staff.

The cost of full-time online education should be left to the marketplace, as providers compete to provide the best education possible for the full price taxpayers are willing to pay for a public education. If online schools are asked to provide the very same education services and satisfy the same standards as brick-and-mortar schools, they should be paid at the same operating funding level. Currently, no states fund online charter schools with all federal, state, and local dollars.[30] Pennsylvania once did so, but now allows local districts to retain some of their per-pupil funds.[31] In general, online charter schools suffer worse versions of the financial handicap suffered by charter schools in general. If policymakers are committed to bringing technological innovation to public schools, they will not disadvantage the innovators financially. Online charter schools, brick-and-mortar charter schools, traditional district schools—they all carry the same full-time responsibilities and should be funded comparably.

The same principles apply to part-time online learning. But the details are different, and tougher to specify. They are also extremely important to get right. Online education must become an integral part of place-based education if it is to improve education for the vast majority of students. Most students, even at the high school level, will not want full-time online learning. The youngest students, needing adult supervision, may find blended learning the only appropriate use of technology. Schools will undoubtedly play a lead role in designing blended environments and offering choices among online and traditional classes. Schools and

districts, subject to competition, will shop among online providers, and pay the price per course or offering that makes sense for their budgets and needs. Schools will use their overall funding per pupil to pay for innovations and allocate dollars among teachers and technology. The market will drive prices down and quality up. Policymakers require no new funding rules to support or drive this change.

But what about students exercising their right to choose online learning part time? States should guarantee this right, to ensure that students are not prevented from accessing ample online options. When schools cannot deny students access to part-time online learning, students may find themselves wanting an online option contrary to the wishes of their school. A high school, for example, may decide that it is teaching Algebra I to all students the old fashioned way, face-to-face, with no blended learning. A student and family may decide the student would be better served learning online. The student is not in control of the school's budget and therefore is not in a position to decide what online option the school can afford. The state will have approved providers and courses through its charter-authorizing function. But this approval does not come with pricing. Prices should be determined competitively through transactions in the marketplace. But the student cannot decide how much of a school's money to spend in the marketplace. So, what can a student pay for an online course that is not selected or negotiated for by the school?

States should address this question by requiring school districts to calculate two different price ceilings available to students purchasing courses online. One ceiling would be for courses taken off school premises with computer equipment, broadband access, and all other needs met by the provider. A second and lower ceiling would be for courses taken on school premises, using school computers and broadband, with a school teacher as the teacher of record. A technical analysis would be necessary to get the price ceilings correct. State policy would specify how the ceilings would be calculated. In principle, the ceilings are set equal to the theoretical avoided cost, fully loaded, of a student taking an online course. Whether schools actually avoid the costs is their challenge. States should require schools to pay up to the level of maximum savings. Policymakers should bear in mind that market prices are likely to be driven below these ceilings as providers compete for school and district business. But states cannot leave students to choose prices when they subscribe online individually.

Step 8: Exempt Online and Blended Teaching from Traditional Teacher Requirements, Including Certification and Class Size

The above steps are designed to create competitive statewide markets for online learning. Students are guaranteed the right to choose online options full time in virtual schools, or part time in any school, most likely the brick-and-mortar variety. This new demand should be met by online schools and online providers, now encouraged to enter the market through a fair approval process crafted to reduce political obstructionism. Funding should provide encouragement as well—being neutral with respect to the method of instruction, online or traditional. These innovations correct the major impediments to supply and demand for online learning in public education today.

With one major exception. Teachers are the ultimate driver of quality in the traditional model of schooling. Nothing, at least within the control of schools, affects student achievement more than the effectiveness of the teacher providing the instruction. Over the span of only a few years, high-quality teachers can help students gain multiple deciles in the national achievement distribution.[32] The recruitment, development, and retention of high-quality teachers are therefore key to school quality in the traditional model.

Public policy, however, does not align well with what research tells us is necessary to build the best teaching force. Teachers must receive state certification to be recruited into the classroom; yet there is no evidence that certification identifies stronger teachers or even weeds out incompetence. Teachers are compensated based on seniority and advanced degrees that predict little or nothing about teacher effectiveness, certainly nothing after the first few years on the job. Teacher evaluations and rewards are not connected to student achievement. On top of these policies are union-driven collective-bargaining agreements that reinforce them and further dictate how teachers may work.

In recent years, reformers have tried to revise these policies. The Bush administration attempted to strengthen teacher certification through No Child Left Behind (NCLB). The Obama administration has encouraged states to link teacher evaluations to student achievement. Thus far these efforts have borne little fruit. Teacher policies remain largely as they have been for decades. This is problem enough, but it becomes ever more vexing with the advent of online learning.

Online instruction makes altogether different uses of teachers. Technology takes over many of the roles that teachers perform in traditional classroom instruction. Teachers then perform new roles, along with some of the established

ones.[33] Because online instructional models are rapidly evolving, it would be most unwise for policymakers to try to prescribe an online teacher's role. It is not possible to say at this moment what constitutes "best practice." The International Association for K–12 Online Learning (iNACOL) has issued recommended standards for online teachers.[34] But these constitute only estimates of what online instruction requires—at this time. There is no research to validate the relationship between these recommended standards and student achievement.

Online instructional models take countless forms. Teachers may be assigned full responsibility for an online class and do everything that a teacher would do for the class if it were in a brick-and-mortar setting (except deliver the content, which is handled by technology): hold synchronous classes online, grade and comment on student work, provide individual tutoring, and contact parents when issues arise. But other models differentiate these roles: Different educators may tutor, grade papers, and serve as advisors.[35] Technology can also perform more or less of the instructional role, leaving less or more work for online teachers. In higher education, Capella University maintains a twenty-to-one student-teacher ratio for its courses; Western Governors University employs ratios over double that.[36]

Instructional models also vary in their use of face-to-face instruction. In K–12 education, blended models are likely to dominate. Students are already in facilities with teachers. Younger learners clearly need adult support and supervision. Various mixtures of online instruction and face-to-face interaction are all but inevitable. Today, with blended learning in its infancy, scores of models have already been documented.[37]

The models vary in the role of teacher—facilitator of follow-up discussions, individual tutor, evaluator of student work, leader of small-group instruction. The models vary in the frequency of student-teacher interactions as well as the size of student groups. The models add new professionals and paraprofessionals to the mix—technology experts and lab facilitators, for example.

This is exciting, as it should be. The goal at this stage of technological innovation should be to find the most effective technology-infused instructional models for students. This can happen only through experimentation. But experimentation is not easy in public education, especially when it comes to the role of teachers and other school staff. Policies and collective-bargaining agreements specify who is qualified to perform what instructional roles, what work teachers may do and not do, and what size classes must be—to name just the major few. Teacher

policy and collective-bargaining agreements could easily stifle innovation in online learning, if flexibility is not built in from the outset.

State policymakers should therefore look carefully at teacher policy as it affects online learning. Most important, states should lift any class-size restrictions on online courses. The concept of a "class" assigned to a single teacher may not even be applicable. Policymakers should eliminate class-size restrictions on full-time online courses. For blended courses, in which online instruction constitutes at least half of the estimated time for course completion, policymakers should also eliminate class-size limits for the face-to-face portion. If a teacher can work with four groups of fifteen—for a class size of sixty—during each group's time off-line, let the teacher and school decide what is workable. If a school wishes to have students supervised in large groups—say two or three classes' worth—in a large lab or media-center environment, do not impose class-size limits on the lab or require certified teachers to supervise students working online. These are just prime examples. The point is not to restrict innovation or impose needless cost by presuming what the role of educators working online or offering online support should be.

Policymakers should remove or avoid unnecessary restrictions on teacher credentials as well. Teachers working fully online should not be required to hold traditional state teacher certifications. Teacher roles online vary with the instructional model. Providers should be able to hire anyone with at least a bachelors degree (and no criminal record), and train them for the instructional role required by their model. Online teachers should not be required to satisfy new certification requirements either—such as those proposed by iNACOL. We simply know too little at this time to require traditional certification, let alone brand new certifications. In time, research will demonstrate what teacher skills, knowledge, and attributes are associated with success by students. Then, training and certification requirements can be entertained.

Finally, online education is inherently not a state-bounded enterprise. Great instruction can be beamed into schools in any and every state from anywhere in the United States or the world. States should want their students to be able to take advantage of the best that the United States, or the world, has to offer. State policies must therefore walk the fine line between protecting legitimate state interests and opening the state to valuable contributions from the outside. Teacher-certification laws have the potential to insulate states from worthy external support.

Online providers have an interest in finding the very best teachers (and other staff) to work with students online. Providers also have incentives—economies of scale—to build online instructional systems that can serve students in as many locations as possible. Providers want their teachers to be able to work with students in whatever state they may live. It may not be efficient or even feasible to run a low-demand online course for students in just one state. To use an obvious example, an AP Calculus teacher can work as effectively with a student in New York as in California. But state certification rules not only require that teachers be certified; they require they be certified *in the state in which they are teaching.* If online teachers must be certified in every state from which their students are enrolled, online-teacher preparation then becomes very expensive (getting certified everywhere) or very inefficient (teaching only students in single states). This problem is easily rectified. States can either require no state certification for online teachers, or recognize or offer reciprocity for teacher certification in all other states. The former is preferable, as it opens the possibility of international teachers helping students in the United States.

Step 9: Establish Student Learning as the Foundation of Accountability for Online Schools and Providers

Online education provides a golden opportunity for policymakers to focus schools more attentively on student achievement. The very point of creating a vigorous market for online education is to maximize innovations in online and blended models—that *raise student achievement*. Neither experts nor policymakers now are in a position to say just how future schooling should be organized to best employ teachers and technology. So policymakers are urged to create a market-based system that will promote experimentation and innovation—in pursuit of student learning. To ensure that the market makes learning its top priority, states should then carefully specify their goals for student achievement and measure how well students, providers, and schools are meeting them.

States have already made great strides in this direction. They only need to continue—and make some important additions. States now have nearly two decades of experience writing academic standards, developing student assessments, and implementing accountability systems for schools. Research has now documented that these practices, when well designed, can be effective in raising student achievement.[38]

States should continue with efforts to raise their academic standards, to align them with the ultimate goal of graduating students from high school ready to succeed in college or an immediate career. They should cooperate with national consortia, such as the Common Core State Standards Initiative, in trying to develop standards for multiple states. In an online environment, where providers can serve students nationwide, progress is abetted by shared standards that allow developers to focus resources on one high-quality program for many states, if not the entire nation. The Common Core project is encouraging online providers to build programs for the forty-seven states (including D.C.) that are now part of that endeavor. States that are part of Common Core will likely see more resources directed toward the development of programs for them than states tackling new standards on their own. All states should continue, as well, with efforts to design assessments better matched to higher standards and to adjust accountability systems to measure student academic growth.

This work is all the more important—and urgent—in an online environment. The measure of success for any and all technological innovations should be improvement in student learning.[39] As schools and providers try out new models, their effects on student achievement should be carefully recorded and examined—a natural offshoot of the online-learning model. Online systems record every bit of data about how students have interacted with online lessons, how they have performed with ongoing formative assessments, how they have responded to online tutoring, and in the end, how they performed on final projects and assessments. Online databases are treasure troves of information about instruction and its impact on achievement.

States can gain maximum advantage from this resource by creating standardized examinations for all courses in a state's core high school curriculum. Students could be required to pass the state exam to receive credit for each course toward a high school diploma. The exams could be delivered online. Their content could be part objective, closed-ended, electronically scored items—ready-made for online courses—and part extended-response questions or problems, scored by state-led teams of online and traditional teachers. For academic standards below the high school level, states should consider using their grade-level reading, math, and science assessments to award grades or credit. States should also consider requiring end-of-course exams for credit in brick-and-mortar and blended courses.

Assessment policies in traditional schools are a larger issue—and should follow the same guidelines as for online courses. But assessment policies must be

addressed up front for online learning if virtual schools and providers are to be driven in the desired direction—of raising student achievement. Online learning cannot be assessed using the traditional model of course credit—namely seat time. Online learning is inherently performance based. Students are given content to learn and are assessed on their mastery. When they master one piece, they move on to the next piece. Students should be allowed to move at their own pace and depending on the content. If mastery is demonstrated, it makes no difference whether a student required an hour to succeed or a week. Some students may complete a semester-long course in a month; others may require more than the normal four months. It should make no difference to state authorities how long a student required to achieve mastery.

The easy recommendation for policymakers is to eliminate seat time as a requirement for earning credit for a high school course or recognition for completing a lower grade-level subject.[40] Full-time online courses should not have seat-time requirements for high school credit. The harder question is this: On what basis, then, should states, through charter authorizers, approve the awarding of course credit? One model is simply to leave the decision to award credit in the hands of authorized schools and providers. If XYZ virtual school or ABC online provider is authorized or licensed to educate students in the state, it will present its methods of assessment to the authorizer and, once approved, be the arbiter of successful student achievement. This is certainly defensible, though policymakers may be uneasy at the prospect of students winning course credit with little "seat time" invested.

A stronger model would put online students to a standardized test. Then, credit would not be at the discretion of an online school, provider, or teacher. All online instruction would be held to a common standard, which the state would set and enforce. The Sunshine State does this already for courses taken by students at Florida Virtual School. Students cannot earn credit unless they pass. Details would need to be worked out for any mandatory testing system. Course grades may be at the discretion of the online teacher but credit dependent on the state test. Students may be given multiple opportunities to pass the state test. Schools may be given the opportunity to appeal failed tests by presenting student coursework. States, of course, would have to show the courage to set high standards in their tests, if those tests were to drive higher quality effectively. These are familiar issues in debates over high school end-of-course exams and competency testing in general.

But the difference here is the online environment. Students will frequently be taking courses—both part time and full time—that are removed from the direct oversight of teachers. The progress of these pupils must be assessed rigorously to ensure that they have actually mastered the material. States should err on the side of objective assessment. On the more positive side, state policymakers are setting the wheels in motion for major technological innovation. They should want to ensure that innovation is for the purpose of higher achievement. The online environment makes testing easy. With learning properly measured, online databases provide a wealth of information to make instruction better still.

If students enrolled in online schools or even online courses are required to pass state tests to earn credit, arguably students in all public schools should face similar standards. One could argue that the online environment presents a unique accountability challenge and therefore merits special assessments. States might embrace this argument and use the online environment as a way to pilot course assessments for all students and schools. But in the end, performance-based accountability should apply regardless of the modality of instruction.

A similar perspective applies to a final opportunity to employ performance-based accountability. Funding for online courses might depend on student passage of a state exam. Florida Virtual follows this practice already. The sending district does not pay the online school until the student passes a state exam. Performance exams certainly provide this opportunity for leverage. States are encouraged to experiment with performance-based compensation. They should not limit the experimentation to online schools. Brick-and-mortar institutions might benefit from similar discipline.

Step 10: Address Market Imperfections by Providing Abundant Information to Students, Families, Schools, and Districts

Public education is not a naturally occurring market; the argument here is to make it more so. Private enterprise, competition, and resources available worldwide have the potential to drive innovation in the delivery of online learning much faster than any system operated directly by the government. The preceding recommendations are designed to establish the conditions for supply and demand, satisfying as far as possible the economic conditions of a perfect market, albeit a publicly created one. Yet no market is perfect. And policymakers must stand ready to correct market imperfections that may arise.

In higher education, we have seen significant problems with student outcomes. Both for-profit and nonprofit providers responded to government subsidy incentives, mainly in the form of federal loan programs, to educate tens of thousands of students who had not been served well by colleges and universities in the past. But many students were not served well by the new entrants, either, and the federal government has stepped in with regulations that require schools to raise student success rates, or not receive federal dollars. In K–12 online learning, policymakers will need to be on the lookout for performance issues as well. By setting academic standards for online schools and providers, and requiring students to pass state tests to receive credit, policymakers are taking major steps to ensuring performance. But as we know from both traditional schools and brick-and-mortar charters, assessment and accountability are no guarantee of strong academic performance.

Regulators—specifically state authorizing and licensing bodies—will need to be tough in approving providers, vigilant in overseeing them, and strict in enforcing standards for renewal. Experience in authorizing traditional charter schools for two decades, and online charter schools for the last decade, should prepare these public overseers to handle this expanded role better than any new entity the state might conceive.

Nevertheless, no government entity can ever manage the behavior of the various players in a marketplace. And policymakers need to appreciate this basic fact. The reason to set up a publicly sponsored market in the first place is to obtain better results than government can achieve directly. So policymakers should do everything possible to create the conditions for the market to do the hard work of driving change, and not overburden regulators with work that better market controls could accomplish more successfully.

The most powerful tool that regulators have to help the market do its work is *information*. The better informed parents and students are about their choices in online learning, the more likely they are to choose high-quality providers and online schools. They are not the only consumers, though. This is important to appreciate. Traditional public schools, charter schools, and school districts, potentially more sophisticated consumers than families, will be making many, perhaps most of the decisions about online providers, as they offer online and blended options to their students. Schools and districts need information about online providers besides the promotional literature of the providers themselves. All decision makers need objective information about the educational attributes

of online programs, especially including the achievement of students enrolled in them. Schools and districts also need financial data, so that they can obtain economic value.

States now have a decade or more of experience providing information to families about school quality. States are required by the federal government to provide school report cards with essential data about teachers, test scores, graduation rates, safety records, and the like, on a state website. Federal and state accountability systems rate schools with letter grades or improvement statuses—so-called Adequate Yearly Progress (AYP) under NCLB. These information systems are a good start toward what states could and should require online schools and providers to report. These public sources of information will likely be supplemented by private sources, like GreatSchools, for which there will be a growing market.

As part of its recommended online policy, each state should have a *transparency* requirement. Such a requirement would call for the expansion of the state report cards to include licensed online providers as well as online charter schools. The report cards would include all currently required data. This information would be supplemented with data unique or at least especially important to judging online performance. Suggestions include persistence rates by course; average time to complete courses, by course; average score for first-time test takers on state end-of-course tests; average hours of teacher contact with students, by course; and student reenrollment rates, year on year. In addition, report cards should include summaries of all subjects offered, instructional methods employed asynchronously and synchronously, formative assessment methods, and tutoring and advising practices.

At the outset, states could rely on the power of information to drive improvement. The more that districts, schools, parents, and students know about the track records of online schools and providers, the more they will choose proven options over uncertain ones. In time, states may be able to set performance standards that providers must meet to remain eligible to work in the system—along the lines of AYP, but focused on course success. The federal government has just adopted such standards for for-profit colleges and universities. States could eventually set minimum standards for persistence rates or test-score performance at the course level, for example. By shining a bright light on performance, state policymakers can get the maximum out of market forces and limit the burden on state authorizers.

In the end, it is impossible for policymakers to correct every market failure or imperfection. The state cannot prevent some parents (or schools) from choosing an inferior online option. Bad decisions get made even when information to make better decisions is ample. The state cannot prevent online schools or providers from offering less-than-optimal programs or cutting corners to save money. The state can take measures to mitigate these risks, as recommended above, through rigorous authorization, licensing, and performance-based accountability—as well as by providing lots of information. But policymakers will promote far more innovation in education technology if they allow market forces to drive change, subject to government oversight, however imperfect, than if they allow government oversight, by local school districts, to remain in control.

Taking Resistance Seriously

The needs of K–12 education are well aligned with what online technology today has to offer. The potential of online education to do even more in the future is greater still. There are a range of challenges ahead, including all that stymie traditional schools—good teachers, involved families, motivated students, higher standards, and more. But the biggest challenge may well be the K–12 system of education itself. It has formidable powers to protect itself from disruptive change. Technology will eventually break down the resistance, offering benefits, here and there, that are just too good to turn down. But it will take a long time—and a longer time than necessary.

State policymakers could change this. They can look to America's more innovative model of higher education for guidance. But in the end, policymakers will need to take seriously the fundamental nature of the challenge.[41] Technological innovation, new approaches to teaching and learning, and higher levels of achievement will not come to public education—at least any time soon—without reforms that break down the system's inherent resistance to technology. The surest way to do this is to shift control of K–12 online learning from the political powers that now favor resistance to a market-based system of control that better allows the most effective solutions to emerge. The market is no panacea. It will require close government oversight. It will also provide incentives for innovation and improvement that the current system of governance never will.

Endnotes

1. National Center for Education Statistics, *The Condition of Education 2010* (Washington, D.C.: Institute of Education Sciences, U.S. Department of Education, 2010), table A43-1.

2. Anthony G. Picciano and Jeff Seamon, *K–12 Online Learning: A 2008 Follow-up of the Survey of U.S. School District Administrators* (Newburyport, MA: Sloan Consortium, January 2009).

3. For a thorough overview of the instructional virtues of online learning, see Matthew Wicks, *A National Primer on K–12 Online Learning, Version 2* (Vienna, VA: International Association for K–12 Online Learning, October 2010).

4. Barbara Means, Yukie Toyama, Robert Murphy, Marianna Bakia, and Karla Jones, *Evaluation of Evidence-Based Practices in Online Learning: A Meta-Analysis and Review of Online Learning Studies* (Washington, D.C.: U.S. Department of Education, rev. September 2010); see also John Watson et al., *Keeping Pace with K–12 Online Learning: A Review of Policy and Practice* (Durango, CO: Evergreen Learning Group, 2011).

5. Terry M. Moe and John E. Chubb, *Liberating Learning: Technology, Politics, and the Future of American Education* (San Francisco: Jossey Bass, 2009).

6. Clayton M. Christensen, Michael B. Horn, and Curtis W. Johnson, *Disrupting Class: How Disruptive Innovation Will Change the Way the World Learns* (New York: McGraw Hill, 2008).

7. Watson et al., *Keeping Pace*, p. 21. See also Margaret Lin, "School Quality in the Cloud: Guidelines for Authorizing Virtual Charter Schools," NACSA Issue Brief, Cyber Series, National Association of Charter School Authorizers, October 2011.

8. Bryan D. Ray, *2.04 Million Homeschool Students in the United States in 2010* (Salem, OR: National Home Education Research Institute, January 2011).

9. Eduventures, "Hot Programs, Hot Markets" (presentation at Pearson Learning Solutions Summit, Las Vegas, NV, December 9, 2009).

10. National Association of Charter School Authorizers, *An (Updated) Primer on Virtual Charter Schools: Mapping the Electronic Frontier* (Chicago: National Association of Charter School Authorizers, September 2011). The District of Columbia was not included in this tally. The District has one virtual charter school serving Kindergarten through eighth grade; D.C. law doesn't fund any other schools. For more, see "Measuring Up to the Model: A Tool for Comparing State Charter School Laws—District of Columbia," National Alliance for Public Charter Schools, http://www.publiccharters.org/law/ViewState.aspx?state=DC.

11. Ambient Insight, *2011 Learning Technology Research Taxonomy* (Monroe, WA: Ambient Insight, September 2011).

12. Watson et al., *Keeping Pace*, p. 28.

13. This number is based on a course load of six courses per semester.

14. Moe and Chubb, *Liberating Learning*, chapters 3 and 5.

15. See "Florida Virtual School Quick Facts," Florida Virtual School, http://www.flvs.net/areas/aboutus/Pages/QuickFactsaboutFLVS.aspx; and Watson et al., *Keeping Pace*.

16. National Center for Education Statistics, *Digest of Education Statistics, 2010* (Washington, D.C.: National Center for Education Statistics, 2011).

17. Research already demonstrates benefits of competition in the current world of K–12 education, from charter schools and private schools, and among school districts. For a recent summary, see Caroline Hoxby, "The Potential of Markets in Primary and Secondary Education" (presentation at the Clarendon Lecture Series, University of Oxford, February 7, 2011).

18. For case studies of political resistance, see Moe and Chubb, *Liberating Learning*, chapter 5.

19. If states choose to create their own virtual schools, like FLVS, they will need to ensure that such entities play by the same rules as other providers and are given no competitive advantage.

20. "Number of Public Charter School Students in U.S. Surpasses Two Million," National Alliance for Public Charter Schools, December 7, 2011, http://www.publiccharters.org/pressrelease-public/default.aspx?id=643.

21. Ambient Insight, *2011 Learning Technology*.

22. National Association of Charter School Authorizers, *Principles & Standards for Quality Charter School Authorizing* (Chicago: National Association of Charter School Authorizers, 2010). See also Susan Patrick and Tom Vander Ark, "Authorizing Online Learning," NACSA Viewpoint, National Association of Charter School Authorizers, Chicago, August 2011.

23. See, for example, Nelson Smith and Paul Herdman, *Built for Quality: The Capacity Needed to Oversee Charter Schools*, Authorizer Issue Brief No. 3, (Chicago: National Association of Charter School Authorizers, June 2004).

24. Watson et al., *Keeping Pace*, 22, 24. Calculated by dividing K12 Inc. enrollment by total full-time virtual charter school enrollment, as K12's students are all enrolled in charters.

25. Gary Miron, Jessica Urschel, Mayra A. Yat Aguilar, and Breanna Dailey, *Profiles of For-Profit and Nonprofit Education Management Organizations: Thirteenth Annual Report* (Boulder, CO: National Education Policy Center, January 2012).

26. See chapter two, "Quality Control in K-12 Digital Learning: Three (Imperfect) Approaches," by Frederick Hess.

27. For a comprehensive view of the issue, with contributions from numerous leading economists, see Eric A. Hanushek, ed. *The Economics of Schooling and School Quality*, vols. 1 and 2 (London: Edward Elgar Publishing, Ltd., 2003).

28. For an extended discussion of this approach to funding online education, see chapter four, "School Finance in the Digital-Learning Era," by Paul T. Hill.

29. For a detailed analysis of costs, see John E. Chubb, "More Productive Schools Through Online Learning," in *Stretching the School Dollar: How Schools and Districts Can Save Money While Serving Students Best*, ed. Frederick M. Hess and Eric Osberg (Cambridge, MA: Harvard University Press, 2011), pp. 155–78; and chapters two and four of this volume.

30. *Measuring Up to the Model: A Tool for Comparing State Charter School Laws* (Washington, D.C.: National Alliance for Public Charter Schools, 2011). See also Meagan Batdorff, Larry Maloney, and Jay May, Charter School Funding: Inequity Persists (Muncie, IN: Ball State University,

May 2010).

31. Pennsylvania Code 24 PS 17-1725-A, "Funding for Charter Schools."

32. For estimates, see William L. Sanders and S. Horn, "Research from the Tennessee Value-Added Assessment System (TVAAS) Database: Implications for Educational Evaluation and Research," *Journal of Personnel Evaluation in Education* 12, no. 3 (1998): 247–56; and Steve Rivkin and Eric A. Hanushek, "Teachers, Schools, and Academic Achievement," *Econometrica* 73, no. 2 (2005): 417–58 .

33. See chapter one, "Teachers in the Age of Digital Instruction," by Bryan C. Hassel and Emily Ayscue Hassel.

34. iNACOL, *National Standards for Quality Online Teaching: Version 2* (Vienna, VA: International Association for K-12 Online Learning, October 2011).

35. Moe and Chubb, *Liberating Learning*, chapter 4.

36. Education Database Online, http://www.onlineeducation.net/ (accessed January 10, 2012).

37. For sixty such examples, see Michael B. Horn and Heather Staker, *The Rise of K–12 Blended Learning* (Mountain View, CA: Innosight Institute, January 2011).

38. Test-based accountability has proven a powerful tool for boosting achievement. For a review of the
evidence and recommendations for improvement, see John E. Chubb, *Learning from No Child Left Behind*
(Stanford, CA: Hoover Institution Press, 2009).

39. Critics of online charter schools are already pointing to "low" test scores as evidence that full-time online education does not work—except for the companies that profit from it. However, rigorous experimental and value-added analyses of online charter schools have not been done yet. Online schools serve students who are "low" to begin with, making cross-sectional test scores an inaccurate measure of school quality. The answer to the controversy is better measures of how students perform course by course over time in online schools—and traditional schools. For criticism, see Stephanie Saul, "Profits and Questions at Online Charter Schools, *New York Times*, December 13, 2011.

40. This is also recommended by the National Association of Charter School Authorizers. See Patrick and Vander Ark, "Authorizing Online Learning."

41. For an equally fundamental set of recommendations, see "Nation's Digital Learning Report Card," Foundation for Excellence in Education, October 2011, http://digitallearningnow.com/nations-report-card/.

About the Authors

Chapter 1: Teachers in the Age of Digital Instruction

Bryan C. Hassel is co-director of Public Impact. He consults nationally with leading public agencies, nonprofit organizations, and foundations working for dramatic improvements in K–12 education. He is a recognized expert on charter schools, school turnarounds, education entrepreneurship, and teacher and leader policy. His work has appeared in *Education Next*, *Education Week*, and numerous other publications and blogs. Dr. Hassel received his Ph.D. in public policy from Harvard University and his master's degree in politics from Oxford University, which he attended as a Rhodes Scholar. He earned his B.A. at the University of North Carolina at Chapel Hill, which he attended as a Morehead Scholar. He is a senior affiliate with the Center on Reinventing Public Education and a nonresident senior fellow with Education Sector.

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Chapter 2: Quality Control in K–12 Digital Learning: Three (Imperfect) Approaches

Frederick M. Hess is resident scholar and director of education policy studies at the American Enterprise Institute. He has authored influential books on education, including *The Same Thing Over and Over*, *Education Unbound*, *Common Sense School Reform*, *Revolution at the Margins*, and *Spinning Wheels*. He also

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Chapter 3: The Costs of Online Learning

Tamara Butler Battaglino co-founded and co-leads the Parthenon Group's Education Center of Excellence. She has advised clients on issues related to operational excellence, strategy development, and new venture creation. Her clients include a wide range of organizations from start-ups to Fortune 100 companies, government agencies, and some of the world's largest foundations. While at Parthenon, Ms. Battaglino has worked extensively with companies in the information and education sector, partnering with clients spanning the K–12, higher education, and corporate training continuum. Ms. Battaglino holds an A.B. in economics from Harvard College. She received her M.B.A. from Harvard Business School and her M.Ed. from the Harvard Graduate School of Education.

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Paul T. Hill, a political scientist, has spent the last twenty-three years trying to answer the question, "How can we create a system of public oversight that supports, rather than interferes with, school effectiveness and innovation?" Through a series of books and articles starting with *Reinventing Public Education* (University of Chicago Press, 1997), he has tried to open up new possibilities for K–12 governance, family choice, educator freedom of action, and equal opportunity for disadvantaged students.

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John E. Chubb, a distinguished visiting fellow at the Hoover Institution and a member of Hoover's Koret Task Force on K–12 Education, is a founder and chief executive officer of Leeds Global Partner, an international education consulting and services firm, and was a founder of EdisonLearning. He was previously a senior fellow at the Brookings Institution, a faculty member at Stanford University, and an adjunct professor at Johns Hopkins University and Princeton University. His books include *Liberating Learning* (Jossey-Bass, 2009) and *Politics, Markets, and America's Schools* (Brookings, 1990), both with Terry M. Moe; *Within Our*

Reach: How America Can Educate Every Child (Hoover, 2005); and *Bridging the Achievement Gap* (Brookings, 2002), edited with Tom Loveless. He earned an A.B. summa cum laude from Washington University in St. Louis and a Ph.D. from the University of Minnesota, both in political science.