Summary: 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.

School Finance in the Digital-Learning Era

By Paul T. Hill

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 which 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. These include:

- Online systems that provide brief (e.g., one hour or less) courses on key concepts in virtually all the science and mathematics disciplines that students are likely to encounter in K-12 schools.

- Computer-based systems that offer basic instruction on a topic (e.g., factoring or oxidation-reduction equations), test students, and provide 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. These same programs can direct students who do well on the basic material to more challenging skills or to enrichment resources.

- Management programs that prescribe a new set of online materials for every student every day, and suggest how teachers might use a daily period where they tutor students to pose challenging questions that 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

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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 individualization and rapid adaptation to what a student is learning, 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 those of 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 district-wide programs, staff positions, and so forth. This 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 workaround solutions to make possible such funding arrangements, but these are fragile, clunky, and problematic, as I will describe. 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 paper details the problems with today's education-finance system writ large, the ways in which it stymies innovation, and the limits of workaround 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 flex 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 U.S. 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, 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 politics and advocacy, 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.

This translates into 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 not imagine that applications they invent for K-12 education can 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 structure requires fundamental restructuring. As Hill, Roza, and Harvey concluded in 2008 in "Facing the Future,"[3] this 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.

None of this happens in today's system.

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

Regulations on 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 on 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 on 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—on particular subjects, length of school day, and length of year. Finally, federal laws on education of the disabled and bilingual education also specify what child shall get what services under what conditions.

Regulations on 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 accommodations. This can make it very difficult for a school to specialize in a particular approach to instruction. Faculties that insist on getting good at something in particular risk harmful confrontations with parents who want something different and can't go elsewhere.

Today's Funding System Permits Marginal Uses of Technology

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 decides both 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 a student has to:

- Take all her courses from a virtual school offered by an online provider located anywhere in the world.
- Enroll in a hybrid or blended school in which she spends some time in face-to-face contact with teachers and other students, and takes 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

Table 1. Funding Sources Now Available to Different Types 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

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 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 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 1 is a "best case" analysis, assuming 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 technology-using 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) which 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).

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 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 can get 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 students are on their own. They, like home schoolers, and the vendors who provide online courses for them, 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 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—to pay for instruction, not unrelated purchases, and to support only schools and organizations that practice non-discrimination, do not advocate violent overthrow of the government, and account honestly for funds. (Later sections will discuss different forms of performance management; these might protect students from wasting their time and taxpayers' money, and provide evidence of productive use of public funds.)

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 would combine all the money they now spend on K-12 education and divide 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 simultaneously eliminate the barriers to innovation and improvement inherent in current funding systems, while forcing 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 IDEA, 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 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.

A rudimentary version of such a system exists already in some form 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. 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 the fact that they only apply to students who transfer to such schools; all other students are still in district-provided 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 and school freedom over spending, staffing, and use of time, as well as other related issues like family and teacher choice, lottery admissions, and oversight by an authorizer whose powers are limited to 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 no matter where 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 its contents 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.

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 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 with her to any eligible school or instructional programs in which 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 face competition, both on the quality and effectiveness of their services and on cost.

Every school or independent instructional provider would have to post its prices for particular courses. No school enrolling backpack-wearing students could charge tuition in excess of the full amount in a 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 an innovator can be paid even if he or she serves only a few students. 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 the possibility of students learning in a one-to-one relationship with a computer-based system, or linking to a set of lectures and other presentation materials along with literally thousands of other students, or receiving their instruction 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.

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 school operating costs. Thus, even if online schools were equitably funded on school operating costs, traditional schools would get a significant extra subsidy.

In a time when innovation is necessary, and the cost structures of different forms of schooling would 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 equipment, research-and-development, and oversight costs could pay for them with funds recovered 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, schools without facilities costs may still 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 space, could also afford to give students access to technology options.

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 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, professional-development programs, development of new curricula, and methods of student assessment. All such investments are meant to benefit children but they also benefit private 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 should be considered 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, hybrid and virtual alike, chartering provides a useable framework for performance management. Charter authorizers can close low-performing charter schools or refuse to renew their authorization—hybrid and virtual charters can be evaluated 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 the basic concept of 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 paper 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, the options available to students, and the opportunities for entrepreneurs, are still 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. What children learn would then depend on the quality of their parents' choices. In the long run, parents might learn to do this 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 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 mean either heightened costs imposed on the government or reduced diversity and boldness of options available to parents.

Risk reducers that might be attached to the funding of parent-guided choices[10] 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 vendors proven to be low-performing, whom no one may choose;
- 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).

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, providing performance information, is the least intrusive risk reducer, but it imposes heavy monitoring and analysis burdens on government. State and local governments historically under-fund and under-perform 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 conflicts of interest experienced by state and local ed 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 sanction 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, 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, 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.

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), if taken together, are promising. Parents could be free to 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, depends 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]

1 For a much more complete account of the possible advantages of technology-enhanced instruction, see Bryan Hassel's and Emily Ayscue Hassel's "Teachers in the Age of Digital Instruction" in this series of working papers.

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 the forthcoming paper tentatively titled "The Costs of Online Learning," authored by the Parthenon Group, in this series.

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 another paper in this series, Rick Hess identifies three possible quality-control mechanisms for online learning: input and process regulation; outcome-based accountability; and market-based quality control. As he 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. See "Quality Control in K-12 Digital Education: Three (Imperfect) Approaches" at http://www.edexcellencemedia.net/publications/2011/2011_CreatingSoundPolicyforDigitalLearn-ing/20110727_QualityControlinK12DigitalLearning_Hess.pdf.

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 prevented from buying supplements with their own money.

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