3x for All

Extending the Reach of Education's Best

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PUBLIC IMPACT

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Abstract

Teacher effectiveness has the largest impact of school effects on student learning, and research indicates that top-quintile teachers produce learning gains three times (3x) that of bottom-quintile teachers. However, the supply of these "3x" teachers is limited. Meanwhile, 3x teachers affect only a small portion of children each year, no more than bottom quintile teachers. Instead of just trying to recruit more great teachers, what if schools chose to reach more children with the great teachers they already have? Reach extension can take several forms, such as redesigning jobs to concentrate 3x teacher time on instruction, putting star teachers in charge of more children's learning, and using technology to extend 3x teacher reach and meet their standard. Potential reach-extension methods vary according to the level of "touch," or direct student interaction with 3x teachers, and "reach," or number of children served by each 3x instructor. By eliminating rote and non-instructional duties from 3x teachers' schedules, *many methods would increase touch and reach simultaneously — especially benefiting students who, because of age or learning needs, learn best with high levels of teacher interaction (see page 12 for examples). Even high-touch, low-reach methods of reach extension could significantly increase the number of children learning from top-quintile teachers*. Star teachers whose reach is extended would have unprecedented opportunities for achievement and could be paid more from existing per-pupil funding streams. The goal of this working paper is not to provide a complete prescription but to launch further thinking and action to achieve 3x for All.

Executive Summary[1]

The Problem

Teacher effectiveness has the largest impact of school effects on student learning, and research indicates that top-quintile teachers produce learning gains three times (3x) that of bottom-quintile teachers. The United States does not have enough 3x teachers to meet the need. 3x teachers also are distributed unfairly, with too few instructing the most-disadvantaged children. Even in typical classrooms, large portions of children have nonstandard learning needs unmet by average teachers. Meanwhile, the best teachers are limited to affecting small numbers of children. Their opportunities to achieve more, influence more children, and receive compensation for their contributions are no better than those of the worst teachers.

Current Solutions Fall Short

Efforts to increase the number and distribution of excellent teachers have focused primarily on recruiting more high achievers into teaching, creating incentives for better teachers to teach less-advantaged children, and implementing better professional development. All are admirable. But even if these efforts grow significantly faster, they will not meet our nation's need in the near future. Another generation of children will pass through America's schools, and only a small portion will have access to the best teachers.

Another Approach: Extend the Reach of the Best Teachers

In addition to recruiting and developing more great teachers, what if schools chose to reach more children with the great teachers they already have? Extending the reach of the best teachers to more children would significantly reduce shortages of top-tier teachers.

The Benefits

Top-tier teachers and the children who today lack access to them will be the primary beneficiaries. Reach extension addresses two factors critical to retaining 3x teachers: career advancement opportunity and better pay for better teaching. Not only can more children be reached with the best instruction, but star teachers whose reach is extended will also have multiple avenues for advancing their achievement and impact *within teaching* and can be paid more from existing per-pupil funding streams. Secondary benefits are numerous. Over time, the need for lower contributors will decline, eliminating the worst learning experiences for children. Many forms of reach extension will increase learning personalization for children and magnify 3x teachers' effects as they focus on learning needs and aspects of instruction in which each excels. Extended 3x talent can be more fairly distributed across economic and geographic boundaries.

3x for All: Three Modes

Schools must first commit to reaching far more children with available 3x instructors and instruction. Reach extension typically requires changing the one-teacher-one-classroom paradigm. As a start, this paper defines three reach extension modes.

- ***In-Person Reach Extension*** involves changing how schools are organized ("organization design") and instructional roles ("job design") to leverage limited talent while keeping the best instructors close to the classroom. 3x teachers are still physically present to interact in person with children and other staff in schools.
- ***Remote Reach Extension*** uses technology that enables 3x teachers to engage directly though not in person with students. 3x teachers can interact

with students both in real time and asynchronously, and both within schools and across long distances.

- ***Boundless Reach Extension*** includes instruction that is based on the insights and practices of 3x instructors and is delivered exclusively via technology. 3x instructors do not interact directly with students. It is called "boundless" because the number of children who can be served under this mode is unlimited. It is bounded very little by the time and not at all by the location of each 3x instructor who contributes intellectual and "performance" capital.

Reach extension methods vary according to "touch," or direct student interaction with 3x teachers, and "reach," or number of children served by each 3x instructor. Even high-touch, low-reach methods could significantly increase the number of children learning from top teachers. Some forms of reach extension would increase personalized instruction time that 3x teachers spend with students while also increasing the number of students reached.

How Is This New?

Making a 3x for All commitment is different from just using technology-based learning, differentiation in the classroom, and other alterations of instructional delivery. These work in absence of a standard of excellence. Schools pursuing them *try* to deliver better instruction to every child, but they ultimately settle for the best they can get, given the quality of the teachers they are able to recruit and retain. Schools making a 3x for All commitment, in contrast, do not settle. Whether by extending the reach of their own teachers or tapping talent from across town — or the world — they commit to providing 3x instruction for every child. The number of additional children successfully reached by instruction that induces top-quintile learning progress becomes a major metric by which the school judges the success of every instructional change. That is the essence of a 3x for All commitment.

Implementation Issues

Aligning financial and human resource systems, tackling management and policy barriers, and adopting measurement practices to optimize reach extension without diluting learning results are some of the critical implementation issues.

The 3x Economy

If significant portions of education providers commit to a 3x standard, a full 3x economy will be possible. Critical roles in this economy likely would include:

- Users: Schools, school networks, and districts committing to 3x will drive this economy.
- Suppliers: Suppliers provide 3x instructors or instruction to those who do not have it.
- Importers: Users that import 3x instructors and instruction they lack.
- Exporters: Users that export excess 3x instructional capability to other Users.
- Brokers: Organizations linking 3x Users and Suppliers, vetting Suppliers for the 3x standard.
- Enablers: Providers of technology to extend 3x capability within and among schools.
- Supporting Talent: The myriad of people in new roles that enable 3x Talent to extend.
- 3x Talent: At the center of it all is still human talent, the star teacher, who now has multiple avenues for unprecedented achievement, learning impact on children, and earning power.

Just think . . .

What if our nation could double the number of children taught by the best teachers — in many cases increasing the personalization of learning and using no new funding or technology? What if millions more had access to the best teachers, using technology? If there is one 3x teacher in a school, cluster of schools, or state, what if every child there had access to that teacher? *What if a motivated, capable group of education innovators figured out how to ensure "3x for All"?*

Introduction

Given the broad agreement about the imperative of high-quality education in the U.S., one might expect rapid improvements in teacher effectiveness. Policymakers and politicians of all stripes have embraced research indicating that teacher effectiveness has the largest impact among school effects on student learning. This growing body of research has shed light on the enormous differences in effectiveness among teachers: Students taught by top-quintile teachers make approximately three times the learning progress of students taught by the bottom fifth of teachers.[2] The effects of having a great teacher — or not — extend for years.[3] According to this research, if disadvantaged children had top-tier teachers instead of bottom-tier teachers for four years in row, the racial and economic achievement gaps that plague American education would disappear.[4]

Not surprisingly, significant talk is aimed at boosting the ranks of highly effective teachers. Programs aimed at recruiting high-performing college students and mid-career professionals have boosted the talk with action, showing that teaching is a profession for those with many options. Even formerly entrenched districts have gotten in the game with small efforts to keep higher contributors on the job and induce them into high-poverty schools to close achievement gaps. Meanwhile, efforts to improve professional development and student progress assessments have placed better tools in the hands of teachers, boosting the hope that typical teachers will excel.

Despite these efforts — and even if they grow far faster — our nation still will not have an excellent teacher in every classroom. Why? Simply put, the magnitude of the gap is too enormous. For example, as an article in *The Atlantic* reported, Georgia has 440 high schools but only 88 certified physics teachers.[5] And, if those 88 follow the typical distribution, only 15 or so are top-notch teachers. None of the strategies we are pursuing as a nation could realistically move Georgia from having 15 excellent physics teachers to having 440. Students in 425 schools in Georgia will have a sub-optimal learning experience in a subject that's vital to the economic prospects of our nation.

Even if we could dramatically boost the recruitment of top-tier teachers, we would face another problem: keeping them. Consider this: Across sectors, top performers are most likely to leave due to lack of pay and career advancement opportunities rather than the working-condition factors that force out more typically performing peers.[6] Even if we assume that great teachers are most concerned with increasing their influence on children, the education sector is not equal to the task. If we were somehow to place a great teacher in every classroom tomorrow, the extreme lack of career advancement opportunity for high performers in education would make talent inflows more like filling a sieve than a bucket.

Even the most innovative, current approaches to improving teacher quality do not change this scenario. They all have two critical limitations: None provides a clear route to increasing the impact of great teachers over more children's learning, and none produces a natural flow of funds to pay teachers for higher contributions to learning. They do not provide the career advancement and matching pay opportunity that the highest performers crave. Thus, they are dependent on political will to pay higher contributors more, a will that has fallen short for decades in America. In short, they have not attracted and kept higher contributors in the field at large scale.

Meanwhile, the best teachers remain limited to affecting small numbers of children — no more than the worst teachers. And the fantastic fruit of their

labors brings little economic reward above that of their least-effective peers. Our robust economy, relatively strong even in the worst of times, offers a combination of significant achievement opportunity and economic reward to the highest contributors in nearly every other sector, public and private.

Perhaps it is time to face an uncomfortable truth in America: In the current mode, we will never have a teacher in every classroom who gets results on par with the best teachers. Moreover, the distribution of instructional talent likely will always be unfair. The least-effective teachers will continue disproportionately to teach children with the least advantage. Teachers who are extraordinarily effective with certain aspects of the instructional process and certain child learning needs will continue to see their learning impact diluted in traditional classrooms.

In the current mode of education in America, it is the *best* teachers and the *most-challenged* students who lose the most.

We need a new mode.

One Solution to the Human Capital Challenge: Extend the Reach of Education's Best

Here is one alternative: Instead of trying only to recruit and develop more great teachers, we also could provide more opportunity to the great teachers we already have. What if we committed to enabling the best teachers — those who induce three times ("3x") the learning progress of less-effective peers — to extend their magic to more children? If we accept that there are limits on the numbers of top-tier teachers but *not* on the number of children each can reach, what could we achieve? How fast could committed schools double or triple the number of children reached by 3x instruction, while in many cases also increasing the personalization of learning? What would it take to ensure that every child in America has 3x instruction?[7]

3x for All: The Will and the Way

But how? We are optimistic that many others will fill in answers to these questions, and indeed some innovators have already begun fledgling efforts. For now, though, our answer is twofold.

First: School providers that are directly accountable for children's learning progress must *commit to a 3x for All standard*. These providers include schools, districts, charter management organizations, and other school networks. The will of those who decide, "We're just not going to offer any student who comes to us less than 3x," will drive the extension of top-tier instruction to more children. By setting a clear, high bar, providers can ward off the cornucopia of tempting compromises that sacrifice learning.

Second: A major infusion of *action* is needed. Here we provide three categories of action to extend the reach of education's best teachers: In-Person Reach Extension, Remote Reach Extension, and Boundless Reach Extension. Each of the three modes is described below. How 3x teachers' reach is extended undoubtedly would vary among schools. The most-driven school providers, having made a 3x for All commitment, will vary the modes to achieve the goal according to the capabilities of available 3x talent, the specific needs of each school's children, and the organization's capacity to implement.

> What if we made the choice to extend the reach of education's best — those who get three times the results — to every child in America?

Reach extension methods within each mode vary according to "touch," or direct student interaction with 3x teachers, and "reach," or number of children served by each 3x instructor. "Touch" includes both the amount of direct student-teacher interaction and the personalization of interactions. Personalization refers to how tailored the interactions and instruction are to the unique needs of each child. Even high-touch, low-reach methods could significantly increase the number of children learning from top teachers. Some forms of reach extension would increase personalized instruction time that 3x teachers spend with students while also increasing the number of students reached.

In-Person Reach Extension

This form of reach extension is achieved by changing how schools are organized ("organization design")

and the instructional roles ("job design") to leverage limited talent while keeping the best instructors close to the classroom. 3x teachers are still physically present to interact in person with children and other staff in schools.

In almost all schools today, the "one-teacher-one-classroom" mode predominates. Teachers may team up and collaborate in various ways, but a child's educational fortunes hinge critically on which particular teachers the child has. When schools cannot fill all of their slots with 3x teachers (as they almost never can), the one-teacher-one-classroom mode means that inevitably, four-fifths of students miss out on 3x instruction.

In likely examples of In-Person Reach Extension, 3x teachers would manage multiple classrooms with other teachers working under their supervision, use all of their work time for instruction and none for tasks that do not benefit children's or other teachers' learning, or shift small numbers of children from less-effective teachers into their classrooms. This category is the "highest touch," since by definition the best teachers are staying close to classrooms and are either interacting directly with children or closely managing those who are. But it is bounded severely both by time that 3x teachers have in the workday and by their geographic location. The 3x teacher must be on-site and also has limited time to teach or manage her team, both of which she must do primarily during the school's operating hours.

These limits inherently restrict the numbers of children who can be reached using this mode. But imagine this: A committed school could double or triple the number of children who have a 3x learning experience *without recruiting even one more excellent teacher* and *without adding any technology whatsoever*. This would be possible in many schools today using some of the ideas below.

In-Person Reach Extension examples include:

- Offering opportunities for 3x teachers to lead "pods" of two or more classrooms with assistance from other teachers. Unlike the current model using faux lead teachers or "mentors" who have little real authority, this model looks more like professional teams in other contexts that are unapologetic about focusing on results. The teams would work *under the direction and leadership of* the lead teacher, working toward her standard of excellence and using her methods and tools. The lead teacher would make more money; the others would make less. Not all 3x teachers would be successful extending their reach this way. It would require setting a high standard for the instructional process; leading the team through implementation, coaching and developing other teachers; and holding them accountable. This package of "managerial competencies" coupled with instructional prowess is rarer than instructional excellence alone.
- Exclusive use of 3x teacher time for academic instruction, certain subjects, or sub-subjects, while leaving the rest of the school day to colleagues. 3x teachers released from noninstructional duties could simultaneously teach more children, increase the time each student spends in personalized instruction (small groups or one-on-one), and shrink instructional group sizes.
- School providers combining the last mode, Boundless Reach Extension, with In-Person Reach Extension. For example, a secondary school teacher might record videos of lecture content that all students need and then use *all* instructional time to teach far more students in smaller groups than typical classrooms — rather than using teaching time to repeat the same live lectures in front of larger classes.
- Offering 3x teachers larger classrooms, *by choice*, in exchange for proportionally enhanced pay. This example occurs naturally in other professions: A bustling law, accounting, or medical practice develops for the best performers, producing longer hours but also more income. These top professionals then set their own workload limits — for example, by limiting how many new patients or clients they take, still more than less- effective peers

but within boundaries that are personally feasible and that produce desired income. In schools, excellence breeds neither opportunity nor rewards, and even the best teachers have little say over their class loads. Ironically, today's simplistic class size limits — which affect all quintiles of teachers equally — decrease the number of students that 3x teachers reach *without* reducing other teachers' classroom sizes enough to improve learning results.[8]

- Specialization in particular components of the instructional process and particular child learning needs. Different teachers who obtain the most learning progress excel at different parts of the instructional process, such as diagnosing learning problems, providing small group instruction, providing large group instruction, teaching the daily habits of successful learning, or addressing certain kinds of child learning needs. Today, a teacher who is superb at some of these activities gets to do each of them for only a small fraction of the school day. At the elementary level especially, all teachers do the whole range of instructional (and noninstructional) tasks for a wide variety of children because of the one-teacher-one-classroom mode. In secondary schools, there is specialization in subject matter but not in the components of the instructional "value chain." More specialization would enable talented teachers who are "3x" in one part of the process or with certain child learning needs to concentrate their time and effort.[9]

In-person reach extension is already in practice in small ways in some schools, such as elementary schools in which two teachers divvy up students for math and language arts within a grade level because each teacher is stronger in one of the subjects. But these efforts are small compared to what schools could do if they upped the goal to 3x for All.

Remote Reach Extension[10]

This category includes technology-enabled means of extending the reach of the best teachers remotely, both within schools and across long distances. In

Remote Reach Extension, the 3x teachers are still the active instructors, engaging directly — but not in person — with students. This engagement includes both real-time and asynchronous versions.

In *real-time* versions of Remote Reach Extension, teachers interact with students two-way at the same time. Examples include two-way interactions using video or holograph; e-chat and text messaging; remote whiteboards; and "immersive online environments" in which participants interact with one another on-screen; or even telephone conference calls and one-on-one phone conversations.

In *asynchronous* versions of Remote Reach Extension, teachers still interact with students directly, but each side of the interaction is separated in time. Examples include e-mail exchanges, multiperson blogs or online discussion boards, and individualized feedback about work submitted online.

Both forms of Remote Reach Extension can be used to untether teachers from the classroom and schoolhouse, enabling children to access 3x-level instructors regardless of where the child and teacher are located. Just as important, Remote Reach Extension enables some 3x teachers to concentrate their efforts on aspects of instruction that do not require in-person interaction, such as review of student work, written feedback, and diagnostic analysis of students' next-step instructional needs. Used in combination with the next form of reach extension — Boundless — Remote Reach Extension could multiply by many times the number of students a single 3x instructor is able to reach.

Remote Reach Extension examples include:

- Pods of teaching specialists working together in desirable living locations and reaching children in far-flung schools that commit to 3x but do not have sufficient local 3x talent.
- School providers focusing 3x teacher time on student work review, personalized feedback, and diagnostics of next-step instructional needs.
- School providers combining the next form, Boundless Reach Extension (for example, prerecorded video of lecture content that all students need), with real-time Remote Reach Extension (the 3x teacher then uses all of his time to interact online with far more students than possible when giving the same live lectures repeatedly).

This category is "lower touch" than In-Person Reach Extension, but "higher touch" than Boundless Reach Extension, described next. Most variations of Remote Reach Extension likely would require facilitation by an on-site adult, for most children. Whether real-time or asynchronous, Remote Reach Extension would not leverage 3x talent endlessly — to 10,000 or a million children per teacher — because direct interaction is bounded by each 3x teacher's total quantity of work time. But Remote Reach Extension could double or triple the number of children reached by top teachers, and it could do so where In-Person Reach Extension is not feasible.

Boundless Reach Extension (a.k.a. The Million-Dollar Teacher)

This category includes instruction that is based on the insights and practices of 3x instructors, delivered exclusively via technology, and does not include direct interaction between the 3x instructors and students. It is called "Boundless," because the number of children who can be served by an individual 3x instructor is unlimited. It is bounded very little by the time and not at all by the location of each 3x instructor who contributes intellectual and "performance" capital. The only limits on time are the time it takes for each 3x instructor to participate in design and production. So, much as the number of movies that a movie star can make are limited, once produced a movie may be watched by boundless numbers of viewers, each of whom can watch unlimited times. With all but very self-motivated older students, Boundless Reach Instruction would require facilitation by another adult in person.

Boundless is the "lowest touch" form of reach extension. However, as the field advances, technology

will emulate and may ultimately exceed today's "high touch" emotional engagement. In the classroom of today, only a portion of teachers are stars at accurately perceiving, understanding, and responding to children's emotions. Technology, particularly technology based on input and observation of 3X stars who excel in emotional connection, may one day surpass many teachers' in-person capabilities.

Boundless Reach Extension examples include:[11]

- Schools using software to deliver "smart" content, rapidly identifying and addressing student learning gaps, with design and production participation by 3X talent.
- Schools piping in video or holographic instructional performances by "super instructors," the very best among 3X instructors in the nation and world for each subject and specific topic within. Once videotaped, a charismatic presentation of superb content can be delivered to 10,000 or a million kids. Targeted instruction addressing even relatively rare child learning needs can be used repeatedly and spread across infinite distances, driving down costs and making tailored instruction affordable and accessible. Teachers operating in both Remote and Boundless modes may address repeat learning needs with Boundless question-and-answer banks, focusing higher-touch interactions on the most unusual and challenging learning needs.

Teachers who are enabled to extend their reach in person and remotely may surpass the $100,000 goal of some pay reforms today. But the people who can design and deliver content using Boundless Reach Extension may simultaneously make *millions* of dollars, help disadvantaged children unaided by even the most avid reforms today, and drive the cost of highly customized education down.

Two elements of great teaching that the best teachers may be able to enhance as they extend their reach with technology are *differentiation* of subject difficulty and teaching approach to meet individual student needs; and *progress monitoring*, with frequent pre- and post-instructional assessments and prewired follow-up to close learning gaps.

However, technology-enabled instruction, even when designed by the very best teachers, may have shortcomings. In addition to making the emotional connection, technology may be pressed to replace other elements of great teaching. These include: providing instructional approaches that a computer screen does not allow (e.g., hands-on learning); ascertaining some learning barriers (attention issues, etc.) that today's classroom computers cannot detect; aligning with differing curricula if reach is extended across state borders; and the "other things" children learn in school, such as social skills, emotional self-control, organizational skills, and the other "habits of learning." All of these can be addressed, either via technology or by in-person staff, if recognized and addressed proactively.

Which Mode is Best?

We do not presume here that one mode of reach extension will result in one optimal level of "touch" and "reach" that produces high progress for the maximum number of children. Ultimately, that is a formula likely to vary by child characteristics (such as age, current achievement level, strength of learning habits, and learning differences) and the capability of the school provider organization to enable 3X reach extension.

Furthermore, 3X teachers themselves vary. Those with managerial competencies can extend their reach in person by managing pods of classrooms, working through other teachers. Those with exceptional presentation and performance skills can extend their reach via video and holograph. Those with exceptional e-interpersonal and motivational skills can extend their reach remotely by reviewing work, providing feedback, and helping students with work online. Those with exceptional gifts for diagnosing child learning needs and determining matching instruction, but weaker interpersonal skills, can contribute their gifts to online learning design.

Experience and evaluation likely will lead to more

High-Touch Reach Extension: A Powerful Combination

It is easy to assume that extended reach means less personalized interaction between students and teachers. Indeed, when the alternative is extremely limited access to the best instructors — as in many rural and urban poor schools today — even low-touch reach may be superior to the status quo. But many methods of reach extension would increase or maintain the portion of student and 3x teacher time spent in smaller, more personalized instruction while also increasing the number of children reached.

Here we offer two examples. No doubt, 3x teachers and committed school providers can generate more examples that fit differing school contexts.

Enabling 3x Elementary Teachers to Focus on Instruction

At the elementary level, roughly half of teacher work hours are spent on instruction.* In most schools, some portion of that is direct, whole-group instruction, and some is more personalized instruction, such as small-group or one-on-one time with the teacher. If noninstructional time were eliminated from elementary 3x teachers' workloads, many 3x teachers could increase the number of students reached by 50% without reducing the more personalized instructional time — and still retain one quarter of work time for coaching and developing less-effective teachers and for additional individual tutoring for students who need it.

Enabling 3x Secondary Teachers to Personalize More Instructional Time

At the secondary level, 3x teachers' repetitive, whole-class instruction time could be replaced by video delivery of the same (either recorded by these teachers or by the best "super-instructors" nationally in each subject). On-site 3x teachers could increase the number of students reached by 50% and double the number of personalized instructional minutes each child experiences — while retaining all of the 3x teacher's noninstructional time for follow-up tutoring, coaching peer teachers, and the like.

If taken to scale, these two examples alone would have the same effect as increasing the number of top-quintile teachers in a school, state, or our nation by 50% — and increasing personalized instructional minutes for children — without recruiting a single additional top-quintile teacher.

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* National Center for Educational Statistics, *Characteristics of Schools, Districts, Teachers, Principals, and School Libraries in the U.S., 2003–04* (Washington, DC: U.S. Dept. of Ed., 2007), Table 26.

knowledge about what combinations work for different children, organizations, and 3x teachers.

How 3x Thinking Differs from Mere Instructional Delivery Innovation

Making a 3x for All commitment is different from just using technology-based learning, differentiation in the classroom, and other alterations of instructional delivery. Each of these and the myriad of other efforts to improve instruction work in *absence of a specific standard of excellence*. Schools pursuing them *try* to deliver better instruction to every child, but they ultimately settle for the best they can get, given the quality of the teachers they are able to recruit and retain. Schools making a 3x for All commitment, in contrast, do not settle. Whether by extending the

reach of their own teachers or tapping talent from across town — or the world — they commit to providing 3x instruction for every child. The number of additional children reached by 3x instruction that continues to produce top-quintile learning progress becomes the major metric by which the school judges its success.

Yes, "how good" remains a point of comparison. The effectiveness of differing 3x extension methods for differing subjects and children will be critical to track, and some dilution of 3x teacher results may occur during experimentation. But the band of acceptable results for instructional changes should operate within the same range of learning progress that top-quintile teachers achieve. That is the essence of a 3x for All commitment. All change is difficult. There is no reason to introduce it without significant positive consequence.

A further note about technology-enabled learning delivery: Both Remote and Boundless Reach Extension rely heavily on technology. Today in most schools, technology is an add-on. One of our hypotheses is that technology will be a far more successful tool if recast as a means of extending the reach of the best instructors a) within schools and b) across CMOs, districts, and other school networks.

The genesis of any great instructional technology is a keen understanding of children's learning needs — *what* a child needs to learn next and *how* to induce that learning. Whether or not designers of such technology have ever taught in a traditional classroom, they are effectively extending their reach boundlessly. It makes no sense for such technology to extend the reach of mediocre instructors. Holding it to the standard of top-quintile teachers is critical.

What 3x for All Means for Teachers

A 3x commitment by schools will increase the reach, impact, and pay of top teachers *without* taking them away from teaching. Today, career opportunities are limited for teachers. They either must remain in the classroom, affecting a small number of children each year, or they must pursue school leadership as a principal or assistant principal. Alternatives, such as instructional specialist and peer-coach roles, are very limited in number, often do not extend the number of children reached, and provide limited additional pay opportunity.

The main benefits of reach extension for star teachers are enhanced opportunities to affect more children and to earn pay for their contributions. But significant collateral benefits may accrue to top teachers, as well.

Acceptable results for instructional changes should operate within the same range of learning progress that top-quintile teachers achieve. That is the essence of a 3x for All commitment.

For example, many forms of reach extension will further magnify 3x teachers' effects by enabling them to focus their time on child learning needs and aspects of instruction in which each teacher excels. Teachers who achieve 3x progress in typical classrooms, doing the myriad of tasks that classroom-based teachers do with a wide range of children, may significantly magnify their learning effects by shifting all of their time to the instructional steps and children with which each achieves the best results. Some 3x teachers may be able to reach more children, receive more pay, and produce even better learning results.

This is an entirely different way of looking at teaching, one that questions the wisdom of all teachers — including the worst — owning their own classrooms. 3x for All thinking changes this paradigm: Classroom ownership should be a privilege for the best. Ironically, today's nearly universal one-teacher-one-classroom structure *guarantees* a sub-premium learning experience for four-fifths of children every single year.

Teachers who are just average (or worse) should

not "own" their own classrooms. Instead, they should work under the direction of the best teachers who are also capable of such leadership. Alternatively, teachers who are merely average on their own should be able — indeed required — to pipe in instruction, learning diagnostics, and feedback for students from 3x teachers via video, online interaction, and other technology-enabled means. Over time, the need for the lowest contributors to fill traditional teacher jobs will decline. Eliminating these peers from teacher ranks will raise the profile of the profession and diminish the extra work better teachers do to make up for children's low-progress learning years.

What 3x for All Means for Children and Parents

In the one-teacher-one-classroom mode, even children and their parents in *good* schools face a perennial concern about whether they will be assigned to one of the few great teachers. Children in schools in which top-quintile teachers are even rarer — rural schools, high-poverty urban schools — face dimmer prospects. Students with nonstandard learning needs, which star teachers are better at diagnosing and meeting, are lucky to have one or two great years of K-12 schooling.

In a 3Xed world, no child would need to experience less than a top-notch learning opportunity in any year. No parent would need to jockey for the best, since all children would have access to top instructors and instruction. Persistently unfair distribution of the best teachers would be reduced, both through technological delivery of instruction to schools with few 3x teachers and through extended reach of the limited 3x teachers available in the least-advantaged schools. Over time, the reduced presence and impact of lower contributors would eliminate the worst learning experiences for children. In addition, reach extension forms that focus 3x teachers on the children and instructional tasks where each excels may push today's outer bounds of learning progress much higher for a wide variety of children.

The Economics of Extending Reach: The Million-Dollar Teacher, Within Budget

As teaching is now configured, better learning results do not generate funds to pay better teachers more, even in subjects and grades that are well-measured. A school gets no more funding when a child learns more, so the school has no natural flow of money to pay for better teaching that led to better learning.[12]

In the current world, performance-based compensation and career advancement must be funded through political will to invest more in education and to distribute it disproportionately to teachers who contribute more to learning. This will falls short in America. Even great schools, as they are now configured, do not economically support performance pay and career advancement for better teachers.

In contrast, extending the reach of the best educators provides a "natural" route to paying more for the best instruction. When a 3x teacher's reach is extended to more children, a portion of each additional child's existing per-pupil funding can flow to the teacher.

Other players in a 3x economy (see *The 3x Economy,* below) will take a portion, and the 3x teacher will need a supporting cast to deliver her goods to more children. Nonetheless, it is likely that Boundless Reach Extension will produce star million-dollar teachers who collect royalties for their contributions to technology-enabled instruction. But Remote and In-Person Reach Extension also provide many avenues for excellent teachers to earn significantly more than they do now and, more important, to achieve learning impact at unprecedented levels — even in relatively traditional school settings, and without requiring more overall funding for schools.

The 3x Economy

If significant portions of education providers commit to a 3x standard, a full 3x economy will be possible. Critical roles in this economy likely would include what we call here Users, Suppliers, Importers, Exporters, Brokers, Enablers, Supporting Talent, and — at the center of it all — 3x Talent.

- **Users**: These are the schools, CMOs, districts, and other school networks that make the 3x for All commitment and ensure that 3x-level instruction is delivered to children, whether from the current staff pool in a school or elsewhere. Users are the drivers of a 3x economy. Without their commitment to a 3x standard, the funding stream and opportunities for other players in the 3x economy fall short. They must lead the way by shifting from a culture of effort to a culture of results. Instead of trying to get a great physics teacher in a rural school, but settling for an OK one, they must commit to providing 3x-level instruction by any means possible, even if the teacher lives in a Manhattan penthouse. Instead of trying to get a 3x-level teacher for every third-grade class, but settling when only one can be found, they must put that teacher in charge of all three third-grade classrooms or dedicate her time exclusively to the gateway subjects of math and reading instruction for *all* of the third graders. They must pay her more so they keep her. And when another can be found they must do the same for the fourth grade and the fifth until every child in every grade is making 3x progress. While the 3x teacher is the star around whom this economy revolves, the 3x Users — the school providers — will drive the economy's success and speed of scale-up.[13]
- **Suppliers**: Suppliers include any group that can provide 3x-level instructors or instruction to those who do not have it. Suppliers include Users with excess 3x capacity to export (an "Exporter," below) and third-party players. For example, a school with exportable 3x capability, such as a fantastic history teacher who videos well, might share or sell a video series of lectures to other Users. The opportunities for third-party Suppliers are numerous. One example might be an online learning company that has demonstrated its 3x capability for specific subjects and populations of children. Another third-party Supplier might be a talent pod of math, language arts or other subject matter specialists available via video, online or a combina-

At the center of this new education economy is still human talent, the star teacher, who now has multiple avenues for unprecedented achievement, learning impact on children — and earning power

tion to deliver initial Boundless Reach Extension instruction and more personalized Remote Reach Extension follow-up. Another third-party example might be a teacher-supply organization that rigorously evaluates the student progress achieved by placed staff. These teacher-supply organizations can drive 3x action into more schools by requiring Users to extend the reach of proven 3x Talent as a condition of continued placement.

- **Importers**: These are Users that, lacking access to 3x instruction within their own school(s), purchase it from elsewhere, for example by contracting with teacher "pods" (groups of aligned 3x teachers, e.g., math specialists, who work together to deliver instruction), teacher-supply organizations, or technology-based instruction suppliers.
- **Exporters**: These are Users that have excess, exportable 3x instructional capability that they deliver to other education providers, for example a school with a proven 3x calculus lecturer who is made available via video to other schools.
- **Brokers**: These are organizations that match 3x need with 3x capability, vetting Suppliers for the 3x standard. Brokers take a portion of the economic value, however, from Suppliers and ultimately from 3x Talent, so their role may be limited. Enablers, below, may play this role as part of providing their enabling technologies.
- **Enablers**: These are firms that develop technological capabilities to enable providers to import, export, and spread 3x capabilities across and among schools readily. They would provide the video, audio, software, and hardware needed to enable Remote and Boundless Reach Extension. Enablers will help speed 3x implementation in providers who would otherwise find it difficult to plan and implement the technology needed to extend the reach of the best teachers.
- **3x Talent:** At the center of this new education economy is still human talent, the star teacher, who now has multiple avenues for unprecedented achievement, learning impact on children — and earning power.
- **Supporting Talent:** The star instructor is not alone. She shares the field with a myriad of other people in newly shaped roles that enable 3x Talent to extend their 3x effect to far more children. In most cases, Supporting Talent remains critical for extending 3x learning progress to more children. Examples include teachers who work in classrooms under the direct supervision of 3x Talent, and on-site monitors who teach personal discipline and social skills as they shepherd children through the nonacademic portions of their school day. Current 2x teachers may take center stage as on-site leaders and motivators who enable Remote and Boundless Reach Extension. Some 2x teachers may find that smaller classrooms and student loads enabled by 3x reach extension allow them to achieve higher progress, too. Savvy school leaders will pair "3x for More" with "1x for none," shifting the least-effective teachers out of instructional roles altogether and into enabling roles where they can contribute without diminishing children's learning. The reach and earning power of Supporting Talent would face the same limits as pay for all teachers today.

At first glance, it might seem that such an economy would rapidly become monopolistic. How many "best" calculus instructors are there who video well? Once the best is found, will there be room for others?

We think the solutions are not so simple. School providers committed to a 3x for All standard will

soon face the reality that different children respond to different modes of instruction and to different instructors. The likely first takes will be "3x for More" and then "3x for Many." 3x for All will require more effort and time and may require "niche 3xers" who are able to meet unusual and especially challenging child learning needs. And as in other dynamic fields, today's "best" is not necessarily tomorrow's best. Once a 3x teacher sets the benchmark for excellence on some dimension of instruction, others will try to do better; some will, and the definition of "best" will evolve for the better.

Committed Users will seek the right solutions for each child and ramp up the field's ability to diagnose learning needs and prescribe solutions that will induce 3x progress for each individual. Some children may always need in-person reach extension: for example, most young children and older children who need more help with the "habits of learning." Others will respond well, even at a young age, to low-touch instruction. Some students may learn well remotely in some subjects but need higher-touch interactions for others.

Some schools may excel at extending 3x learning opportunity to a wide range of children, using all three modes of reach extension. Other schools may excel at meeting a narrower range of learning needs with a narrower range of reach extension methods.

Implementing 3x for All

We expect that emerging members of the 3x economy will contribute significantly to advancing implementation thinking and action. Here we touch briefly on some critical issues.

Understanding What Great Teachers Do

One benefit of reach extension is that we do not necessarily have to understand *how* great teachers work their magic if we are simply letting them work it with more children. But several forms of reach extension would benefit from better knowledge of the actions great teachers take, so that none are lost in the reach-extension process. Undoubtedly there is much more to know about what great teachers do than is known today, and it is completely within reach for the field to know it. States and funders could leapfrog this knowledge forward by simply commissioning studies by the best job analysis experts to identify top-teacher actions and competencies.

Aligning Management Systems

Many policies and practices related to people and budget management will have to change in schools that want to extend the reach of the best teachers to more children. Budgets that are rigidly allocated to either people or technology — and to specific roles for people assuming a one-teacher-one-classroom model — will need to be spent differently to achieve optimal reach extension in each school setting. Likewise, teacher recruiting, compensation, performance measurement and evaluation, career advancement, professional development, and the work processes that tie all these systems into coherent learning delivery, will all need to change. Some of these are highlighted further in the following section about barriers to implementation.

Daunting though this may be from a "system" perspective, the reality is that any committed school leader can extend the reach of the best teachers to more children right away, without policy or system changes. After reaping learning results, pushing for the change will be more feasible. Leaders who already have more autonomy, in public charter schools for example, may be able to extend top-teacher reach faster.

Any established school, though, may find the task of reorganizing jobs challenging. Job redesign is critical, because all three modes of reach extension will require it from inception. In-Person Reach Extension in all forms will require significant job redesign, except when merely shifting a few more children to 3x teachers' classrooms. Remote Reach Extension in all forms will require job redesign to clarify the *work process* — how all the people work together with children using available instructional tools — and *individual roles*, for both 3x Talent and Supporting Staff. Boundless Reach Extension in all forms will require job redesign. Today, technology is still largely "glued on" to most classrooms, adjunct and easily unhitched from core, essential learning routines. If used that way, 3x-generated instruction delivered via technology is likely to have little better effect than instruction of lower quality.

Because job redesign is so critical and difficult to do well, it is possible that even the most-committed schools will have difficulty extending 3x teacher reach to *all* children fast. Only a long-term commitment and willingness to retry when reach extension is not working for some children will lead to ultimate success. Some school networks may find it easiest to attempt 3x for More in existing schools, using forms of reach extension that fit the current process best, and 3x for All in new schools where the learning delivery process can be designed from scratch.[14]

Barriers to Implementation

Technology is already available to scale up high-performer reach in the Remote and Boundless modes, and In-Person Reach Extension via organization and job redesign requires no new technology at all. So what stands in the way of 3x reach extension happening immediately and in large scale?[15] Here are some possibilities, discussed in brief:

- **Performance measurement:** Measurement, both to identify 3x instructors and to determine the effectiveness of different reach-extension methods, is critical. Measurement inadequacy would lead to extension of non-3x teachers' reach and false conclusions about the effectiveness of reach extension methods. Subjects and grades that are not tested or otherwise assessed in ways that allow identifying the effectiveness of instructors and instruction are problematic. If an education provider does not know who the best teachers are, it cannot increase their reach. To the extent that multiple players become involved in learning delivery to individual children, careful and continuous measurement will be essential to making sure that 3x learning happens and that each participant is contributing to results. We think the answer to all the problems posed here can be summarized thus: Instead of using imperfect measurement as an excuse not to extend the best instruction to more children, the field must focus on improving and extending measurement to all valued subjects, grades, and steps in the learning process. It is only in this way that schools can assess whether 3x instructors and technology-based instruction deliver top-quintile learning progress.
- **State policies:** Any state policy that acts as a practical or political barrier to changing teachers' roles, increasing pay fairly for teachers whose reach is extended, or reaching children across state boundaries will reduce the number of children who receive the best instruction in that state and will maintain the inadequate, inequitable distribution of top talent that exists today.
- **Budget allocation:** Rigid line items for technology and people, as well as job-based funding of districts (by states) and schools (by districts), are common today. In a public school attempting to increase the reach of top teachers — and redesigning roles and technology to make it happen — line-item budgets would inhibit change and prevent the best teachers from receiving their due pay even when the existing funding stream is adequate.
- **Simplistic class size mandates:** Class size limits are well-intended. In a one-teacher-one-classroom mode of learning delivery, they are a reasonable attempt to improve working conditions, though few class-size reduction policies mandate the very small class sizes (12-17 or so) in which research suggests better learning effects occur.[16] In effect, these mandates actually force allocation of more children to bottom-quintile teachers by pushing children out of top teachers' classrooms. Instead of helping children, regulations that limit class size without regard to teacher effectiveness rob children of the chance to learn from 3x teachers and rob 3x teachers of additional pay they might receive for reaching more children. Responsibility for more children, and commensurate pay when success is achieved at larger scale, should be an opportunity for the best performers as it is in other professions. Proportional reductions in class sizes and student loads[17] of non-3x staff may simultaneously enable better progress for students who cannot be reached with 3x instruction.
- **Romanticized notion of the one-teacher-one-classroom model:** We all tend to romanticize — to over-credit the good aspects and minimize the bad — the concept of having one teacher who delivers learning to each class of children. But this model of learning delivery restricts even luckier children to only a few truly stellar teachers in a lifetime and limits all children to small portions of personalized learning (small groups, one-on-one time). Ironically, focusing on "a great teacher in *every classroom*" gives even the very best teach-

ers in America opportunity to reach no more students than the worst teachers in America (and the pay to match). Parents, nearly all of whom were educated in traditional schools, likely will be among the most vocal defenders of the old way. Children lucky enough to experience 3x for All learning *every year* will be the future ambassadors of the new way. Meanwhile, it will take leadership to initiate changes at the schoolhouse level, and the parents who seize this opportunity for their children may disproportionately be those whose children are not well-served by schools today.

- **Will:** Where there is a will there is a way, but in American education our will has often fallen short. An initial commitment to 3x for All is not enough. Every change faces barriers, not just because people have entrenched interests in the status quo but also because figuring out the new way, the better way, is hard work. Ruthlessly discarding failed attempts and retrying quickly when reach extension does not meet the 3x standard will be the hallmark of successful efforts to achieve 3x for All.

Measurement: Identifying 3x Teachers and Measuring Reach Extension Success

Identifying 3x teachers and assessing the success of reach extension methods are inextricably linked, since the strength of both depends on accuracy of measurement systems. Whether and how 3x teachers can be identified in the absence of standardized tests is a critical question, since student learning in many grades and subjects is not measured on commonly used tests. William Sanders, who led the early teacher effectiveness studies from which we have extracted the "3x" term, has hypothesized that even untrained observers can tell who the top-quintile (and bottom-quintile) teachers are.[18] Yet 3x talent identification is undoubtedly subject to challenges, such as fluctuations from year to year in the performance of individual teachers and school context effects. We are optimistic nonetheless that education leaders who commit to 3x for All will find good, if not perfect, ways to identify the *best*[19] teachers — those who should be enabled to reach far more children.

There are two fundamental measures of reach extension success. The first is the number of additional children reached by instructors and instructional technology proven to produce learning progress in today's top quintile. The second, and ultimate, measure is the level of learning progress that those children make compared to other children. Both measures are critical, and without either a school's 3x for All effort will fall short. There are significant additional issues to consider, which we and others will surely address in future work. In brief, some of these issues include determining:

- Effects on learning progress of each contributor to the learning process (3x Talent, Supporting Talent, instructional technology);
- How well different reach extension methods work for different children's learning needs;
- How well different reach extension methods work in different subjects and grades;
- Effects of different reach extension methods on teacher pay, both for 3x staff and others;
- Effects of different reach extension methods on 3x teacher retention;
- Methodologies for studying reach extension effects, including all of the issues above.

One obvious concern is that extending a teacher's reach will dilute her effectiveness, that the increased number of children she reaches will not make learning progress in the 3x range. We expect that different combinations of 3x teacher characteristics, school characteristics, and reach extension methods will produce different effects for different populations of children.

Calling All Innovators

3x for All, even "3x for More," cannot be accomplished in a white paper. School providers and teacher-supply organizations must lead the way by making the commitment, taking action, and conquering implementation challenges. Others must

step in to play enabling roles. Both new, pioneering initiatives and bold commitments to change by pre-existing members of the education community can contribute. The payoff of successful reach extension is so immediate and consequential for the additional children reached that even imperfect or incomplete movement is warranted. In all cases, an unyielding commitment to change that, in implementation, actually extends 3x learning progress to more children is essential. Here, we offer a few key questions for critical members of the 3x economy and policymakers:

- **School providers (districts, CMOs, and other school networks)**: How could you use the three modes of 3x Reach Extension to extend the reach of your own best teachers to more children *right now*? How could you import 3x talent for your students from elsewhere? What would it take to ensure that every child receives 3x-level instruction in your schools? How fast could you get it done? What effect would an emerging 3x economy have on your ability to grow without diluting learning results?
- **Third-party suppliers (teacher-supply organizations, technology providers)**: How could you use your current strengths to contribute most successfully to the three modes of Reach Extension (Boundless, Remote, and In-Person)? What leverage do you have to ensure that 3x instructors and instruction you provide are extended to more children in the schools you supply? How fast and how much could you increase the number of children you reach with existing 3x talent and technology? What effect would an emerging 3x economy have on your ability to grow?
- **Entrepreneurs**: What roles might you play in the 3x economy? What would be the advantages of moving quickly to establish your role and reputation?
- **Policymakers**: How might you harness political will to achieve 3x for All? What current policies in your state or district might inhibit 3x for All achievement? What could you change to enable 3x for All? How might you motivate 3x action by both public and private entities? Are you in a position to mandate 3x for All — and make the policy changes to achieve it? How might your region benefit economically by being a first mover in a 3x economy (that is, being the exporter rather than importer of 3x instruction)?

Conclusion

We do not anticipate that this is the end of this discussion nor in many ways the beginning. Others have been working for years to increase the number of great teachers, improve the effects of instruction on children's learning progress, and increase the number of children reached via technology when qualified teachers are unavailable.

Instead, we hope that "3x for All" thinking will focus the field, school providers in particular, on facing with resolve and creativity the inevitable limits on top-flight talent. Most great solutions arise from seemingly intractable limits. Limits on numbers of teachers who can induce the highest levels of learning progress will always exist, but limits on how many children they reach need not.

Notes

1. The authors are grateful to the Charles and Helen Schwab Foundation for financial support of this paper and for its commitment to extending the impact of effective people and organizations in education.

2. For sample studies showing the extent of teacher effects on student learning, see Steven G. Rivkin, Eric A. Hanushek, and John F. Kain, "Teachers, Schools, and Academic Achievement," *Econometrica*, 73, 2 (2005), 417–458; Jonah E. Rockoff, "The Impact of Individual Teachers on Students' Achievement: Evidence from Panel Data," *American Economic Review* 94, 2 (2004), 247–52. One early study of teacher effects found that for students with low starting test scores, those exposed to top-quintile teachers improved their test scores by an average of about three times as much as those taught by bottom-quintile instructors: William L. Sanders & Joan C. Rivers, *Cumulative and Residual Effects of Teachers on Future Student Academic Achievement* (Knoxville, TN: University of Tennessee Value-Added Research and Assessment Center, 1996).

3. Sanders and Rivers, *Cumulative and Residual Effects.*

4. Robert Gordon, Thomas J. Kane, and Douglas O. Staiger, *Identifying Effective Teachers Using Performance on the Job* (Washington, DC: The Hamilton Project of the Brookings Institution, 2006).

5. Clayton M. Christensen and Michael B. Horn, "Revolution in the Classroom," *The Atlantic Monthly* (August 12, 2009), accessed: http://www.theatlantic.com/doc/200908u/race-to-the-top-education.

6. HayGroup, *Bridging the Pay-for-Performance Gap: Establishing Truly Differentiated Rewards* (Philadelphia, PA, 2004).

7. Here we would like to acknowledge that 3x reach extension thinking can be applied to school leadership. The limited number of excellent school leaders is constraining turnaround of failing, district-managed schools and growth of even the best charter organizations. So, we pose a basic question: How might school providers extend the reach — the number of children impacted — by the best principals? Other sectors do this regularly. One example is having the most successful principals manage pods of schools (perhaps two to five), with assistant principals, newer principals, or ones with less stellar track records reporting to pod leaders. Just as extending the reach of the best teachers might require undoing "classroom ownership" by non-3x teachers, this would require re-thinking "school ownership" by principals.

8. Almost certainly, many top-quintile teachers could achieve the same high-progress results with slightly larger classrooms, 10% to 20% larger for example. Proportional class size reductions might enable better results by less-effective peers. In some ways, this is the simplest form of reach extension, and as such is both full of opportunity and subject to abuse. Within school walls, many principals could distribute somewhat more children to the best teachers and fewer to the worst, shifting average student progress higher. But we offer two caveats: First, access to more children must be a privilege for the best, those who are already achieving 3x progress with children. Second, classes must not be so large that the 3x teacher cannot extend her effects to the additional children; this limit might vary by teacher and have absolute limits based on student ages and the diversity of child needs within a classroom.

9. For a discussion of the potential for teacher specialization, see Frederick M. Hess, "How to Get the Teachers We Want," *Education Next* (Summer 2009), 35–39.

10. Readers can find rich discussions of the many possibilities for technology-enabled instruction in Clayton Christensen, Michael Horn, and Curtis 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* (San Francisco, CA: Jossey-Bass, 2009) The 3x for All way of thinking focuses these means both on *extending the reach* of top instructional talent in the field and ensuring that technology-delivered instruction *meets the 3x standard*.

11. See Christensen et al., *Disrupting Class,* and Moe and Chubb, *Liberating Learning* for more examples.

12. One acquaintance of ours suggested creating a futures market that could reward teachers (and investors) now for the prospects of their students. Teachers would receive futures contracts that would pay off based on their students' outcomes at a future time, such as graduating from high school or completing college. Teachers could hold the contracts or sell them now to investors, who would presumably pay more for the contracts of teachers who get great learning results now. Perhaps similarly creative minds will figure out how to pay more for better learning without fighting the political beast. Meanwhile, reach extension offers an alternative mode for funding better pay for better teaching.

13. "3x Boutiques" may emerge as well, schools with teachers who choose "3x for All, small," teaching in traditional classrooms. They would earn less than 3x teachers who extend their reach, just like high-end boutiques that choose not to grow but nonetheless carry top-notch goods. If we really lived in a 3x for All world, where star teachers could earn multiples of what they do now, there would be economic pressure to pay boutique teachers more, too, even

without extended reach. For example, private schools that spend enormous sums on bricks and mortar would be forced to allocate more to teachers — if they want 3x Talent.

14. See Christensen for more about challenges of introducing disruptive technologies in existing organizations.

15. See Moe and Chubb, *Liberating Learning,* for a lengthy discussion of political and policy barriers to using technology in schools.

16. Joan McRobbie et al., *Class Size Reduction: Lessons Learned from Experience* (San Francisco: WestEd, 1998).

17. William G. Ouchi, *The Secret of TSL: The Revolutionary Discovery That Raises School Performance* (New York, Simon & Schuster, 2009).

18. William J. Sanders, remarks made at "Nashville Teacher Compensation Reform Forum: A Working Discussion," Nashville, TN, August 13, 2009.

19. While we chose the 3x concept from work that measured effects of teachers divided into quintiles, here we note that school providers might choose other cutoff points for teachers whose reach will be extended. Only experimentation and research will reveal the effects of differing cut points and methods of reach extension.