Getting to Scale with Good Educational Practice

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How can good educational practice move beyond pockets of excellence to reach a much greater proportion of students and educators? While many children and young adults in school districts and communities around the country have long benefited from the tremendous accomplishments of successful teachers, school, and programs, replicating this success on a larger scale has proven to be a difficult and vexing issue. In this article, Richard Elmore addresses this problem by analyzing the role of school organization and incentive structures in thwarting large-scale adoption of innovative practices close to the "core" of educational practice. Elmore then reviews evidence from two attempts at large-scale school reform in the past — the progressive movement and the National Science Foundation curriculum reform projects — to evaluate his claims that ambitious large-scale school reform efforts, under current conditions, will be ineffective and transient. He concludes with four detailed recommendations for addressing the issue of scale in improving practice in education.

The Problem of Scale in Educational Reform

Why do good ideas about teaching and learning have so little impact on U.S. educational practice? This question, I argue, raises a central problem of U.S. education: A significant body of circumstantial evidence points to a deep, systemic incapacity of U.S. schools, and the practitioners who work in them, to develop, incorporate, and extend new ideas about teaching and learning in anything but a small fraction of schools and classrooms. This incapacity, I argue, is rooted primarily in the incentive structures in which teachers and administrators work. Therefore, solving the problem of scale means substantially changing these incentive structures.

Changing the Core: Students, Teachers, and Knowledge

The problem of scale in educational innovation can be briefly stated as follows: Innovations that require large changes in the core of educational practice sel-

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dom penetrate more than a small fraction of U.S. schools and classrooms, and seldom last for very long when they do. By "the core of educational practice," I mean how teachers understand the nature of knowledge and the student's role in learning, and how these ideas about knowledge and learning are manifested in teaching and classwork. The "core" also includes structural arrangements of schools, such as the physical layout of classrooms, student grouping practices, teachers' responsibilities for groups of students, and relations among teachers in their work with students, as well as processes for assessing student learning and communicating it to students, teachers, parents, administrators, and other interested parties.

One can think of schools as generally representing a standard set of solutions to these problems of how to manage the core. Most teachers tend to think of knowledge as discrete bits of information about a particular subject and of student learning as the acquisition of this information through processes of repetition, memorization, and regular testing of recall (e.g., Cohen, 1988). The teacher, who is generally the center of attention in the classroom, initiates most of the talk and orchestrates most of the interaction in the classroom around brief factual questions, if there is any discussion at all.

Hence, the teacher is the main source of information, defined as discrete facts, and this information is what qualifies as knowledge. Often students are grouped by age, and again within age groups, according to their perceived capabilities to acquire information. The latter is generally accomplished either through within-class ability groups or, at higher grade levels, through "tracks," or clusters of courses for students whom teachers judge to have similar abilities. Individual teachers are typically responsible for one group of students for a fixed period of time. Seldom working in groups to decide what a given group of students should know or how that knowledge should be taught, teachers are typically solo practitioners operating in a structure that feeds them students and expectations about what students should be taught. Students' work is typically assessed by asking them to repeat information that has been conveyed by the teacher in the classroom, usually in the form of worksheets or tests that involve discrete, factual, right-or-wrong answers (Elmore, 1995).

At any given time, there are some schools and classrooms that deliberately violate these core patterns. For example, students may initiate a large share of the classroom talk, either in small groups or in teacher-led discussions, often in the context of some problem they are expected to solve. Teachers may ask broad, open-ended questions designed to elicit what students are thinking and how they are thinking, rather than to assess whether they have acquired discrete bits of information. Students' work might involve oral or written responses to complex, open-ended questions or problems for which they are expected to provide explanations that reflect not only their acquisition of information, but also their judgments about what kinds of information are most important or appropriate. Students may be grouped flexibly according to the teacher's judgment about the most appropriate array of strengths and weaknesses for a particular task or sub-

ject matter. Teachers may share responsibility for larger groups of students across different ages and ability levels and may work cooperatively to design classroom activities that challenge students working at different levels. In other words, students' learning may be assessed using a broad array of tasks, problems, mediums of expression, and formats.

In characterizing these divergences from traditional educational practice, I have deliberately avoided using the jargon of contemporary educational reform — "teaching for understanding," "whole language," "heterogeneous grouping," "team teaching," " cooperative learning," "authentic assessment," etc. I have done this because I do not want to confuse the problems associated with the implementation of particular innovations with the more general, systemic problem of what happens to practices, by whatever name, that violate or challenge the basic conventions of the core of schooling. The names of these practices change, and the intellectual traditions associated with particular versions of the practices ebb and flow. But, the fundamental problem remains: Attempts to change the stable patterns of the core of schooling, in the fundamental ways described above, are usually unsuccessful on anything more than a small scale. It is on this problem that I will focus.

Much of what passes for "change" in U.S. schooling is not really about changing the core, as defined above. Innovations often embody vague intentions of changing the core through modifications that are weakly related, or not related at all, to the core. U.S. secondary schools, for example, are constantly changing the way they arrange the schedule that students are expected to follow — lengthening or shortening class periods, distributing content in different ways across periods and days, increasing and decreasing class size for certain periods of the day, etc. These changes are often justified as a way to provide space in the day for teachers to do a kind of teaching they wouldn't otherwise be able to do, or to develop a different kind of relationship with students around knowledge.

However, the changes are often not explicitly connected to fundamental changes in the way knowledge is constructed, nor to the division of responsibility between teacher and student, the way students and teachers interact with each other around knowledge, or any of a variety of other stable conditions in the core. Hence, changes in scheduling seldom translate into changes in the fundamental conditions of teaching and learning for students and teachers. Schools, then, might be "changing" all the time — adopting this or that new structure or schedule or textbook series or tracking system — and never change in any fundamental way what teachers and students actually do when they are together in classrooms. I am not interested, except in passing, in changes that are unrelated to the core of schooling, as I have defined it above. My focus is on that narrower class of changes that directly challenge the fundamental relationships among student, teacher, and knowledge.

In some instances, such as the high-performance schools described by Linda Darling-Hammond (in press), a whole school will adopt a dramatically different form of organization, typically by starting from scratch rather than changing an

existing school, and that form of organization will connect with teaching practices that are dramatically different from those traditionally associated with the core of schooling. At any given time there may be several such model schools, or exemplars of good practice, but as a proportion of the total number of schools, they are always a small fraction. In other words, it is possible to alter organization and practice in schools dramatically, but it has thus far never been possible to do it on a large scale.

The closer an innovation gets to the core of schooling, the less likely it is that it will influence teaching and learning on a large scale. The corollary of this proposition, of course, is that innovations that are distant from the core will be more readily adopted on a large scale. I will later develop some theoretical propositions about why this might be the case.

The problem of scale is a "nested" problem. That is, it exists in similar forms at different levels of the system. New practices may spring up in isolated classrooms or in clusters of classrooms within a given school, yet never move to most classrooms within that school. Likewise, whole schools may be created from scratch that embody very different forms of practice, but these schools remain a small proportion of all schools within a given district or state. And finally, some local school systems may be more successful than others at spawning classrooms and schools that embody new practices, but these local systems remain a small fraction of the total number in a state.

The problem of scale is not a problem of the general resistance or failure of schools to change. Most schools are, in fact, constantly changing — adopting new curricula, tests, and grouping practices, changing schedules, creating new mechanisms for participation in decisionmaking, adding or subtracting teaching and administrative roles, and myriad other modifications. Within this vortex of change, however, basic conceptions of knowledge, of the teacher's and the student's role in constructing knowledge, and of the role of classroom- and school-level structures in enabling student learning remain relatively static.

Nor is the problem of scale a failure of research or of systematic knowledge of what to do. At any given time, there is an abundance of ideas about how to change fundamental relationships in the core of schooling, some growing out of research and demonstration projects, some growing directly out of teaching practice. Many of these ideas are empirically tested and many are based on relatively coherent theories of student learning. We might wish that these ideas were closer to the language and thought processes of practitioners, and that they were packaged and delivered better, but there are more ideas circulating about how to change the core processes of schooling than there are schools and classrooms willing to engage them. There are always arguments among researchers and practitioners about which are the most promising ideas and conflicting evidence about their effects, but the supply of ideas is there. The problem, then, lies not in the supply of new ideas, but in the demand for them. That is, the primary problem of scale is understanding the conditions under which people working in schools seek new knowledge and actively use it to change the fundamental processes of schooling.

Why Is the Problem of Scale Important to Educational Reform?

Two central ideas of the present period of U.S. educational reform raise fundamental, recurring problems of U.S. education. One idea is that teaching and learning in U.S. schools and classrooms is, in its most common form, emotionally flat and intellectually undemanding and unengaging; this idea is captured by that famous, controversial line from *A Nation at Risk*: "a rising tide of mediocrity" (National Commission on Excellence in Education, 1983). This is a perennial critique of U.S. education, dating back to the first systematic surveys of educational practice in the early twentieth century and confirmed by contemporary evidence.[1] One recent survey characterized typical classroom practice this way:

> No matter what the observational perspective, the same picture emerges. The two activities involving the most students were being lectured to and working on written assignments... Students were working alone most of the time, whether individually or in groups. That is, the student listened as one member of a class being lectured, or the student worked individually on a seat assignment... In effect, then, the modal classroom configurations which we observed looked like this: the teacher explaining or lecturing to the total class or a single student, occasionally asking questions requiring factual answers; the teacher, when not lecturing, observing or monitoring students working individually at their desks; students listening or appearing to listen to the teacher and occasionally responding to the teacher's questions; students working individually at their desks on reading or writing assignments; and all with little emotion, from interpersonal warmth to expressions of hostility. (Goodlad, 1984, p. 230)

Every school can point to its energetic, engaged, and effective teachers; many students can recall at least one teacher who inspired in them an engagement in learning and a love of knowledge. We regularly honor and deify these pedagogical geniuses. But these exceptions prove the rule. For the most part, we regard inspired and demanding teaching as an individual trait, much like hair color or shoe size, rather than as a professional norm. As long as we consider engaging teaching to be an individual trait, rather than a norm that might apply to any teacher, we feel no obligation to ask the broader systemic question of why more evidence of engaging teaching does not exist. The answer to this question is obvious for those who subscribe to the individual trait theory of effective teaching: few teachers are predisposed to teach in interesting ways. Alternatively, other explanations for the prevalence of dull, flat, unengaging teaching might be that we fail to select and reward teachers based on their capacity to teach in engaging ways, or that organizational conditions do not promote and sustain good teaching when it occurs.

The other central idea in the present period of reform is captured by the slogan, "all students can learn." What reformers seem to mean by this idea is that "all" students — or most students — are capable of mastering challenging academic content at high levels of understanding, and the fact that many do not

[1] See for example, Lawrence Cremin's (1961, p. 157) reference to Randolf Bourne's critique of the "artificially and dullness of U.S. classrooms", published in *The New Republic* in 1915.

is more a testimonial to how they are taught than to whether they are suited for serious academic work. In other words, the slogan is meant to be a charge to schools to make challenging learning available to a much broader segment of students than they have in the past. The touchstone for this critique is consistent evidence over the last two decades or so that U.S. students do reasonably well on lower level tests of achievement and cognitive skill, but relatively poorly on tests that require complex reasoning, inference, judgment, and transfer of knowledge from one type of problem to another (National Center for Education Statistics, 1993).

It is hard to imagine a solution to this problem of the distribution of learning among students that does not entail a solution to the first problem of increasing the frequency of engaging teaching. Clearly, getting more students to learn at higher levels has to entail some change in both the way students are taught and in the proportion of teachers who are teaching in ways that cause students to master higher level skills and knowledge. It is possible, of course, that some piece of the problem of the distribution of learning can be solved by simply getting more teachers to teach more demanding academic content, even in boring and unengaging ways, to a broader population of students. But, at some level, it seems implausible that large proportions of students presently disengaged from learning academic content at high levels of understanding will suddenly become more engaged if traditional teaching practices in the modal U.S. classroom remain the norm. Some students overcome the deadening effect of unengaging teaching through extraordinary ability, motivation, or family pressure. Other students, however, require extraordinary teaching to achieve extraordinary results. The problem of scale, then, can be seen in the context of the current reform debate as a need to change the core of schooling in ways that result in most students receiving engaging instruction in challenging academic content.

This view of educational reform, which focuses on changing fundamental conditions affecting the relationship of student, teacher, and knowledge, might be criticized as being either too narrow or too broad. My point in focusing the analysis wholly on the core of schooling is not to suggest that teaching and learning can be changed in isolation from an understanding of the contextual factors that influence children's lives. Nor is it to suggest that the object of reform should be to substitute one kind of uniformity of teaching practice for another. Rather, my point is that most educational reforms never reach, much less influence, long-standing patterns of teaching practice, and are therefore largely pointless if their intention is to improve student learning. I am interested in what is required before teaching practice can plausibly be expected to shift from its modal patterns toward more engaging and ambitious practices. These practices might be quite diverse. They might involve creative adaptations and responses to the backgrounds, interests, and preferences of students and their families. And they might be wedded in interesting ways to solutions to the multitude of problems that children face outside of school. But the fundamental problem I am interested in is why, when schools seem to be constantly changing, teaching practice changes so little, and on so small a scale.

The Evidence

The central claims of my argument, then, are that the core of schooling — defined as the standard solutions to the problem of how knowledge is defined, how teachers relate to students around knowledge, how teachers relate to other teachers in the course of their daily work, how students are grouped for purposes of instruction, how content is allocated to time, and how students' work is assessed — changes very little, except in a small proportion of schools and classrooms where the changes do not persist for very long. The changes that do tend to "stick" in schools are those that are most distant from the core.

The Progressive Period

To evaluate these claims, one would want to look at examples where reformers had ideas that challenged the core of schooling and where these ideas had time to percolate through the system and influence practice. One such example is the progressive period, perhaps the longest and most intense period of educational reform and ferment in the history of the country, running from roughly the early teens into the 1940s. What is most interesting about the progressive period, as compared with other periods of educational reform, is that its aims included explicit attempts to change pedagogy, coupled with a relatively strong intellectual and practical base. Noted intellectuals — John Dewey, in particular — developed ideas about how schools might be different, and these ideas found their way into classrooms and schools. The progressive period had a wide agenda, but one priority was an explicit attempt to change the core of schooling from a teacher-centered, fact-centered, recitation-based pedagogy to a pedagogy based on an understanding of children's thought processes and their capacities to learn and use ideas in the context of real-life problems.

In a nutshell, the progressive period produced an enormous amount of innovation, much of it in the core conditions of schooling. This innovation occurred in two broad forms. One was the creation of single schools that exemplified progressive pedagogical practices. The other was an attempt to implement progressive pedagogical practices on a large scale in public school systems. In discussing these two trends, I draw upon Lawrence Cremin's *The Transformation of the American School* (1961), which provides a detailed review of progressive education.

The single schools spawned by the progressive movement represented an astonishing range of pedagogical ideas and institutional forms, spread over the better part of four decades. In their seminal review of pedagogical reform in 1915, *Schools of To-Morrow,* John and Evelyn Dewey documented schools ranging from the Francis Parker School in Chicago to Caroline Pratt's Play School in New York, both exemplars of a single founder's vision. While these schools varied enormously in the particulars of their curricula, activities, grade and grouping structures, and teaching practices, they shared a common aim of breaking the lock of teacher-centered instruction and generating high levels of student engagement through student-initiated inquiry and group activities. Furthermore,

these schools drew on a common wellspring of social criticism and prescription, exemplified in John Dewey's lecture, *The School and Society* (1899). According to Cremin, *The School and Society* focused school reform on shifting the center of gravity in education "back to the child. His natural impulses to conversation, to inquiry, to construction, and to expression were … seen as natural resources of the educative process" (1961, pp. 118-119). Also included in this vision was the notion that school would be "recalled from isolation to the center of the struggle for a better life" (p. 119).

This dialectic between intellect and practice continued into the 1920s and 1930s, through the publication of several books: William Heard Kilpatrick's *Foundations of Method* (1925), an elaboration of Dewey's thinking about the connection between school and society; Harold Rugg and Ann Schumaker's *The Child-Centered School* (1928), another interpretive survey of pedagogical practice like Dewey's *Schools of To-Morrow*; and Kilpatrick's *The Educational Frontier (* 1933), a restatement of progressive theory and philosophy written by a committee of the National Society of College Teachers of Education (Cremin, 1961, pp. 216-229). Individual reformers and major social educational institutions, such as Teachers College and the University of Chicago, designed and developed schools that exemplified the key tenets of progressive thinking.

One example illustrates the power of this connection between ideas and institutions. In 1915, Abraham Flexner, the father of modern medical education, announced his intention to develop a model school that would do for general education what the Johns Hopkins Medical School had done for medical education. He wrote an essay called "A Modern School" (1917), a blueprint for reform describing a school that embodied major changes in curriculum and teaching. It was designed to serve as a laboratory for the scientific study of educational problems. In 1917, Teachers College, in collaboration with Flexner and the General Board of Education, opened the Lincoln School, which became a model and a gathering place for progressive reformers, a major source of new curriculum materials, and the intellectual birthplace of many reformers over the next two decades. The school survived until 1948, when it was disbanded in a dispute between its parents' association and the Teachers College administration (Cremin, 1961, pp. 280-291).

The second form of innovation in the progressive period, large-scale reforms of public school systems, drew on the same intellectual base as the founding of individual schools. A notable early example was the Gary, Indiana, school district. The Gary superintendent in 1907 was William Wirt, a former student of John Dewey at the University of Chicago. Wirt initiated the "Gary Plan," which became the leading exemplar of progressive practice on a large scale in the early progressive period. The key elements of the Gary Plan were "vastly extended educational opportunity" in the form of playgrounds, libraries, laboratories, machine shops, and the like; a "platoon system" of grouping, whereby groups of children moved *en masse* between classrooms and common areas, allowing for economies in facilities; a "community" system of school organization in which skilled tradespeople from the community played a role in teaching students; and a heavily project-focused curriculum (Cremin, 1961, pp. 153-160).

In 1919, Winnetka, Illinois, hired Carleton Washburn of the San Francisco State Normal School as its superintendent. Washburn launched a reform agenda based on the idea of individually paced instruction, where the "common essentials" in the curriculum were divided into "parcels," through which each student advanced, with the guidance of teachers, at his or her own pace. As students mastered each parcel, they were examined and moved on to the next. This individualized work was combined with "self-expressive" work in which students were encouraged to develop ideas and projects on their own, as well as group projects in which students worked on issues related to the community life of the school. Over the next decade, the Winnetka plan was imitated by as many as 247 other school districts, but with a crucial modification. Most districts found the practice of tailoring the curriculum to individual students far too complex for their tastes, so they organized students into groups to which they applied the idea of differential progress. In this way, a progressive reform focused on individualized learning led to the development of what is now called tracking (Cremin, 1961, pp. 295-298).

A number of cities, including Denver and Washington, DC, undertook massive curriculum reform projects in the late 1920s and early 1930s. These efforts were extraordinarily sophisticated, even by today's relatively rarefied standards. Typically, teachers were enlisted to meet in curriculum revision committees during regular school hours, and outside experts were enlisted to work with teachers in reformulating the curriculum and in developing new teaching practices. In Denver, Superintendent Jesse Newlon convinced his school board to appropriate $35,500 for this process. Denver became a center for teacher-initiated and -developed curriculum, resulting in the development of a monograph series of course syllabi that attained a wide national circulation. The resulting curriculum changes were sustained in Denver over roughly two decades, when they were abandoned in the face of growing opposition to progressive pedagogy (Cremin, 1961, pp. 299-302; Cuban, 1984, pp. 67-83). In Washington, DC, Superintendent Frank Ballou led a pared-down version of the Denver curriculum revision model: Teacher committees chaired by administrators met after school, without the support of outside specialists. Despite these constraints, the process reached large numbers of teachers in both Black and White schools in the city's segregated system (Cuban, 1984, pp. 83-93).

Larry Cuban concluded in *How Teachers Taught: Constancy and Change in American Classrooms, 1890-1980*, his study of large-scale reforms of curriculum and pedagogy in the late-progressive period, that progressive practices, defined as movement away from teacher-centered and toward student-centered pedagogy, "seldom appeared in more than one-fourth of the classrooms in any district that systematically tried to install these varied elements" (Cuban, 1984, p. 135). Even in settings where teachers made a conscious effort to incorporate progressive practices, the result was more often than not a hybrid of traditional and progresive, in which the major elements of the traditional core of instruction were largely undisturbed:

> The dominant pattern of instruction, allowing for substantial spread of these hybrid progressive practices, remained teacher centered. Elementary and secondary teach-

> ers persisted in teaching from the front of the room, deciding what was to be learned, in what manner, and under what conditions. The primary means of grouping for instruction was the entire class. The major daily classroom activities continued with a teacher telling, explaining, and questioning students while the students listened, answered, read, and wrote. Seatwork or supervised study was an extension of these activities. (Cuban, 1984, p. 137)

The fate of the progressive movement has been well documented. As the language of progressivism began to permeate educational talk, if not practice, the movement began to lose its intellectual edge and to drift into a series of empty cliches, the most extreme of which was life adjustment education. Opposition to progressivism, which had been building through the twenties, came to a crescendo in the forties. The movement was increasingly portrayed by a skeptical public and press in terms of its most extreme manifestations watered-down content, a focus on children's psychological adjustment at the expense of learning, and a preoccupation with self-expression rather than learning. Abraham Flexner, looking back on his experiences as a moderate progressive, observed that "there is something queer about the genus 'educator'; the loftiest are not immune. I think the cause must lie in their isolation from the rough and tumble contacts with all manner of men. They lose their sense of reality" (Cremin, 1961, p. 160).

The particular structure that educational reform took in the progressive period, though, is deeply rooted in American institutions and persists to this day. First, contrary to much received wisdom, intellectuals found ways to express their ideas about how education could be different in the form of real schools with structures and practices that were radically different from existing schools. There was a direct and vital connection between ideas and practice, a connection that persists up to the present, though in a much diluted form. But this connection took the institutional form of single schools, each an isolated island of practice, connected by a loosely defined intellectual agenda that made few demands for conformity, and each a particular, precious, and exotic specimen of a larger genus. So the most vital and direct connections between ideas and practice were deliberately institutionalized as separate, independent entities, incapable of and uninterested in forming replicates of themselves or of pursuing a broader institutional reform agenda.[2] A few exceptions, like the Lincoln School, were deliberately designed to influence educational practice on a larger scale, but the exact means by which that was to happen were quite vague. For the most part, progressive reformers believed that good ideas would travel, of their own volition, into U.S. classrooms and schools.

[2] Dewey's own ambivalence about the connection between the exemplary practices developed in laboratory schools and the broader world of practice can be seen in his reflections on the University of Chicago Lab School:

> As it is not the primary function of a laboratory to devise ways and means that can at once be put to practical use, so it is not the primary purpose of this school to devise methods with reference to their direct application in the graded school system. It is the function of some schools to provide better teachers according to present standards; it is the function of others to create new standards and ideals and thus to lead to a gradual change in conditions. (quoted in Cremin, 1961, p. 290n)

Second, where public systems did attempt to change pedagogical practice on a large scale, often using techniques that would be considered sophisticated by today's standards, they succeeded in changing practice in only a small fraction of classrooms, and then not necessarily in a sustained way over time. Sometimes, as in the case of Washburn's strategy of individualizing instruction in Winnetka, as the reforms moved from one district to another they became sinister caricatures of the original. The district-level reforms produced impressive tangible products, mostly in the form of new curriculum materials that would circulate within and outside the originating districts. The connection to classroom practice, however, was weak. Larry Cuban likens this kind of reform to a hurricane at sea — "storm-tossed waves on the ocean surface, turbulent water a fathom down, and calm on the ocean floor" (Cuban, 1984, p. 237).

Third, the very successes of progressive reformers became their biggest liabilities as the inevitable political opposition formed. Rather than persist in Dewey's original agenda of influencing public discourse about the nature of education and its relation to society through open public discussion, debate, and inquiry, the more militant progressives became increasingly like true believers in a particular version of the faith and increasingly isolated from public scrutiny and discourse. In this way, the developers of progressive pedagogy became increasingly isolated from the public mainstream and increasingly vulnerable to attack from traditionalists.

The pattern that emerges from the progressive period, then, is one where the intellectual and practical energies of serious reformers tended to turn inward, toward the creation of exemplary settings — classrooms or schools — that embodied their best ideas of practice, producing an impressive and attractive array of isolated examples of what practice *could* look like. At the same time, those actors with an interest in what would now be called systemic change focused on developing the tangible, visible, and material products of reform — plans, processes, curricula, materials — and focused much less, if at all, on the less tangible problem of what might cause a teacher to teach in new ways, if the materials and support were available to do so. These two forces produced the central dilemma of educational reform: We can produce many examples of how educational practice could look different, but we can produce few, if any, examples of large numbers of teachers engaging in these practices in large-scale institutions designed to deliver education to most children.

Large-Scale Curriculum Development Projects

Another, more recent body of evidence on these points comes from large-scale curriculum reforms of the 1950s and 1960s in the United States, which were funded by the National Science Foundation (NSF). In their fundamental structure, these reforms were quite similar to the progressive reforms, although much more tightly focused on content. The central idea of these curriculum reforms was that learning in school should resemble, much more than it usually does, the actual processes by which human beings come to understand their environment, culture, and social settings. That is, if students are studying mathematics, science, or social science, they should actually engage in activities similar to

those of serious practitioners of these disciplines and, in the process, discover not only the knowledge of the subject, but also the thought processes and methods of inquiry by which that knowledge is constructed. This view suggested that construction of new curriculum for schools should proceed by bringing the best researchers in the various subjects together with school teachers, and using the expertise of both groups to devise new conceptions of content and new strategies for teaching it. The earliest of these projects was the Physical Sciences Study Committee's (PSSC) high school physics curriculum, begun in 1956. Another of these was the Biological Sciences Curriculum Study (BSCS), begun in 1958. A third was *Man: A Course of Study* (MACOS), an ambitious social science curriculum development project, which began in 1959, but only received its first substantial funding from the Ford Foundation in 1962 and NSF support for teacher training in 1969 (Dow, 1991; Elmore, 1993; Grobman, 1969; Marsh, 1964). These were among the largest and most ambitious of the curriculum reform projects, but by no means the only ones.

From the beginning, these curriculum reformers were clear that they aimed to change the core of U.S. schooling, and their aspirations were not fundamentally different from the early progressives. They envisioned teachers becoming coaches and coinvestigators with students into the basic phenomena of the physical, biological, and social sciences. Students' work was to focus heavily on experimentation, inquiry, and study of original sources. The notion of the textbook as the repository of conventional knowledge was to be discarded, and in its place teachers were to use carefully developed course materials and experimental apparatus that were keyed to the big ideas in the areas under study. The object of study was not the assimilation of facts, but learning the methods and concepts of scientific inquiry by doing science in the same way that practitioners of science would do it.

The curriculum development projects grew out of the initiatives of university professors operating from the belief that they could improve the quality of incoming university students by improving the secondary school curriculum. Hence, university professors tended to dominate the curriculum development process, often to the detriment of relations with the teachers and school administrators who were expected to adopt the curricula once they were developed and tested in sample sites. The projects succeeded to varying degrees in engaging actual teachers in the development process, as opposed to simply having teachers field-test lessons that had already been developed.

Teachers were engaged in one way or another at the developmental stage in all projects, but were not always codevelopers. In PSSC, a few teachers judged to be talented enough to engage the MIT professors involved in the project were part of the development process; the main involvement of teachers came at the field-testing stage, but their feedback proved to be too voluminous to accommodate systematically in the final product (Marsh, 1964). In MACOS, one school in the Boston area was a summer test site, and teachers were engaged in the curriculum project relatively early in the process of development. Later versions of the curriculum were extensively tested and marketed in schools throughout the country (Dow, 1991).

By far the most ambitious and systematic involvement of teachers as co-developers was in BSCS. BSCS was designed to produce three distinct versions of a secondary biology curriculum (biochemical, ecological, and cellular), so that schools and teachers could have a choice of which approach to use. The development process was organized into three distinct teams, each composed of equal numbers of university professors and high school biology teachers. Lessons or units were developed by a pair composed of one professor and one secondary teacher, and each of these units was reviewed and critiqued by another team composed of equal partners. After the curriculum was developed, the teachers who participated in development were drafted to run study groups of teachers using the curriculum units during the school year, and the results of these study groups were fed back into the development process. Interestingly, once the curriculum was developed, NSF abandoned funding for the teacher study groups. NSF's rationale was that the teachers had accomplished their development task, but this cut-off effectively eliminated the teacher study groups, potentially the most powerful device for changing teaching practice (Elmore, 1993; Grobman, 1969).

Evaluations of the NSF-sponsored curriculum development projects generally conclude that their effects were broad but shallow. Hundreds of thousands of teachers and curriculum directors were trained in summer institutes. Tens of thousands of curriculum units were disseminated. Millions of students were exposed to at least some product or by-product of the various projects. In a few schools and school systems, teachers and administrators made concerted efforts to transform curriculum and teaching in accord with the new ideas, but in most instances the results looked like what Cuban (1984) found in his study of progressive teaching practices: A weak, diluted, hybrid form emerged in some settings in which new curricula were shoe-horned into old practices, and, in most secondary classrooms, the curricula had no impact on teaching and learning at all. While the curriculum development projects produced valuable materials that are still a resource to many teachers and shaped peoples' conceptions of the possibilities of secondary science curriculum, their tangible impact on the core of U.S. schooling has been negligible (Elmore, 1993; Stake & Easely, 1978).

Most academic critics agree that the curriculum development projects embodied a naive, discredited, and badly conceived model of how to influence teaching practice. The model, if there was one, was that "good" curriculum and teaching practice were self-explanatory and self-implementing. Once teachers and school administrators recognized the clearly superior ideas embodied in the new curricula, they would simply switch from traditional textbooks to the new materials and change long-standing practices in order to improve their teaching and the chances of their students succeeding in school.

What this model overlooked, however, was the complex process by which local curricular decisions get made, the entrenched and institutionalized political and commercial relationships that support existing textbook-driven curricula, the weak incentives operating on teachers to change their practices in their daily work routines, and the extraordinary costs of making large-scale, long-standing changes of a fundamental kind in how knowledge is constructed in classrooms.

In the few instances where the advocates for the curriculum development projects appeared to be on the verge of discovering a way to change practice on a large scale as in the BSCS teacher study groups, for example — they failed to discern the significance of what they were doing because they saw themselves as developers of new ideas about teaching and not as institution-changing actors.

The structural pattern that emerges from the large-scale curriculum development projects is strikingly similar to that of the progressive period. First, the ideas were powerful and engaging, and they found their way into tangible materials and into practice in a few settings. In this sense, the projects were a remarkable achievement in the social organization of knowledge, pulling the country's most sophisticated thinkers into the orbit of public education and putting them to work on the problem of what students should know and be able to do. Second, the curriculum developers proved to be inept and naive in their grasp of the individual and institutional issues of change associated with their reforms. They assumed that a "good" product would travel into U.S. classrooms on the basis of its merit, without regard to the complex institutional and individual factors that might constrain its ability to do so. Third, their biggest successes were, in a sense, also their biggest failures. Those few teachers who became accomplished teachers of PSSC physics, BSCS biology, or MACOS approaches to social studies only served to confirm what most educators think about talent in the classroom. A few have it, but most do not. A few have the extraordinary energy, commitment, and native ability required to change their practice in some fundamental way; most others do not. The existence of exemplars, without some way of capitalizing on their talents, only reinforces the notion that ambitious teaching is an individual trait, not a professional expectation.

What Changes?

Critiques of this argument posit that U.S. schools have changed in fundamental ways over the last one hundred years, and that focusing on the fate of what I have characterized as "good" classroom practice gives a biased picture. To be sure, schools have changed massively over the last century. David Cohen argues, for example, that in the critical period of the early twentieth century, when the secondary school population increased four-fold in three decades, massive institutional changes were necessary to accommodate newly arrived students. Larger, more complex schools, a more differentiated curriculum, and grading and retention practices designed to hold adolescents out of the labor force were just a few of those changes (Powell, Farrar, & Cohen, 1955). Vocational education emerged in the post-World War I era as a mechanism to bind schools more closely to the economy and to provide a more differentiated curriculum for a diverse student body. Kindergartens emerged on a large scale in the 1940s and 1950s, extending the period of life children were in school and altering the relationship between the family and school in important ways. The equity-based reforms of the 1960s and 1970s revealed the limits of earlier approaches to equality of opportunity, and new programs addressed the needs of students from disadvantaged backgrounds, many with physical and learning problems, and who

spoke native languages other than English. In brief, this critique states that we face a much different educational system now than we did in the early decades of the twentieth century, and that these changes have surely had a significant impact on how teachers teach and how students learn.

I am inclined to agree with those who take an institutional perspective on educational change. In a nutshell, this argument states that it is possible, indeed practically imperative, for institutions to learn to change massively in their surface structures while at the same time changing little at their core (Cuban, 1990; March & Olsen, 1989; Meyer & Rowan, 1978; Tyack & Cuban, 1995; Tyack & Tobin, 1994). Institutions use their structures to buffer and assimilate the changing demands of a political and social order that is constantly in flux — they add new programs, they develop highly visible initiatives that respond to prevailing opinions in the community, they open new units in the organization to accommodate new clients, they mobilize and organize public opinion by creating new governance structures. But the gap between these institutional structures and the core patterns of schooling is slippery and elusive: The core of schooling remains relatively stable in the face of often massive changes in the structure around it. Schools legitimize themselves with their various conflicting publics by constantly changing external structures and processes, but shield their workers from any fundamental impact of these changes by leaving the core intact. This accounts for the resilience of practice within the context of constant institutional change.

The Role of Incentives

Nested within this broad framework of institutional and political issues is a more specific problem of incentives that reforms need to address in order to get at the problem of scale. Institutional structures influence the behavior of individuals in part through incentives. The institution and its political context help set the values and rewards that individuals respond to within their daily work life. But individual values are also important. As David Cohen (1995) cogently argues in his discussion of rewards for teacher performance, incentives mobilize individual values; that is, individual values determine to some degree what the institution can elicit with incentives. For example, if teachers or students do not value student academic performance, do not see the relationship between academic performance and personal objectives, or do not believe it is possible to change student performance, then it is hard to use incentives to motivate them to action that would improve performance.

Thus, individual acts like the practice of teaching in complex institutional settings emanate both from incentives that operate on the individual and the individual's willingness to recognize and respond to these incentives as legitimate. Individual actions are also a product of the knowledge and the competence that the individual possesses. As Michael Fullan has argued, schools routinely undertake reforms for which they have neither the institutional nor the individual competence, and they resolve this problem by trivializing the reforms,

changing the language they use, and modifying superficial structures around the practice, but without changing the practice itself (Fullan, 1982; Fullan & Miles, 1992). Individuals are embedded in institutional structures that provide them with incentives to act in certain ways, and they respond to these incentives by testing them against their values and their competence.

One way of thinking about the aforementioned evidence is that it demonstrates a massive failure of schools to harness their institutional incentives to the improvement of practice. I think this failure is rooted not only in the design of the institutions, but also in a deep cultural norm about teaching that I referred to earlier: that successful teaching is an individual trait rather than a set of learned professional competencies acquired over the course of a career.

Both the progressive reformers and the curriculum reforms of the 1950s and 1960s focused on connecting powerful ideas to practice, developing exemplars of good practice and attracting true believers. These efforts largely failed, often in very interesting and instructive ways, to translate their ideas into broad-scale changes in practice. A very large incentive problem is buried in this strategy: Reform strategies of this kind rely on the intrinsic motivation of individuals with particular values and competencies — and a particular orientation toward the outside world — to develop and implement reforms in schools.

These intrinsically motivated individuals are typically highly engaged in the world outside of their workplace, and hence come in contact with the opportunities presented by new practices. They are usually willing to invest large amounts of their own time in learning new ways to think about their practice and in the messy and time-consuming work of getting others to cooperate in changing their practice. And, perhaps most importantly, they see their own practice in a broader social context, and see certain parts of that social context as having authority over how they practice. Progressive teachers and school-builders, for example, saw themselves as participants in a broad movement for social reform and were willing to evaluate their own work in terms of its consistency with the goals of that reform (Tyack & Hansot, 1982). Some teachers who were directly involved in the curriculum reform projects formed an identity as science or math teachers affiliated with professional organizations that had authority and influence over their practice.

The problem of incentives is that these individuals are typically a small proportion of the total population of teachers. The demands required by this kind of ambitious, challenging, and time-consuming work seems at best formidable, and at worst hopelessly demanding. Friedrich Engels once said that the problem with socialism is that it spoils too many good evenings at home, and one could say the same about the reform of educational practice.

Ambitious and challenging practice in classrooms thus occurs roughly in proportion to the number of teachers who are intrinsically motivated to question their practice on a fundamental level and look to outside models to improve teaching and learning. The circumstantial evidence suggests that, at the peak of reform periods, this proportion of teachers is roughly 25 percent of the total population, and that it can decrease to considerably less than that if the general climate for reform is weak (Cuban, 1990). The most successful and ambitious

strategies of reform, then, embody incentive structures that can mobilize, at most, roughly one-fourth of the total population of teachers.

Given this interpretation of the evidence, then, it is possible to see the enormous power of a cultural norm that describes successful teaching as an individual attribute rather than a body of deliberately acquired professional knowledge and skills. If what a teacher does is based wholly or largely on individual traits, then it is highly unlikely that the incentive structures of schools could alter the proportion of teachers willing to engage in ambitious practice, other than changing the composition of the teaching force.

It is also possible to see the perverse incentives buried in typical reform strategies. The first step serious reformers typically take involves gathering up the faithful and concentrating them in one place in order to form a cohesive community of like-minded practitioners. In the case of the progressives, reformers started schools that embodied their ideas; in the case of the curriculum projects, reformers identified early adopters of their new curricula as exemplars of success. This strategy immediately isolates the teachers who are most likely to change from those who are least likely to embrace reform. This dynamic creates a social barrier between the two, virtually guaranteeing that the former will not grow in number and the latter will continue to believe that exemplary teaching requires extraordinary resources in an exceptional environment.

One can see vestiges of this perverse incentive structure in the design of current school reform movements. These reforms typically begin with a few teachers in a building and nurture a distinctive identity among those teachers, or they construct a new school from scratch and recruit teachers who are highly motivated to join the faculty. Both strategies guarantee the isolation of the small fraction of teachers who are willing to engage in change from the majority who find it an intimidating and threatening prospect, and are likely to instigate a conflict between the two groups of teachers that renders the scaling up of this reform highly unlikely.

Without some fundamental change in the incentive structure under which schools and teachers operate, we will continue more or less indefinitely to repeat the experience of the progressives and the curriculum reformers. Like our predecessors, we will design reforms that appeal to the intrinsic values and competencies of a relatively small proportion of the teaching force. We will gather these teachers together in ways that cut them off from contact and connection with those who find ambitious teaching intimidating and unfeasible. We will demonstrate that powerful ideas can be harnessed to changes in practice in a small fraction of settings, but continue to fail in moving those practices beyond the group of teachers who are intrinsically motivated and competent to engage in them.

Working on the Problem of Scale

What might be done to change this self-reinforcing incentive structure? Probably the first step is to acknowledge that social problems of this complexity are not amenable to quick, comprehensive, rational solutions. Fundamental changes in

patterns of incentives occur not by engaging in ambitious, discontinuous reforms, but rather by pushing hard in a few strategic places in the system of relations surrounding the problem, and then carefully observing the results. My recommendations will be of this sort.

Furthermore, it seems important to continue to do what has yielded success in the past and to continue to do it with increasing sophistication. I have argued that the most successful part of the progressive and curriculum reform strategies was the creation of powerful connections between big ideas with large social implications and the micro-world of teaching practice. The progressives succeeded in creating versions of educational reform that both exemplified progressive ideals and embodied concrete changes in the core of schooling. Likewise, the curriculum reformers succeeded in harnessing the talent of the scientific elite to the challenge of secondary school curriculum and teaching.

This connection between the big ideas and the fine grain of practice in the core of schooling is a fundamental precondition for any change in practice. Capacity to make these connections waxes and wanes, and probably depends too heavily on the idiosyncrasies of particular individuals with a particular scientific or ideological ax to grind. One could imagine doing a much better job of institutionalizing the connection between big ideas and teaching practice. Examples might include routine major national curriculum reviews composed of groups with equal numbers of school teachers and university researchers, or a national curriculum renewal agenda that targeted particular parts of teaching and curriculum for renewal on a regular cycle. The more basic point, however, is that preserving the connection between big ideas and teaching practice, embodied in earlier reform strategies, is an essential element in tackling the problem of scale.

With these ideas as context, I offer four main proposals for how to begin to tackle the problem of scale. Each grows out of an earlier line of analysis in this article, and each embodies an argument about how incentives should be realigned to tackle the problem of scale.

1. Develop Strong External Normative Structures for Practice.

The key flaw in earlier attempts at large-scale reform was to rely almost exclusively on the intrinsic commitment of talented and highly motivated teachers to carry the burden of reform. Coupled with strong cultural norms about good teaching being an individual trait, this strategy virtually guarantees that good practice will stay with those who learn and will not travel to those who are less predisposed to learn. One promising approach, then, is to create strong professional and social normative structures for good teaching practice that are external to individual teachers and their immediate working environment, and to provide a basis for evaluating how many teachers are approximating good practice at what level of competence.

I use the concept of external normative structures, rather than a term like standards, because I think these structures should be diverse and need to be constructed on different bases of authority in order to be useful in influencing

teaching practice. The category of external structures could include formal statements of good practice, such as content and performance standards developed by professional bodies like the National Council of Teachers of Mathematics. External structures might also include alternative credentialling systems, such as the National Board for Professional Teaching Standards.

But strong external structures could also include less imposing and more informal ways of communicating norms of good practice. For example, curriculum units designed to demonstrate more advanced forms of practice could be accompanied by videotapes of teachers engaging in these practices and then disseminated through teacher organizations. These external normative structures can be hooked to internal systems of rewards for teachers — salary increments for staff development related to changes in practice, release time to work on curriculum or performance standards, time to develop curriculum units that embody particular approaches to teaching, or opportunities to engage in demonstration teaching. There is no particular requirement for unanimity, consistency, or "alignment" among these various external structures, only that they embody well-developed notions of what it means for teachers to teach and students to learn at high levels of competency in a given area. The important feature of these structures is not their unanimity or consistency, which is probably illusory anyway, but the fact that the structures are external to the world in which teachers work, they form teachers' ideas about practice, and they carry some form of professional authority.

Why is the existence of external norms important? Because it institutionalizes the idea that professionals are responsible for looking outward at challenging conceptions of practice, in addition to looking inward at their values and competencies. Good teaching becomes a matter for public debate and disagreement, for serious reflection and discourse, for positive and negative feedback about one's own practices. Over time, as this predisposition to look outward becomes more routinized and ingrained, trait theories of teaching competence should diminish. Teachers would begin increasingly to think of themselves as operating in a web of professional relations that influence their daily decisions, rather than as solo practitioners inventing practice out of their personalities, prior experiences, and assessments of their own strengths and weaknesses. Without external normative structures, teachers have no incentive to think of their practice as anything other than a bundle of traits. The existence of strong external norms also has the effect of legitimating the proportion of teachers in any system who draw their ideas about teaching from a professional community, and who compare themselves against a standard external to their school or community. External norms give visibility and status to those who exemplify them.

2. Develop Organizational Structures That Intensify and Focus, Rather than Dissipate and Scatter, Intrinsic Motivation to Engage in Challenging Practice. The good news about existing reform strategies is that they tend to galvanize commitment among the already motivated by concentrating them in small groups of true believers who reinforce each other. The bad news is that these

small groups of self-selected reformers apparently seldom influence their peers. This conclusion suggests that structures should, at a minimum, create diversity among the energetic, already committed reformers and the skeptical and timid. But it also suggests that the unit of work in an organization that wants to change its teaching practice should be small enough so that members can exercise real influence over each others' practice. Certain types of structures are more likely than others to intensify and focus norms of good practice: organizations in which face-to-face relationships dominate impersonal, bureaucratic ones; organizations in which people routinely interact around common problems of practice; and organizations that focus on the results of their work for students, rather than on the working conditions of professionals. These features can be incorporated into organizations, as well as into the composition of their memberships.

Heather Lewis, an accomplished practitioner of school change with the Center for Collaborative Education in New York City, has argued that we will solve the problem of scaling-up by scaling-down.[3] By this, I think she means that more ambitious teaching practice is more likely to occur in smaller schools, where adults are more likely to work collaboratively and take common responsibility for students. Teachers in schools with a tighter sense of mutual commitment, which arguably comes with smaller size, are more likely to exert influence on each other around norms of good practice than are teachers in anonymous organizations in which bureaucratic controls are the predominant mechanism of influence.

The problem is that there is so little structural variation in U.S. public education that we have little conception of what kinds of structures would have this intensifying and focusing effect. The first job of structural reform should be to create more variation in structure — more small schools, more schools organized into smaller sub-units, more structures that create stronger group norms inside larger schools, more ways of connecting adventurous teachers with their less ambitious and reflective colleagues — but not structures that isolate the true believers from the skeptical and the timid. In the absence of such structures, there will be no connective tissue to bind teachers together in a relationship of mutual obligation and force them to sort out issues of practice. Organizational forms that intensify and focus group norms, without nesting them in some system of external norms of good practice, will simply perpetuate whatever the prevailing conventional wisdom about practice happens to be in a given school.

3. Create Intentional Processes for Reproduction of Successes.

One of the major lessons from past large-scale reforms is their astounding naivete about how to get their successes to move from one setting to another. The progressives seemed to think that a few good exemplars and a few energetic superintendents pursuing system-wide strategies of reform would ignite a conflagration that would consume all of U.S. education. If any social movement had the possibility of doing that, it was the progressive movement, since it had, at

[3] Remarks at Project Atlas Forum on Getting to Scale, April 3, 1995.

least initially, a high degree of focus, a steady supply of serious intellectual capital, and an infrastructure of committed reformers. But it did not succeed at influencing more than a small fraction of schools and classrooms. The curriculum reformers thought that good curriculum models would create their own demand, an astoundingly naive idea in retrospect, given what we know about the limits within which teachers work, the complex webs of institutional and political relationships that surround curriculum decisions, and the weak incentives for teachers to pay attention to external ideas about teaching practice.

This is not so much a failure of a theory of how to reproduce success as the absence of a practical theory that takes account of the institutional complexities that operate on changes in practice. I am skeptical that such a theory will emerge without serious experimentation, since I know of no clear a priori basis on which to construct such a theory. I suggest five theories that might serve as the basis for experimentation with processes designed to get exemplary practices to scale.

Incremental Growth. The usual way of thinking about increases in scale in social systems is incremental growth. For example, according to the incremental growth theory, the proportion of teachers teaching in a particular way would increase by some modest constant each year, until the proportion approached 100 percent. This model implies a fixed capacity for training a given number of teachers per year in an organization.

The problems with this model are not difficult to identify. The idea that new practice "takes" after a teacher has been trained is highly suspect. The notion that a fixed number of teachers could be trained to teach in a given way by circulating them through a training experience seems implausible, although it is probably the way most training programs are designed. Teaching practice is unlikely to change as a result of exposure to training, unless that training also brings with it some kind of external normative structure, a network of social relationships that personalize that structure, and supports interaction around problems of practice. The incremental model, if it is to work, needs a different kind of specification, which I will call the cumulative model.

Cumulative Growth. The cumulative growth model suggests that "getting to scale" is a slower, less linear process than that described by the incremental model. It involves not only creating interventions that expose teachers to new practices, but also monitoring the effects of these interventions on teaching practice. When necessary, processes may be created to compensate for the weaknesses of initial effects. Cumulative growth not only adds an increment of practitioners who are exposed to a new practice each year, but also involves a backlog of practitioners from previous years who may or may not have responded to past training. This problem requires a more complex solution than simply continuing to provide exposure to new practice at a give rate. It might require, for example, the creation of professional networks to support the practice of teachers who are in the process of changing their practice, or connecting the more advanced with the less advanced through some sort of mentoring scheme.

Discontinuous Growth. Another possibility is a sharply increasing, or discontinuous, growth model. This could occur through a process like a chain letter, in which an initial group of teachers learned a new kind of practice, and each member of that group worked with another group, and so on: The rate of growth might go, for example, from x, to 10x, to 100x, to 1000x, etc.

This discontinuous growth model shares the same problem with the incremental growth model, but on a larger scale. As the number of teachers exposed to new practices increases, so too does the backlog of teachers for whom the initial intervention was inadequate, eventually reaching the point at which this accumulation of teachers overwhelms the system. It also seems likely that the discontinuous growth model would create serious quality control problems. As growth accelerates, it becomes more and more difficult to distinguish between teachers who are accomplished practitioners of new ways of teaching, and those who are accomplished at making it appear as though they have mastered new ways of teaching.

In all the examples of growth models so far, teachers operate in a system of relationships that provides training and support, but not as members of organizations called schools. In addition to these three models that construct training and support around teachers, two additional models treat teachers as practitioners working in schools.

Unbalanced Growth. One of these models is the unbalanced growth model. This extends and modifies the standard model of innovation in education: collecting true believers in a few settings. Whereas the standard model socially isolates true believers from everyone else, virtually guaranteeing that new practices do not spread, versions of the unbalanced growth model correct for these deficiencies. A version of unbalanced growth might involve concentrating a critical mass of high-performing teachers in a few schools, with an explicit charge to develop each other's capacities to teach in new ways. The growth of new practice would be "unbalanced" initially because some schools would be deliberately constructed to bring like-minded practitioners together to develop their skills. Such schools might be called "pioneer" schools or "leading edge" schools to communicate that they are designed to serve as places where new practices are developed, nurtured, and taught to an ever-increasing number of practitioners. Over time, these schools would be deliberately staffed with larger proportions of less accomplished practitioners and teachers not yet introduced to new models of practice. The competencies developed in the high-performing organizations would then socialize new teachers into the norms of good practice.

The main problem with this model is that it goes against the grain of existing personnel practices in most school systems. Teaching assignments are typically made through collectively bargained seniority and/or principal entrepreneurship, rather than on the basis of a systematic interest in using schools as places to socialize teachers to new practice. Younger teachers are typically assigned to schools with the largest proportions of difficult-to-teach children, and spend their careers working their way into more desirable assignments. Principals who understand and have mastered the assignment system often use it to gather

teachers with whom they prefer to work. In order for the unbalanced growth model to work, a school system would have to devise some deliberate strategy for placing teachers in settings where they would be most likely to develop new skills. Teachers, likewise, would have to be willing to work in settings where they could learn to develop their practice as part of their professional responsibility.

Cell Division, or Reproduction. The other model of growth that treats teachers as practitioners working in schools is the cell division, or reproduction, model. This model works from the analogy of reproductive biology. Rather than trying to change teaching practice by influencing the flow of teachers through schools, as in the unbalanced growth model, the cell division model involves systematically increasing the number and proportion of schools characterized by distinctive pedagogical practices.

The cell division model works by first creating a number of settings in which exemplary practitioners are concentrated and allowed to develop new approaches to teaching practice. Then, on a more or less predictable schedule, a number of these practitioners are asked to form another school, using the "genetic material" of their own knowledge and understanding to recruit a new cadre of teachers whom they educate to a new set of expectations about practice. Over time, several such schools would surface with strong communities of teachers invested in particular approaches to teaching.[4]

The reproduction model elicits more systematic thinking about what constitutes evidence of the "spread" of good teaching practice. Given the slipperiness of attempts to "replicate" successful programs or practices from one setting to another, the idea of getting to scale should not be equated with the exact replication of practices that work in one setting to others. For example, when we reproduce as human beings, children are not identical replicates of parents; rather, each child is a new human being with a distinctive personality that may bear a family resemblance to the mother and father. Children from the same family differ quite dramatically from each other, even though they may share certain common traits. The reproduction model broadens notions of evidence by allowing for the dissemination of good teaching practices with "family resemblances" in different settings. It causes us to look at the fundamental process by which practices are chosen for reproduction, while others are bypassed or significantly modified. It also prompts us to reproduce "family resemblances" in such a way as to have a meaningful impact on practice rather than merely promoting assimilation of symbols that do not go to the core.

These alternative models of growth each embody an explicit practical theory of how to propagate or reproduce practice. They also have a transparent logic that can be understood and adapted by others for use in other settings. More such theories, and more documented examples of how they work in use, should help in understanding how to get to scale with good educational practice.

[4]This is, in fact, the model used by the Central Park East Elementary School in New York City to create two other elementary schools to serve parents and children who could not be accommodated in the original school.

4. Create Structures That Promote Learning of New Practices and Incentive Systems That Support Them.

Reformers typically make very heroic and unrealistic assumptions about what ordinary human beings can do, and they generalize these assumptions to a wide population of teachers. Cremin (1961) made the following observation about progressive education:

> From the beginning progressivism cast the teacher in an almost impossible role: [she] was to be an artist of consummate skill, properly knowledgeable in [her] field, meticulously trained in the science of pedagogy, and thoroughly imbued with a burning zeal for social improvement. It need hardly be said that here as elsewhere ...the gap between the real and the ideal was appalling. (p. 168)

Likewise, the curriculum reformers appeared to assume that teachers, given the existence of clearly superior content, would simply use the new curricula and learn what was needed in order to teach differently. Missing from this view is an explicit model of how teachers engage in intentional learning about new ways to teach. According to Fullan and Miles (1992), "change involves learning and ... all change involves coming to understand and to be good at something new" (p. 749). While knowledge is not deep on this subject, the following seem plausible: teachers are more likely to learn from direct observation of practice and trial and error in their own classrooms than they are from abstract descriptions of new teaching; changing teaching practice even for committed teachers, takes a long time, and several cycles of trial and error; teachers have to feel that there is some compelling reason for them to practice differently, with the best direct evidence being that students learn better; and teachers need feedback from sources they trust about whether students are actually learning what they are taught.

These conditions accompany the learning of any new, complicated practice. Yet, reform efforts seldom, if ever, incorporate these conditions. Teachers are often tossed headlong into discussion groups to work out the classroom logistics of implementing a new curriculum. They are encouraged to develop model, lessons as a group activity and then sent back to their classrooms to implement them as solo practitioners. Teachers are seldom asked to judge if this new curriculum translates well into concrete actions in the classroom, nor are they often asked to participate as codesigners of the ideas in the first place. The feedback teachers receive on the effects of their practice usually comes in the form of generalized test scores that have no relationship to the specific objectives of the new practice. In other words, the conditions under which teachers are asked to engage in new practices bear no relationship whatsoever to the conditions required for learning how to implement complex and new practices with success. Why would anyone want to change their practice under such conditions?

A basic prerequisite for tackling the problem of scale, then, is to insist that reforms that purport to change practice embody an explicit theory about how human beings learn to do things differently. Presently, there are few, if any, well-developed theories that meet this requirement, although I have sketched out a few above. Furthermore, these theories have to make sense at the individ-

ual and at the organizational level. That is, if you ask teachers to change the way they deal with students and to relate to their colleagues differently, the incentives that operate at the organizational level have to reinforce and promote those behaviors. Encouragement and support, access to special knowledge, time to focus on the requirements of the new task, time to observe others doing it — all suggest ways in which the environment of incentives in the organization comes to reflect the requirements of learning.

These four basic principles constitute departures from previous strategies of broad-scale reform, and they address fundamental problems of previous strategies. It is unlikely that teachers or schools will respond to the emergence of new practices any differently than they have in the past if those practices are not legitimated by norms that are external to the environment in which they work every day. It is unlikely that teachers who are not intrinsically motivated to engage in hard, uncertain work will learn to do so in large, anonymous organizations that do not intensify personal commitments and responsibilities. It is unlikely that successful practices will spontaneously reproduce thernselves just because they are successful, in the absence of structures and processes based on explicit theories about how reproduction occurs. And it is unlikely that teachers will be successful at learning new practices if the organizations in which they work do not embody some explicit learning theory in the way they design work and reward people.

Each of these principles presents a formidable agenda for research and practice. The magnitude of the task suggests that we should not expect to see immediate large-scale adoption of promising new practices. It also suggests that progress will come from an explicit acknowledgment that the problems of scale are deeply rooted in the incentives and cultural norms of the institutions, and cannot be fixed with simple policy shifts or exhortations from people with money. The issue of getting to scale with good educational practice requires nothing less than deliberately creating and reproducing alternatives to the existing flawed institutional arrangements and incentives structures.

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