

ESSAY 1

*The Three Big Rocks
of Education Reform*

The Need for Good Teaching for America's Poorest Children: Where Social Justice and Economic Self-Interest Come Together

A

futurist of my acquaintance once started a workshop by filling a giant glass jar with rocks. The jar was about two feet high and very wide, and the rocks were between the size of golf balls and baseballs. When the level of the rocks reached the lip of the jar, the presenter asked us if we thought the jar was now full. We said, "Yes".

Then he pulled out a tray of gravel from under the table and proceeded to pour in a cupful, shake the gravel down between the cracks in the rocks, and then put in many more cupfuls. He then looked at us and asked if we thought the jar was full. We nodded a hesitant "yes".

Then he pulled out a tray of sand and proceeded to ladle in many cupfuls, pausing to shake the sand in between the cracks until the jar was...full? "Probably not," we said.

And, indeed, he then pulled out a tray of water and poured in over a quart before the water leveled off at the top.

I never forgot the point of his story. It went something like this: "If I hadn't put in the big rocks first, I never would have had room for all the other stuff. But when I started with the big rocks, there was plenty of room later for the other smaller items to sift down in between them."

Ever since that day, I have thought of this analogy of the "big rocks" when trying to sift through educational innovations. What are the "big rocks" of school improvement? What things are more important than others and will allow room for all the other good things to sift into place?

What I see now is that, while my colleagues and I have worked on many good things over the last three decades, we have not yet "filled the jar". The standards movement alone, as much as it was needed, has not budged student performance much in big city schools or nar-

rowed the achievement gap for poor children and children of color. It is time to put our efforts in perspective and focus on the missing “big rocks”.

Dramatically improving low performing schools, especially for children of poverty, is a demanding but doable task and essential to preserving our national unity, our economic vitality, and our democracy. It is the most important domestic priority of the next 20 years. This is said with mindfulness and respect of the great need for national health care and a secure retirement system³.

The promise of American democracy has always been a fair chance at a good life if you work hard and take advantage of the opportunities of a free society. This is no longer true in our country. Poor children, especially poor children in our cities, do not get their fair chance because they do not get the education that would give it to them. For working class children, the problem is just as serious but less visible. Many receive mediocre educations that leave undeveloped the vision and promise our schools could deliver.

Ten million children in urban and poor schools in this country are four grade levels or more behind in basic literacy and math skills (Haycock, 2004; Thernstrom and Thernstrom 2003). That is one fifth of all the children. But John Adams' promise for a good education was not just (or even particularly) for the poor. Working class children live in families where disposable income has declined steadily for twenty years despite the overall increase in national wealth and the shift to dual wage-earner families. (Jencks 2004; Phillips 2002). These families see the possibilities for social mobility, that were so important to their parents, disappearing for their children. They do not see clearly that their children are not pressed hard or taught well enough to achieve the levels of excellence that would enable the “better life” that American education was always supposed to offer.

I grew up in the shadow of the depression with working class grandparents who taught me from deep belief that doing well in school was my job and my ticket to an unlimited future. As first generation Irish Catholic and Dutch Jewish immigrants, they taught me more than my parents did about the land of opportunity. They went to public schools in New York City where most of them, including my

³ George Kennan was a wise, philosophical, experienced State Department hand. In the course of an interview somebody asked him what our foreign policy should be during the Clinton administration. He thought for a minute and said that the best foreign policy the United States can have is to get its own house in order. (Max DePree, *Leading Without Power*.)

mother, could not afford to finish high school. America *did* become a land of opportunity for them, and ultimately, for me. My forebears were white so it was easier for them than for people of color. But historically, the value of an education has been even stronger in the African-American community as it rose out of slavery (Perry et al. 2003); and it has continued to be so until quite recent times. Living out of this consciousness is probably more alive in Black America than anywhere in our society. Nor is this consciousness missing in Hispanic America. In San Diego, for example, legions of Mexican families cross the border weekly to work as domestics and laborers so their children can get an education in American schools.

Here is my point: the promise of making the life you can dream for yourself and for your children has its roots in good education. Our current system does not have the capacity to deliver on that promise. And it doesn't have to be that way.

This situation is not new, and dealing with it has stymied reformers for half a century, despite the United States being the wealthiest country in the world. Twenty-five years ago, Ron Edmonds (1978) said we already had the knowledge to remedy the achievement gap of our poorest children, but lacked the political will. He may have been right about the political will; I am not sure that he was right then about the knowledge. But we *do* have the knowledge now. Some have believed the problem to be intractable because of the magnitude of social problems bred by poverty (Traub 2000.) We also know now that this is not true. Against the worst odds and in the most devastated neighborhoods, we can find schools where poor children's learning is accelerated past their initial disadvantages (Charles A. Dana Center 1999; NASSP 2004; Minkoff 2003; Jerald 2001). The children in these schools equal or outperform their more affluent suburban peers. These schools, however, are like bright burning candles: they get great results and usually flame out within 10 years or less. Their examples are never brought to scale in their cities or districts.

Our urban and our poor schools "underperform" not just because the children come from deprived backgrounds, but because we fail to provide their teachers with enough teaching expertise to do what needs to be done. This is not meant to diminish the daunting obstacles to academic achievement that face children in severely disadvantaged neighborhoods. I acknowledge the need, so well articulated by Richard Rothstein (2004), for national policies that address the social, economic, health and nutrition issues of poor children. School improvement alone is not enough to solve the problems of poverty in America.

12% of our school age population, now, is Hispanic. In 2025, it will be 25%. In that same year, 53% of our total school age population will be children of color. Does anyone really think that white males – by then 20% of the workforce – will be able to carry this nation economically? Do we really think we can afford not to have an educated workforce across the board? We could get by without it as recently as the 70s, but no more.

The global marketplace and our own new demographics have changed everything. Thanks to technology, we can now move the work to where the workers are – not just information and service work either. Only 30% of India's population gets a good education, but that's 300 million people – more than the entire population of the United States!

To remain competitive, we have to graduate H.S. seniors who are prepared for the modern workplace. So how are our schools doing? Not so well.

Right now we have an achievement gap of four grade levels between affluent communities and poor communities, between white suburbs and communities with children of color.

But school improvement could easily become a doorway out of poverty for a generation of children who deserve a chance and aren't getting it. We should at least get this part of our national agenda right and do it now. We have the knowledge, we have the talent, and we have the resources.

Large numbers of poor children throughout our urban and rural systems are far behind academically, but they are not condemned to stay there. That is the message of the high performing urban schools cited previously, schools that have proven that children's learning can be accelerated to make up the deficits with which their environments have saddled them. To act otherwise is to deny the data and to create a dead-end, which Walter Lippmann described long ago in the pages of the *New Republic* (1928), in which he warned we could create "generations of students and educators who don't believe that those who begin weak can ever become strong." We are in danger of fulfilling this prophecy.

It is false to say our schools are failing across the board. We rank second in the world for 4th grade literacy, fourth for 8th grade achievement, and in the middle for high school results (Sherman, et al. 2003) when compared to the most advanced industrial democracies in the world. Our suburban schools are doing all right, at least in literacy. But our city schools *are* failing the children, and it is not their fault! As a society, we have not honored the commitment of our forebears to equal opportunity. Thus, we have not mustered the political will and economic resources to build the personnel systems that could make all our schools work.

Let me put this in perspective. We have made certain choices in our history about what role our government should play in guaranteeing rights to all its citizens. For example, workers have a right to a base-line retirement income through social security. Yet our children do not have a right to a minimum standard of living; they do not have a right to guaranteed health care; they don't even have a right to clean water! But they *do* have a right to a good education. That was the promise of John Adams and a commitment represented today in the rhetoric of "No Child Left Behind". We have the knowledge and the resources to deliver on this promise; but we do not. We must change that if we are to remain a strong country and a real democracy. This is both a moral and an economic imperative. What is our government *for* if not to assure equality of opportunity in this rich nation of resources and prom-

ise? That is the American dream—true equal opportunity if you work hard to make something of yourself.

“The leading object of government is to lift artificial weights from all shoulders...to afford all an unfettered start and a fair chance in the race of life.”

– Abraham Lincoln ⁴

How we treat our poorest and most oppressed people is the measure of our society and its moral fibre. This was the message of the prophet Amos, of Jesus, of Martin Luther King, Jr., of Abraham Lincoln, and of modern writers like Robert Bellah.

The economic argument lines up in parallel, not opposition, to the moral one. We see the needs of the workplace behind the drive and large commitment that American industry has made to improving our education system. Corporate giants like Boeing, Motorola, IBM and dozens of others make significant contributions annually to improving public education. Business leaders know that in the information economy of the 21st century they can no longer hire the workers that they need when the majority of our high school graduates are below proficiency in literacy (Daggett 2002). They spend \$80 billion annually providing these skills to entry-level employees. It did not matter as much in an industrial economy where factory workers did not need high literacy skills, but it does now (Daggett 2002; Murnane and Levy 1995; Hershberg 1997).

Put simply, in addition to the moral and civic obligation to make good on the promise of our democracy, it is in the direct economic interest of the affluent suburban electorate and of corporate America that poor city kids get a good education. Instead, city children now get the least prepared teachers who teach in poor working conditions with fewer resources than their colleagues in more affluent districts. (Darling-Hammond 1996)

To succeed in improving schools for poor children, we need to get our priorities right. There are so many dimensions to the problem that it is easy to get distracted by important but not central

⁴ Special session message, July 4, 1861.

The gap is widening, not narrowing. 17 year old Hispanic and African-Americans’ scores are comparable to white 13 year olds’ on NAEP math, the most reliable nation-wide measure we have of student achievement over time. And these students represent the majority of the workforce that is going to pay all our social security.

These statistics don’t just spotlight public schools. 47% of this years college freshmen will take 1 or more remedial courses. Only 55% of kids who enter 2-year colleges will be back for the second year. That’s a 45% drop out rate. How about AYP (adequate yearly progress scores) for higher education?

26% of kids who enter 4-year colleges drop out after the first year; and 60% overall drop out before graduation.

And of those who *do* graduate:

43% of science degrees are awarded to non-U.S. citizens.

42% of mathematics degrees are awarded to non-U.S. citizens.

46% of computer science degrees are awarded to non-U.S. citizens.

36% of physics degrees are awarded to non-U.S. citizens.

56% of engineering degrees are awarded to non-U.S. citizens.

And remember the 40+% college graduation rate we *do* have includes all those non-US citizens!

—Willard Daggett.

Presented at the 2004 Model Schools Conference, © International Center for Leadership in Education.

“Human capital, as Lester Thurow, Robert Reich, and many others have argued, will be the source of comparative advantage in the 21st century global economy. Although the overall U.S. economy has done well over the past 25 years, not all Americans shared equally in its rewards. The top fifth of American families were the overwhelming beneficiaries—the bottom three-fifths lost ground and the second fifth were largely stagnant—and the resulting income inequality threatens the long-term viability of our economy and the stability of our democracy.

Economists are generally agreed that although the sources of this inequality are many—an eroding minimum wage, the declining power of unions to win large settlements at the bargaining table, and growing global competition—fully half the explanation can be attributed to “new technologies that favor the better educated.”

Our schools always did one thing well: They educated the top fifth of their students. The performance of the remaining 80 percent didn't matter because, upon leaving school, they entered a robust manufacturing economy that provided abundant jobs for those with limited skills. Although the work was hard, the pay was good—good enough after World War II and into the 1960s for the wife of a typical blue-collar worker to stay at home and raise the kids and still have enough left over for the family to buy a boat or recreational vehicle.

But those days are gone, and they are not coming back. According to the 1990 book *America's Choice: High Skills or Low Wages*, if companies around the globe can now buy foolproof machinery to compensate for deficient worker skills, and if people in other countries using this machinery will work for \$5 a day, let alone the \$10 or \$15 an hour that American workers want, we cannot compete on the basis of wage. We can only compete on the basis of skill.

The end of the manufacturing era, with its well-paying jobs for people with limited skills, means that our schools must now educate *all* our children to a level never required before. For over a century, our schools taught millions upon millions of immigrants and farmers to respect authority, to show up on time, to work hard, and to repeat monotonous tasks. In short, schools were the vehicle through which an entire labor force was socialized to accept the discipline of the industrial era.

But these are not the skills needed in a postindustrial, global economy. The battleground of the future will be economic, not military. Nations are fighting for domination of the high-value-added industries—computers and software, robotics, civilian aviation, synthetic materials, microelectronics, biotechnology, and telecommunications—that pay high wages and offer their employees living standards American workers have grown to expect.

While we still desire a strong work ethic, we must appreciate the implications for education of an economy that changes with striking and unprecedented rapidity. This rapidly changing economy requires workers who are flexible, adaptable, quick learners, critical thinkers and above all else, problem-solvers. *And these are precisely the skills our schools are not teaching.*

Most suburban residents compare their schools with those of the big cities they surround. Because on average they have lower dropout rates, better achievement scores and higher college-enrollment rates, suburbanites conclude their schools are fine and the problems reside in the cities. Unfortunately, there is no comfort in this suburban-to-urban comparison. Worse, this comparison functions as a sedative, a soporific that has put Americans to sleep. It has left us complacent, thinking that the education problem lies elsewhere, in our cities with their large, poor, disproportionately nonwhite populations.

Ample evidence from the National Academy of Sciences' Third International Mathematics and Science Study and the results from the internationally benchmarked reference exams developed by the national New Standards project make clear that nowhere in America—even in our best school districts—are the majority of students performing at world-class levels.

The floor on which Americans have been standing for the past two decades has been tilting, and people without real skills have been sliding to reduced-wage levels. The angle of the tilt in this floor will grow sharper with each passing year as global trade and technology advance. If we want to anchor our children to firm economic ground, we'll have to provide them with lifelines fashioned of genuine skill and high-quality education."

– Theodore Hershberg, *Education Week*, December 10, 1997. Reprinted with permission.

issues. We have not, I believe, focused on the central issues up to this point. That is the reason for this monograph.

To get the achievement results we want for children in urban and poor communities, the overriding goal and one guiding principle that we need to keep in view as we work on any question, consider any program, change any structure is that: *everything hinges on improving the teaching expertise of the individual teachers who work with the children.* We must recognize that teaching expertise is far more complicated and sophisticated than we have acknowledged.

Teaching is intellectually complicated, difficult and demanding work with as many elements in successful practice as one finds in engineering, law, architecture, or any knowledge-based profession. Later in this monograph, I will attempt, with some trepidation, to describe the scope of this knowledge base in six pages (See Appendix A)⁵. The range of variables for which teachers need well-developed skills is far wider than our voting public understands when it debates school budgets.

To make an analogy, imagine an automobile where we want to improve poor or mediocre gas mileage (replace with student achievement). What factors bear on mileage? The following do, simultaneously and interactively: proper spark plug gap; dirty or clean carburetor jets; correct octane of fuel; wear on manifold gasket; correctness of tire pressure; driving habits (jerky or smooth); cylinder pressure (are the cylinder rings still tight?); leaks in gas lines; cleanliness of fuel filter; ignition timing; (I could go on...). Every one of these is PROVEN CLINICALLY to improve gas mileage if optimized (same for each of the tasks of teaching described in the sections to follow). But peak gas mileage is only attained if ALL of them are in good shape. And if gas mileage is very poor, improving a few of them will make a dent but perhaps only a small dent in the problem. And some factors are probably more important than others (e.g., fixing the gas leak.) Fixing any constellation of these variables, if one hits enough of them, will improve performance. Exactly the same can be said for the fifty-plus tasks of teaching and all the knowledge and skills in generic and content-specific pedagogy that will be presented in this monograph.

Making teaching expertise the focus of national and state policy will

⁵ Elsewhere (Saphier and Gower 1997) I have struggled to do so in 600 pages.

reframe and potentiate all the other important things we are doing around standards, leadership, resources, and teacher quality.

The task is complicated and multi-faceted enough so that we must focus on the “big rocks”, the most essential levers on improvement. So what are they? Small schools? Lesson study? Block scheduling? Reading across the curriculum? School choice? Site-based decision-making? Parent-involvement programs? These and dozens of other programs are all important, all good, all worthwhile. But they are not the “big rocks”. They are significant stones, good vehicles for school improvement if the “big rocks” are in place. None of them alone will make much difference. And each and every one of them will be multiplied in potency if the “big rocks” are in the jar.

I have selected three “big rocks” for highlighting because I believe focusing on them is the only way that we will create the space in the jar for all the other good programs ... and the only way our public schools can fulfill their promise, namely, a fair chance at a good life for all our children through equal educational opportunity. The three “big rocks” are: (1) teaching expertise based on professional knowledge, (2) leadership skills for strong organizational culture, and (3) higher salaries and differentiated career paths for teachers.

“Big Rock” #1: Expertise Based on Professional Knowledge

An accessible common core of professional knowledge exists for the development of expertise in teaching. Expertise in teaching—what individual teachers know, believe and can do—matters more than any variable in student achievement. It is not the only one, but it is the defining one. The data on teacher effects is clear and consistent (Gross 1999; Mendro 2000; Muijis and Reynolds 2000; Sanders and Rivers 1996). Too few of our teachers have enough expertise, and our poorest children have the largest share of low-expertise teachers. (Darling-Hammond 1996).

Sanders' research and follow-up studies by others at other sites showed startling findings: regardless of their starting academic level, students who have three high-gain teachers in a row wind up performing fifty percentile points higher than matched students who have three low-gain teachers in succession. This same “value-added” research, however, did not reveal what successful teachers do. The Sanders studies only identified that some teachers reliably outperform others in producing student learning, not *what* successful teachers do to get these results!

Designing observational studies to find the commonalities of what these people do, however, would probably only reproduce the tepid findings of the 1960s and 1970s when such research on teaching had its heyday (Dunkin and Biddle 1974). Because of the erroneous approach we took to determine “effective” teaching in the late 20th century, we missed the fact that we were building a powerful knowledge base for practice despite failing to profile the “effective” teacher. I will expand on this point shortly.

My main point is that *there is already a common core of professional knowledge about teaching and learning that comprises “expertise in teaching.”* It is different in character from simple lists of “effective behavior,” and it is far more complex and sophisticated than we have allowed. There is not enough teaching expertise from this common core resident in enough teachers to educate all our children. It is not even readily accessible to most of them in poor and rural areas. This expertise gap is the root cause of the inequality that public education delivers to chil-

dren across America; and let there be no doubt: it is, indeed, unequal (Carroll, et al. 2004). In making this case, I will not ignore the powerful forces of poverty that blight large parts of our nation. But I will make the case, already supported by data, that it does not make as much difference as some people want it to make; and that with appropriate focus of our resources, American public schools can be an opportunity machine far beyond what they are now.

So “big rock” #1 is to recognize this common core of professional knowledge, claim it, and organize everything we do around the improvement of teachers’ expertise at acquiring it, using it and enlarging it. This common core can be built into teacher education, teacher licensure, and into district systems for new teacher induction, teacher evaluation, on-going professional development and career advancement. But it presently is not.

Demand to unify the common core of knowledge about medicine occurred as a result of the Flexner Report in 1910. The report caused a sea-change that revolutionized medical education and, consequently, the standards for admission into the profession (Starr 1982). Medical education became a knowledge-based system built on extensive clinical practice, close continual supervision, and gradual assumption of responsibility for client welfare. This was not a radical concept then, nor is it today. On the contrary, using professional knowledge to create standards of practice is quite a conventional idea. The result of agreeing on knowledge-based standards in medicine was a profession that today earns public trust and whose performance is the envy of the world. It is time to do the same for education.

Let me begin by outlining the scope of this common core of professional knowledge on teaching and learning before describing each domain in detail. The knowledge base for successful teaching is far bigger than any undergraduate program (or any 5th year program for that matter) could contain. We cannot expect teacher education to be completed by the undergraduate and graduate study that goes into the initial licensing process. We do not expect that for other professions where our society acknowledges the complexity of good practice. The same will become true for the path into teaching when we acknowledge the extensive nature of the professional knowledge that it takes to do the job well. Just as highly skilled practitioners do not emerge up and running from medical school, we cannot expect beginning teachers to graduate as high functioning professionals.

Many readers who have succeeded in life believe themselves to be well educated and may not think that their teachers did anything complex or extraordinary. "They had high expectations and just gave us the material clearly." This attitude leads to the prevailing idea that any decent, literate person can step into a classroom and learn the "tricks of the teaching trade" in a year or two. But tricks of the trade will not do for most students, at least not if we are serious about the standards movement and educating all our children to proficiency levels in major subject areas. Motivated children from literate homes may do all right with teachers who bring common sense but no professional expertise to the job. This is not so, however, for the majority of our children and especially for those students who are poor. Yet we entrust many beginning teachers, unprepared as they are, with the reading and writing instruction of children who will suffer devastating limits on their future lives if they do not acquire proficient literacy skills. We need to expect, and even demand, that their teacher preparation be based on a common core of essential professional knowledge. Only then can we effectively structure the entrance of novices into the profession along with their continuing growth and gradual assumption of responsibilities.

Now let me offer a definition of teaching: *Teaching expertise is anything a teacher does that influences the probability of intended student learning.*

This definition allows us to acknowledge the extraordinary array of skills successful teachers bring to their work, an array far beyond being a content expert who presents material and gives tests. It allows us to include a spectrum all the way from the skills for building a humane and caring environment to those of cognitive science that scaffold concepts and maximize student construction of meaning . . . from the skills of data analysis about student work to the skills for teaching students to believe in themselves and study effectively.

Expertise in a complex profession *does not* consist of executing "effective" behaviors. *Expertise consists in making choices and making decisions based on expert knowledge.* These choices are drawn from an extensive repertoire of approaches and practices: a repertoire that beginners do not have no matter how talented or dedicated they may be. They are choices that are a good match for the students, the curriculum, and/or the context. So teaching expertise is about making decisions and choices. Expert teachers are always seeking to broaden their repertoires for making these choices. They are also constantly finding new questions and new professional frontiers to explore. One

area mastered then reveals the next one to learn and to integrate (Bereiter and Scardamalia 1993.)

Potent evidence of the importance of teacher expertise at making these choices comes from research on successful teachers of beginning reading (Pressley et al. 1998). The most effective reading teachers draw on methods from the different mainstream approaches to reading: phonemic awareness and phonics, linguistics, explicit comprehension skills instruction, whole language, and meaning emphasis. “These teachers were often quite explicit when developing word-level skills and strategies, but they also contextualized this explicit instruction in real reading and writing activities and tailored instruction to children’s specific needs. Such instruction cannot be packaged in ‘teacher-proof’ curriculum materials.” (Pressley 1998). The point is that teacher expertise makes the difference.

Six Areas of Teaching Expertise

Teaching expertise means having a repertoire of ways at one’s disposal for handling the tasks of teaching, and then knowing how to choose and apply what is appropriate from one’s repertoire. I have grouped the tasks into six categories: (1) Management, (2) Motivation, (3) Instruction, (4) Planning, (5) Applying Craft Knowledge for Teaching Specific Concepts and Skills, and (6) Understanding the Connections between Concepts in the Content and How Students Learn Them.

What follows is a description of each of the six global areas of teaching expertise. The elaborated list of tasks will come later, some 50 plus of them, for which we have convincing data. (See Appendix A for these tasks of teaching.) Each task separately is research validated, field tested, and known to impact student learning. Together they form the basis of our common core of professional knowledge. **N.B.: teaching skill does not mean executing specific behaviors; it means accomplishing 50+ tasks any way your repertoire equips you to do so.**

Management expertise means arranging the environment to maximize attention and engagement with the learning experiences. This is teacher as environmental engineer. Teachers need to know how to get students’ attention and hold it, supported by planfully engineered rules, routines, procedures, and arrangements of time and space. If the classroom is not well managed, no one pays attention to the instruction no matter how good it is. There is no one right way to get students’ attention and get rules and procedures in place, but there is



an extensive repertoire of strategies. Research confirms our common sense that, the more teachers explicitly handle these situations, the better is the student learning. But if management of classroom procedures is not practiced to some degree, learning does not take place at all.

Motivational expertise pertains to teachers' ability to mobilize students' desire to learn, build their confidence and belief in themselves, and teach them how to exert effective effort. This is teacher as spiritual leader and psychologist. When students feel psychologically safe, able, and motivated to do well, they will do better work. The more teachers explicitly build these conditions into students' classroom lives, the more they learn. With firm management and wonderful instruction, learning still may not take place if the students do not want to learn, believe it is not worth their while, or spend all their energy consumed with feeling hostile, stupid or fearful of their peers.

Spiritual Leader
& Psychologist

Instructional expertise includes all the teacher dispositions and skills associated with getting inside the learners' heads; finding out what they know and do not know; surfacing their thinking; assessing and redesigning instruction based on how well the learners are learning. This is teacher as applied cognitive scientist and diagnostician. It includes skillful application of the hundreds of strategies derived from cognitive research such as modeling thinking aloud, periodic summarizing, application of classical learning principles, and frequent detailed feedback that students can use for improvement. It also includes a repertoire of powerful framing strategies to make new learning take and stick. Some are highly technical in nature and take extended practice and theoretical understanding to use well.

Cognitive
Scientist &
Diagnostician

Planning expertise means applying highly developed skills of logic and design to daily lessons. This is teacher as architect of students' intellectual experience. Successful teachers plan backwards from the outcomes they want; thus, they create daily lessons that are tight designs of learning experiences precisely aligned with worthwhile, high-leverage objectives like knowing how to make and read a graph.⁶ (Reeves 2002) and that are assessed frequently. The learning experiences are both engaging and effectively crafted vehicles of learning because they make the content accessible to the learners. Skillful planning originates in knowledge of one's curriculum and in one's knowledge of how to analyze class data on how the students as a group are doing, plus detailed knowledge of where one's students are as individuals in relation to intended learnings.

Architect of
Intellectual
Experience

⁶ A "high leverage objective" is one that has high use in life and transfer across disciplines. For example, one uses the ability to make and read graphs in the social sciences, in mathematics, and in all the physical sciences.

Craft knowledge for teaching specific concepts and skills was described two decades ago by Lee Shulman (1984) as Pedagogical Content Knowledge. This term described the knowledge that allows teachers to teach their particular content. This meant content-specific repertoires of activities, examples, stories, equipment, readings, analogies that make the concepts and skills accessible to students. Such knowledge is craft knowledge. It is accumulated slowly over years of experience, of experimentation, of trading ideas with colleagues, and from good professional development. Like the other domains of professional knowledge we have profiled above, pedagogical content knowledge consists of repertoires, not right or best ways.



Understanding the connections between the concepts and the content is another kind of knowledge related to the teaching of content that is different from the accumulated treasury of examples and instructional approaches we call pedagogical content knowledge. It is knowledge of how the concepts and skills one is teaching are connected to one another and how to bring these relationships to the attention of one's students. This includes an understanding of the network of concepts "that relate to the specific concept to be taught and of how that network is connected to the [content] in the yearlong curriculum as well as to the curricula of the previous and following years." (West and Staub 2003).



These six categories of teaching expertise that include the 50+ research validated tasks of teaching delineated in Appendix A can be said to form the Common Core of Professional Knowledge. As different as they are from one another, all six types are necessary. If any one of them is absent, learning will not take place for many students.

In addition to these six areas of teaching skill, there are other important knowledge bases that bear on teacher's success. Like the six areas above, these three are seldom found in teacher preparation programs or other systems that influence teacher capacity.

- Knowledge of individual differences in learners and how to include those differences in instructional decisions. These include cultural differences, developmental differences, and learning style differences.
- Knowledge of how to be a good colleague and team member.
- Knowledge of how to communicate effectively with parents and community.

Why Is This Core of Common Knowledge Not Acknowledged?

Great chunks of the common core of professional knowledge are missing in action from most teacher education, induction, and evaluation programs. How could this be so in an era of educational reform and supposedly strong commitment to improve American public education?

If you ask the wrong questions, you get the wrong answers. For the entire 20th century, we asked the wrong question, namely, what behaviors and practices make “effective” teaching? Commentators said again and again: There is no convincing or consistent research to back up any particular practices. We had no agreement among experts about what a common core of professional knowledge might be.

Have you noticed that no one asks: “What are the effective practices that make a good lawyer?” There is no demand to cite a research-backed list of “effective” practices and behaviors. There are no “effective practice” list for architects or engineers either. Why is that?

For one thing, we know practitioners in those fields have passed a rigorous examination administered by standards boards that are controlled by the profession itself. The profession acts as gate-keeper against shoddy practice. We trust these professions to certify people and protect the public against personnel who could damage clients. But we do not feel the need to have a “profession” of teaching because we do not believe it takes “professional knowledge” to do the job well; nor do we believe that well-meaning but unexpert practitioners could damage children. How wrong that is! At our children’s peril we continue to believe that teaching is a low-level craft, easily learned and practiced well by smart college graduates who were highly successful students themselves. That is the problem because that belief is false, as so much evidence shows (Laczko-Kerr 2003).

The Nature of Professional Knowledge

Successful teaching and learning co-varies with the six areas of teaching expertise. What the research on teaching gives us is the inventory of tasks inside these areas that *do* make a difference in student learning. Each has a separate effect, and cumulatively and interactively, they account for how the learning is going. There exists a *repertoire* of moves or strategies from which individuals may draw to fulfill these tasks. The knowledge base on teaching and learning does not show,

nor could it, that any *particular* strategy (say, using slates to check for understanding or teaching phonics to beginning readers) is inherently better (i.e., effective). But research tells us that applying *some* well-chosen strategies to handle the job (e.g., checking for understanding; developing letter sound correspondence) is essential.

Skillfulness in teaching derives from having large enough repertoires so that you are equipped to make choices in the major areas of performance that affect student learning. Once you have the repertoires, skillfulness means making choices thoughtfully based on reason, experience, and knowledge—making choices that are appropriate for a given student, situation, or curriculum. This is the nature of professional knowledge and its use in any profession. In a profession, you have to have knowledge of your clients, of your content, and of the array of tools particular to your craft in order to act with expertise and get good results for your clients. So it is with teaching.

Every one of the tasks of teaching identified in Appendix A bears positively and significantly on the achievement of the students in a classroom. They operate cumulatively and interactively. And there are a great many of them. Given the complexity of professional knowledge and what is expected from teachers in different contexts, it would be naïve to expect a study of successful teachers to come up with a simple or even a uniform profile of good teaching.

I believe that there are some teachers who are so good at motivating their students that they do startlingly well. Some teachers may have mediocre planning skills, may be undistinguished but adequate in instructional skills, but superb at inspiring confidence in their students. Still other teachers may be very highly developed at planning and instructional skills, so much so that most of their students do very well even though the teacher does not have a brilliant repertoire for the motivational tasks. Unfortunately, unnoticed by these teachers may be the discouraged or quietly unmotivated kids who slip through the cracks.

Since ALL the tasks of teaching bear on academic success of the students, many profiles of teachers with differential strengths in their expertise can combine to produce impressive student gains.

I previously cited the value-added methodology pioneered by William Sanders and colleagues that showed the most significant variable in student achievement was the classroom teacher. Students of equal-entering performance placed in the classes of high-performing

teachers for three successive years score 50 percentile points above matched students placed in the classes of low-performing teachers. This is a huge difference that is enough to impact, significantly and permanently, the lives and future success of these children. These results have justifiably provoked renewed interest in teacher quality. If this interest spawns a new surge of observational research on teaching as was so active in the 1960s and 1970s, it will be important in the design of this research to recognize the complexity and multiplicity of the teaching variables operating on students.

Implications for Teacher Preparation and Professional Development

How does a person learn these six skill areas? Our pre-service teachers ought to be learning how to carry out some of these tasks in their undergraduate and graduate programs, but they must realistically continue their professional learning from colleagues and post-graduate professional development programs.

The first four domains of professional knowledge (Management, Motivation, Instruction, and Planning Expertise) described here are generic, (i.e., they are appropriate and applicable for all grade levels and in any subject). For these four domains we say that policy makers and teacher educators need: (1) to decide which parts of these four areas of the common core are best learned in pre-service teacher preparation, which during internship, and which in later career⁷; (2) to create institutes, academies, regional centers, on-line data bases so that access to this common core is available to all teachers all the time; and 3) to build connections of practitioners to one another through electronic libraries (Hiebert, Gallimore and Stigler⁸) so that

⁷ It is my personal view that Planning Expertise is one area that could and should be mastered in the academic phase of preparation programs. My 30 years of classroom work on the ground with teachers, however, have shown it to be glaringly absent in huge numbers of beginning and veteran practitioners alike.

⁸ "Collaboration, then, becomes essential for the development of professional knowledge, not because collaborations provide teachers with social support groups but because collaborations force their participants to make their knowledge public and understood by colleagues."

"To be successful...the research and development system (about teaching) needs to incorporate the expertise and unique skills of both teachers and researchers. Both communities would need to reorient their professional goals and values. Teachers would need to change their view that teaching is a personal and private activity and adopt the more risky but rewarding view that teaching is a professional activity that can be continuously improved if it is made public and examined openly.

James, Heibert, Ronald Gallimore, and James Stigler. *Educational Researcher*. A Knowledge Base for the Teaching Profession: What Would It Look Like and How Can We Get One? Vol. 31, Number 5, June/July 2002.

teachers in the field can continue to be constant contributors and refiners of the professional knowledge base.

For each academic subject at each level—early elementary, middle elementary, middle school, and high school—ask experts of pedagogical content knowledge to agree on what beginning teachers should know and be able to do, especially for literacy and mathematics instruction. This, of course, is no mean feat. It calls for unprecedented dialog, cooperation and consensus building between expert practitioners and the faculties of teacher preparation programs. That will never happen by itself. It will have to be induced by the pressure of public opinion, as happened in medicine, and by the incentives and pressure that can be brought by policy makers, legislators, and private funders.

“In most accounts, new teachers need three or four years to achieve competency and several more to reach proficiency.” (Feiman-Nemser 2003). This means placing a major emphasis on quality induction programs in districts supported by state and federal funding, as well as careful attention to first-job placement for these beginners in teams or paired settings where they can be immersed in observing good practice and conversations with experienced practitioners.

This approach to the gradual assumption of professional responsibility may or may not carry significant cost implications, but is unavoidable if we are to improve the quality of instruction on a large scale. The Milken design for differentiated staffing (1999) shows ways to put novice teachers in schools with integrated teams led by master teachers. Even without such models, true team teaching widely adopted and married to quality long-term induction programs could make beginning teachers highly productive in their early career and eliminate the need for full solo responsibility for teaching decisions they were unprepared to make.

There is an influence on what teachers know and can do that may be more powerful than their preparation programs: that is the work environments into which they go when they take their first jobs. The next section of this monograph is about that workplace and its culture – the second “big rock”. The argument will be that the critical role in shaping the workplace environment is the one played by leaders, especially the principal. What are the elements of such a professional environment, and why does it count in the equation of growing teaching expertise?

"Overall, if we compared two average students, one in a school with low professional community, and the other in a school with high professional community, the students in the high community would score about 27% higher on the SRS measure. The difference would represent a gain of 31 percentile points."

– Newmann and Wehlage

"Strong professional communities...will typically produce frequent disagreements and disequilibria because they are continually questioning and debating issues of teachers' practice. They are involved in a critical school wide focus on teaching and learning that Little (1990) labels 'joint work.' . . . The ultimate goal is to increase teachers' interpretive power."

"We think a key leadership role in constructing a professional learning community is to make visible and expected a vision for what it means to be a good colleague."

"The type of professional learning communities that we envision are intended to integrate simultaneously a focus on teacher affiliation, teacher learning, and student achievement."

– Toole and Seashore, 2001

"Big Rock" #2: Leadership for Strong Organizational Culture

The most immediate and direct influence on teaching expertise is the workplace of the school itself.⁹ Over the last two decades, dozens of articulate writers (see bibliography on Professional Community Building) have called for collegial professional cultures in schools where teachers actively collaborate to share craft knowledge, do lesson study, observe one another, analyze student work and data together and adjust their teaching appropriately. But these cultures are as rare as hens' teeth. The reason is not that we cannot name the practices in these cultures or even show what they look like. The reason is that *we have not prepared our school-based leaders to create the human environment where these practices can thrive*. Thus, the second "big rock" is to explicitly teach leaders the skills for building the relationships and practices that make the improvement of teaching and learning the absolute center of school operations. I believe this is the essence of the concept of Professional Learning Community.

Professional Learning Communities (PLC) that produce student results have *Academic Focus* driven by *Productive Professional Relationships*. Both of these are sustained by *Shared Beliefs* about students, about learning, and about how the adults should operate with one another. The school principal is the key figure, in fact, the indispensable figure in building such an environment for the constant increase of teaching expertise, and thus student learning. It takes teacher leaders as well as a skillful principal to make this PLC grow strong, but without a committed and knowledgeable principal it will not happen at all. So developing skilled principals at building PLC becomes "big rock" two.

This chapter is about the most important ways leaders support and embed teaching expertise in the workplace of the school. The operating qualities of a school as workplace that most influence teaching expertise and its constant improvement are: **ACADEMIC FOCUS, SHARED BELIEFS, AND PRODUCTIVE PROFESSIONAL RELATIONSHIPS.**

⁹ "School culture" and "Professional Learning Community" are the two terms under which these workplace conditions have been studied (see bibliography.)

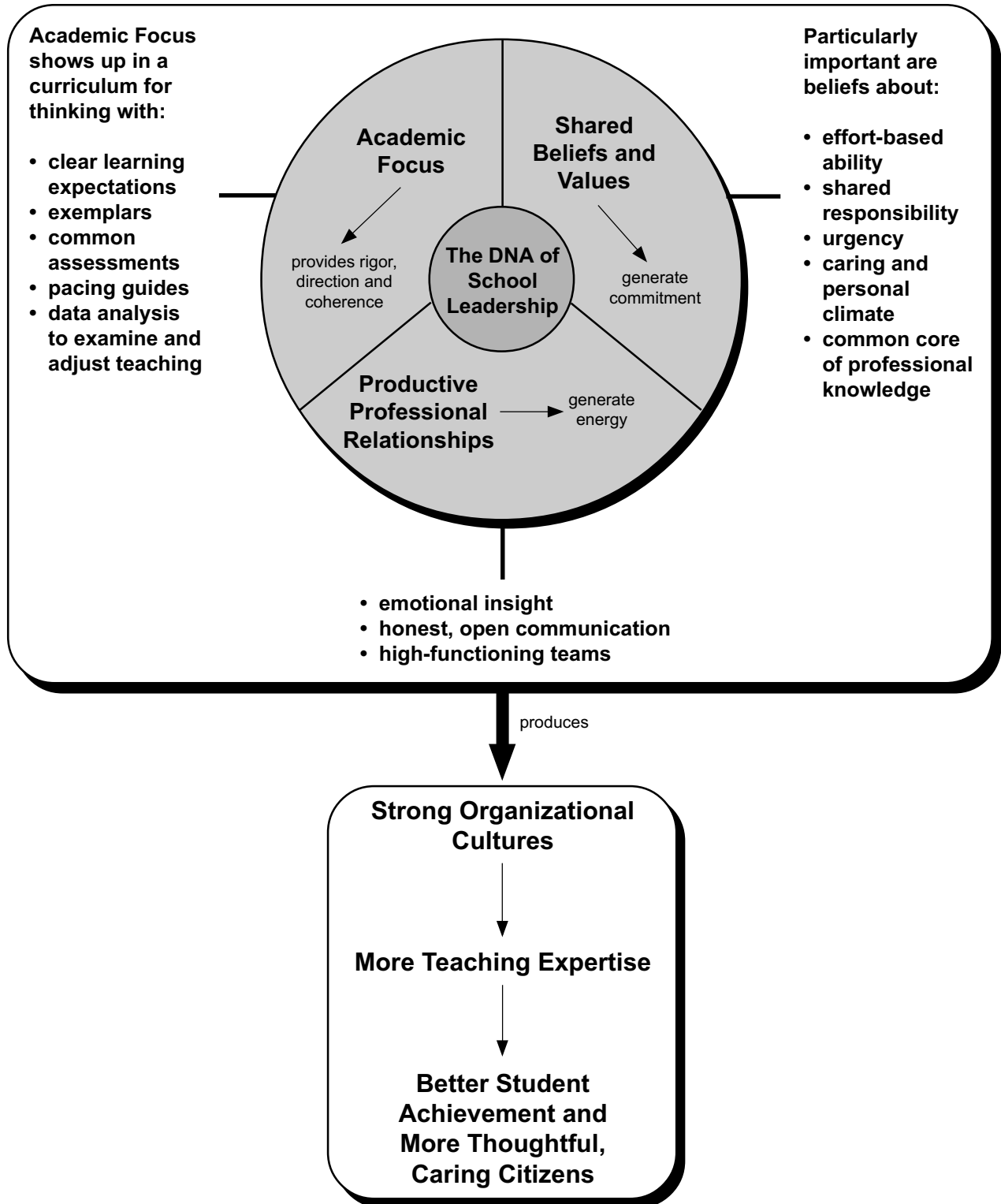
These three qualities interact constantly to grow the teaching expertise of the staff and directly produce higher student achievement (see fig. 1). It takes a particular kind of leadership to develop these qualities. Thus, the second “big rock” is the leadership that does so; and the priority becomes developing people in leadership positions who know how to grow these attributes of Academic Focus, Shared Beliefs, and Powerful, Productive Relationships.

In the 1990s, powerful research showed beyond question that schools that succeeded for children, especially poor urban children, had strong organizational cultures (see bibliography). As more and more work was done to understand these cultures, they came to be called Professional Learning Communities. Toole and Louis pointed out by using the term Professional Learning Community, “we signify our interest not only in discrete acts of teacher sharing, but also in the establishment of a school wide culture that makes collaboration expected, inclusive, genuine, ongoing, and focused on student outcomes. The term integrates three robust concepts...Professionalism [which means] client centered and knowledge based; and ‘learning’ which places a high value on teacher professional development; and one that is ‘communitarian’ [meaning it] emphasizes the personal connection [between staff members]”.

All of the nine high poverty, high performing schools in the Department of Education’s report “Hope for Urban Education” (Charles A. Dana Center 1999) put particular emphasis daily on developing teachers’ knowledge and skills. Some principals spent almost half of their time in direct contact with teachers around improving teaching and learning, and in most cases, *created positions for instructional specialists who did the same*. This is a very important capacity-building move. I highlight it in the list of highest priority action plans for improving low performing schools [p.49].

If we put this research together with the Sanders, et al. studies on the primacy of teachers in accounting for student learning, it allows one to hypothesize that *the reason Professional Learning Communities (PLC) increase student learning is that they produce more good teaching by more teachers more of the time*. Put simply, PLC improves teaching, which improves student results, especially for the least advantaged students. It is, therefore, particularly important to understand what these cultures are like and how they are created. I have worked with Matt King and John D’Auria since the mid-1980s on this question, and together we have developed the following framework.

Figure 1.
The DNA of School Leadership Has Three Elements



– Saphier, D’Auria & King

Defining the Map of Strong Professional Culture

Excellent schools have Academic Focus, Shared Beliefs, and Productive Professional Relationships. These three are not hierarchical, they are equal; they are not sequential, they are cyclical; they are not causative of one another, they are interactive. Together we think that they form a new and useful way of understanding what Professional Learning Community is and how to build it.

Academic Focus is a set of practices that bring clarity, coherence and precision to everybody's classroom work. It is a "professional" aspect of PLC because it has rigor, precision, alignment, accountability, and data at its center.

Shared Beliefs serve to give people meaning in their work, a feeling of belonging and commitment to one another, and the endurance to keep going when the going gets tough. They are the "community" part of PLC because they forge the commitments and the bonds that keep people together.

Productive Professional Relationships are defined by norms of interaction among staff that enable the honesty, curiosity, and self-examination that lead to better teaching and learning. They are the "learning" part of PLC because they enable and fuel constant teacher learning about the practice of teaching.

I. Academic Focus

The practices of Academic Focus can be grouped into three components, all related to concepts of precision, logic, and organization. And they show up in observable, tangible practices and artifacts.

1. A rigorous, thought-provoking curriculum that is crystal clear because it has the following features:
 - compact list of clear learning expectations for each grade and subject or course ready to hand a newly hired teacher
 - tangible exemplars of student proficiency for each learning expectation
 - "power standards" (Reeves 2002) (i.e., identification of most important high leverage skills)
 - common end-of-course/year assessments with common standards

- common quarterly assessments
- emphasis on non-fiction writing across the content areas
- high level thinking tasks and questions in the learning experiences for students of all academic skill levels. No dumbed down thinking even though students may have low skill levels. [see American Diploma Project]
- materials (guides, manuals, realia, tasks) that support best content specific pedagogy and high level thinking
- pacing guides

It is a fact that most schools in America do not have these practices now. Where parent and community support are strong and family expectations are high, children seem to do fairly well anyway. But a clear and rigorous curriculum with the above bullets tangibly in place is absolutely essential for children of the poor (and would benefit legions of low to mid performing middle class students too.) This is also true of the next two features of “Academic Focus.”

2. Systematic Analysis of Data and Feedback Mechanisms to Students
 - classroom systems for high frequency, detailed feedback to students that compare their work with work that meets standards and gives help on how to improve
 - quarterly teacher team meetings to analyze student data from common assessments
 - weekly team meetings to improve instruction of skills and concepts with which students are struggling
3. “Academic Press”

“Academic Press” means that the faculty and staff press the students to do well, and they do so in multiple ways. Students are consistently sent messages that they are able and that academic achievement is important for them now and in the future. Persistence and pursuit, support and push show up in the students’ experience in equal measure.

The more this commitment is present, the more it shows up in individual teacher behavior, classroom structures and practices, school policies and procedures. For a complete description of these behaviors, practices and policies. See DuFour 2004 and Saphier in DuFour 2005.

Related Terms and Notable Advocates		
	Authors	Related Terms in the Literature
“Relationships”	Michael Fullan Phil Schlechy	Collegiality, Experimentation, Honesty, Contact, Joint Work, Appreciation, Collaboration, Courage, Risk-taking, Deprivatising Practice, Non-Defensiveness, Creative Conflict, Initiative
“Academic Focus”	Mike Schmoker Rick DuFour	Data, Precision, Alignment, Assessment, Goals, Proficiency Targets, Accountability, Feedback
“Shared Beliefs”	Tom Sergiovanni Lorraine Monroe Jeff Howard	Shared Responsibility, Community, Effort-Based Ability, Real Knowledge Base, Passion, Urgency, Tenacity, Caring, Resiliency

II. Shared Beliefs

The following Shared Beliefs ripple out into individual teacher behavior, class routines, procedures and practices, and adults’ behavior with one another. They also show up in school structures, including schedules, grouping, and grading practices. They are evident in interactive teaching in very concrete and observable ways (Saphier and Gower 1997). They particularly influence the spirit, the fiber, the character and commitment of the staff in the school to be persistent when the going gets tough with discouraged students or youngsters who have fallen behind:

- Effort Based Ability (i.e., “smart is something you can get” (Jeff Howard). “Think you can; Work hard; Get smart.” [Verna Ford’s personal communication during her years with The Efficacy Institute]).

- Errors are normal and opportunities for learning and are simply feedback that enable productive goal setting.
- Care, quality and craftsmanship are what count, not speed or being first or fastest.
- Good students (and professional teachers) know how to ask for help and get critique and feedback on their work.
- Climate counts. Students need to feel known, included, and valued for who they are, and be members of a cohesive supportive community (NRCIM 2003; Poplin and Weeres 1992; Resnick et al. 1997; Sparks 2003).
- The success of our students is our joint responsibility, and when they succeed, it is to our joint credit and a cumulative accomplishment.
- Urgency... "Our school can do a lot better for most of its students than it is doing now. Each child can succeed at an important task every day." (Schlechty 2001)
- There is a real common core of professional knowledge about generic teaching and learning and about content specific pedagogy to which we must be constantly reaching out. It is huge, complex, and organized around repertoire and matching, not singularly "effective" behaviors (Saphier and Gower 1997).

I would like to lift one of these beliefs out for special consideration, "Effort Based Ability". "Malleable intelligence" is another term for this belief. It holds that innate ability is not as deterministic as effort in predicting academic success. This belief asserts that virtually all students have the capacity to achieve proficiency in literacy and numeracy, even if they feel stupid or exhibit low performance now. It is not defective intellectual capacity that sorts our students onto a bell curve. This view of intellectual ability leads directly to the inescapable conclusion that we could actually teach all the children if we had enough diversified tools, and they could be made to believe in their own capacity (and perhaps also if they believed that it would matter for them if they did.)

Put simply, "All the students¹⁰ have sufficient intellectual capacity to do rigorous academic work at high standards." They may come with widely varying levels of performance and preparation, different levels of commitment and motivation, and different rates of learning. Almost none are hampered by defective mental equipment for meeting high standards. It is primarily motivation, the belief in self, and

¹⁰ Except those who may have organic damage of some sort.

the capacity to mobilize effective effort that determines success in school (and in other walks of life, too.) Good teaching with high expectations, of course, can have a powerful impact on these student beliefs.

Educational leaders need to pay close attention to the prevailing beliefs about intelligence that permeate a school community. Understanding what factors influence children to develop a particular perspective on their intelligence has significant potential for teachers and school leaders. The work of Carol Dweck and her colleagues indicates that the particular view a child has about intelligence will influence the type of goals they establish in school; the amount of effort they expend on learning; and how they will respond to setbacks (see Dweck & Legget 1988). Given the significance of these behaviors, adults who are charged with teaching young people will want to influence children to persevere in the face of obstacles and understand the learning potential of mistakes. Helping students to develop and nurture these habits of mind will aid schools and communities to achieve what Snow and Yallow (1982) refer to as the most important aim of education: aptitude development.

A strong argument can be made that without altering the basic assumption of fixed and unalterable intelligence, all the strategies, educational interventions, initiatives, and innovations that researchers and teachers design to improve schools, particularly in our urban centers, will fail. Without addressing the futile conclusions that flow from this assumption, education can only sort talent rather than develop it (Chapman 1988). Lurking behind failed attempts to help students learn and improve their achievement is the belief that the problem ultimately lies not with the pedagogy or the curriculum or the educational framework but with the immutability of the intellectual deficit within the child, the group, the culture, the gender, the race.

– D’Auria 2001

Resnick (1995), building on the work of Jeff Howard (1990), succinctly captures this problem and points us in the direction of a solution:

Early in this century, we built an education system around the assumption that aptitude is paramount in learning and that it is largely hereditary. The system was oriented toward selection, distinguishing the naturally able from the less able and providing students with programs thought suitable to their talents. In other periods, most notably during the Great Society reforms, we worked on a compensatory principle, arguing that special effort, by an individual or an institution, could make up for low aptitude. The third possi-

bility-that effort actually creates ability, that people can become smart by working hard at the right kinds of learning tasks-has never been taken seriously in America or indeed in any European society, although it is the guiding assumption of education institutions in societies with a Confucian tradition.

– Resnick 1995, pp. 55-62

Wide faculty acceptance of this belief that one can “get smarter,” coupled with clear and demanding proficiency targets and periodic assessments, leads to what Newmann and Wehlage (1995) call “academic press” for all students, that is, the persistent push for quality

“Proficiency” is a central concept to improving student performance and offering equal opportunity to all our children. It is also a central idea of the standards movement. “Proficiency” means the standard of work which we define as a high and rigorous level of performance or mastery. It is a “3” on a 4-point scale, 4 being “accomplished” or “above standard.” Anything below this level is not OK, not finished. Anything over it is OK, is acceptable. At this level of performance we are satisfied. This standard of “proficiency” is objective, independent of students, their backgrounds or what we think is reasonable for “these kids.”

The point is that our work is not done, either as students or as teachers, until this standard is reached. The concept of “proficiency” thus embeds the commitment to get all students to this level, even if some take much longer to get there. This is a very different idea about schooling, because it is unwilling to passively allow the supposed “bell curve of ability” to become a self-fulfilling prophecy for student results.

A related concept is an “exemplar,” which is a real piece of student work that demonstrates “proficiency” (e.g. a writing sample, a word problem that has been solved, a reading passage with questions to answer and the answers written out, a completed essay that meets criteria). Not only do we and the students have the example of “proficiency” to look at, but we also have a list of the criteria that the sample embodies. In addition, we have something to guide us to be able to see how and where the criteria are met in the work sample, perhaps a rubric for discriminating levels of performance above and below “proficiency”. Other terms used for the above are “proficiency target,” “anchor paper,” and “benchmark student performance.”

Schools and teachers committed to “proficiency” usually generate common end-of-course or year assessments. This is a set of problems, questions, writing prompts, etc. that are created and given to students to elicit performances. (Sometimes in service of clarity of expectations, they are given to students at the beginning of the year or course.) The products the students produce on these common assessments are compared to the exemplars of “proficiency” described above. What each student produces is used to “grade” the student’s current level of performance in relation to “proficiency.” These assessments themselves, based on a common image of “proficiency,” become common across the whole school district when there is a commitment to elevating all students’ achievement.

work from all students and the expressed belief that all can attain it. The attitude is: We do not expect all students to learn at the same rate or meet standards at the same time, especially when they have wide differences in their prior preparation. We can take it as our responsibility to teach our kids to believe in themselves and also to teach them how to work not just harder but smarter, with appropriate strategies. This only makes sense since thorough reviews of the history of IQ (Gould 1981 and 1996) coupled with studies of the role or “hard wired ability” in academic and workplace success (Perkins 1995) have discredited IQ as fixed and deterministic of student success.

This belief also leads to a different conception of error. Mistakes are normal, to be expected. And mistakes are not proof of low intelligence but opportunities for learning. Thus, instead of avoiding mistakes or covering them up, mistakes become an accepted part of learning. This belief, it turns out, plays just as important a part in open communication between adults as it does in the learning environment of students. Belief in “developed” capacity for a school and its practitioners becomes a pillar of the Professional Learning Community itself.

Since most of us in this country were brought up to believe in the bell curve of intellectual ability, it is significant work for a leader to address this belief system with a faculty. This work involves much introspection, conversation, and modeling. But the slowness of beliefs to change does not prevent a school from instituting policies and practices at the school level that are consistent with the belief that “smart is something you can get,” and effective effort is the main determinant of success. These structures, policies, and practices are then becomes major topics of study for those working on school leadership. I have written elsewhere in detail about these policies and procedures (Saphier in DuFour 2005).

III. Productive Professional Relationships

“Relationships, relationships, relationships – it’s all about relationships.” Tony Alvarado said this in his early days of leadership in New York’s District #2. What characterizes these relationships?

In schools that grow teaching expertise, relationships between adults actively show 12 norms¹¹:

¹¹ Matt King and I identified a similar set 20 years ago (Saphier and King 1985.) Though some items have been modified to reflect current research, the overall importance of these aspects of human relationships in schools have been reaffirmed by the research of the 90s (see bibliography on PLC.)

Relationships

12 Cultural Norms of Professional Community

<p>The sine qua non . . . Requisite norms that allow all the others to develop</p> <p>1 Honest, Open Communication</p> <p>2 Involvement in Decision Making</p> <p>3 Distributed Leadership & Initiative</p>	<p>What "Collaboration" really means: norms which lead directly to improved instruction and better student achievement</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>4 Systematic Examination of Data</p> <p>5 Non-Defensive Self Examination of Teaching Practice 5 elements of collegiality</p> <p>6 Reaching Out to the Knowledge Base</p> <p>7 Experimentation, Analysis, & Self Critique in Groups sharing, listening, & encouraging</p> </div> <p>Groups of teachers who share students and/or content demonstrate these behaviors in regular meetings. They align curriculum, standards, and assessment and constantly examine student work to improve lessons and make student tasks more interesting and focused.</p>	<p>Important background norms that generate affiliation and commitment</p> <p>8 Protecting What's Important</p> <p>9 Respect & Confidence</p> <p>10 Appreciation & Recognition</p> <p>11 Celebration, Caring, Humor, Traditions, Rituals, & Ceremonies</p> <p>12 High Expectations & Accountability for Adults</p>
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Research for Better Teaching, Inc. and *TEACHERS*²¹

- honest, open communication that allows equanimity with conflict and disagreement; supports robust, healthy professional dialog and the ability to discuss the undiscussable
- legitimate decision-making and involvement
- distributed instructional leadership and initiative to do something for the good of the school or team
- habits of systematic examination of data
- non-defensive self-examination of practice
- curiosity and constant learning from the knowledge base on teaching and learning
- experimentation, analysis, and critique in groups leading to deprivatization of teaching practice
- protecting what is important
- respect and confidence
- appreciation and recognition
- celebration, caring, humor, traditions, rituals and ceremonies that bind the adults into a community
- willingness to hold each other accountable for agreed norms and student results.

The above items shape a human environment for adults (with, of course, perceivable consequences in the environment for children). It is a human environment where people feel safe yet challenged; where they feel a sense of belonging and ownership; and where people roll out of bed early in the morning and look forward to going to work. This is different from the precision and rigor that comes from the Academic Focus factors and different from the passion and drive that comes from the Shared Belief factors. These Relationship elements enable challenge and synergy between people. They are far more than “feel good” traits. They enable the courageous conversations that maximize learning and continuous improvement of teaching expertise.

IV. Student Culture of Pride, Aspiration and Respect

In successful schools for disadvantaged children, the staff pays serious and playful attention to the student culture. Expertise at building student motivation to learn shows up not only in individual teacher behavior, but also in school-wide policies and practices that shape the answers to the following questions:

EFFORT — Does the social system of the school and the student culture make it embarrassing or “uncool” for a youngster to be seen working hard on academics and doing well, or is academic effort supported and celebrated among the students?

PRIDE — Do students see their school as a place for “losers” and distance themselves from it, or do they feel a sense of belonging and exert themselves to make “their” school look good?

BETTER LIFE — Do the students see school as a place to “get through” and focus their energy on socializing with friends, or do they have a vision of a better life attainable through academic achievement?

RESPECT — Do the students feel contained and coerced by the environment, or do they feel valued and included in shaping decisions about the life of the school?

KNOWN AND CARED FOR — Do the students feel anonymous or are they known and cared for by multiple adults in the school?

I have not included the arena of “student culture” in the DNA diagram on p. 24, but for many schools, especially inner city secondary schools for children of poverty, this is a vital topic for leaders. I observed this first hand over the seven years my RBT colleagues and I participated in the Phoenix-like rise of the Jeremiah Burke HS in Dorchester, MA between 1995 and 2002. Deliberately building a student culture of pride, aspiration, and respect was crucial to the results Dr. Stephen Leonard and his staff achieved. From a gang-ruled, chaotic, and dangerous school in a decrepit building that had lost its high school accreditation (unheard of in recent MA history,) Burke went to being a school where every one of the 200+ graduating seniors was accepted to college or jr. college. That story is a textbook case for the DNA elements described here [Academic Focus, Shared Beliefs, Productive Professional Relationships.] But in addition, the Burke staff focused unceasing attention on shaping student attitudes about academic work and about school as a place worthy of student affiliation and identify.

There is much justifiable emphasis these days on the importance of students feeling known and valued by adults in their school. The focus is on each individual student feeling known. I am writing here about something different: the *student culture* and what it authorizes and, more, encourages in student norms and mores. The point is that adults can influence and shape that student culture into one that cel-

brates being a good student. Without taking that on explicitly in secondary schools, the predominant teen culture of music, media, consumerism, and hanging out with friends easily trumps investment in achievement. Pride in the school, aspiration for a better life through education, and valuing academic effort can become the hallmarks of the student culture if the adults take it on with the same seriousness and commitment we are bringing to analyzing data on student results. I have seen this repeatedly in inner city schools that are outperforming the stereotypes of what their students “should” be able to do.

Roles of Leaders and Teams

Robust dialog and non-defensiveness between teachers are grounded in a leader’s willingness to be open about discomfort and non-defensive about the examination of practice—and being so in the presence of others. True confessions? No. But true thinking out loud and honest sharing of confusions and disappointment as well as satisfaction? Yes. When groups of teachers bring this quality to the table, we get the next level of professional talk: joint commitments to experiment with new approaches, to analyze what the teaching is doing for student learning, and willingness to critique our efforts together. Colleagues disagree without jeopardizing their relationships; tenderness and hypersensitivity to criticism dissolve into the challenge and stimulation of friendly debate. That is when the promise of “collegiality” really flowers—and when teachers feel the satisfaction of growing and learning together in a flourishing professional community.

The kind of conversation that promotes teacher learning differs from usual modes of teacher talk, which feature personal anecdotes and opinions and are governed by norms of politeness and consensus. What distinguishes professional learning communities from support groups where teachers mainly share ideas and offer encouragement is their *critical stance and commitment to inquiry*. Exercising what Lord (1994) calls the traits of critical collegueship, teachers ask probing questions, invite colleagues to observe, and review their teaching and their students’ learning and hold out ideas for discussion and debate. Among critical colleagues, disagreements are viewed as opportunities to consider different perspectives and clarify beliefs, not something to be avoided.

– Sharon Feiman-Nemser, 2001

Our case here is that the emotional intelligence of leaders and team members is the indispensable catalyst to develop this critical stance. How do we create conditions for these courageous conversations?

Certain structures are necessary to bring people together often enough to have growth oriented conversations: designated groups that build agreements about common curriculum; structures of time and intent that increase contact and dialog for professional purposes between staff; procedures and support for being in each other's classrooms to see what people are doing; protocols for how to talk about the visits with focus afterwards. We can have all these elements present, however, and still hear conversations that sidestep tough issues and tiptoe through the tulips; we are making "nice" not making professional community; we are avoiding disagreement and conflict and not using emotional intelligence.

The breakthrough into the kind of courageous conversations we are talking about is facilitated when people bring student work to the table for examination with peers. The concreteness of those work samples generates questions; these conversations set the platform for the dialog and the agendas for experimentation in one's teaching. To get the juices flowing, we need some explicit discussion of norms¹² for how we will act with one another; we need the leadership of group members who are willing to model being vulnerable. These are people who will share their unresolved problems and questions, and similarly challenge their colleagues to do the same (Hiebert, et al.2002).

A number of skills support these interactions—active listening, problem finding, brainstorming, group norm setting, giving feedback, and facilitating. Training can be provided for all of these and will be helpful. (Keiffer-Barone and Ware 2002). *But nothing will be as helpful as group members who are willing to model self-awareness, self-examination, experimentation and risk-taking with colleagues.* Nothing can set the tone for this better than building-based leaders who will do the same, such as principals, assistant principals, department chairs, specialists and support teachers of all kinds. They must be willing to advocate and model all these qualities in the conduct of their own daily business. Along with modeling must come explicit school and district commitment to these norms and deliberate use of them in hiring and induction of new teachers.

¹² Norms such as no "put-downs", a place for everyone's voice, stick to agenda, start on time, etc.

At a still deeper level of these relationships is the capacity to manage conflict with emotional intelligence. This can be the pivot for all the rest. Day after day in schools across America, change initiatives, instructional improvement, and better results for children are blocked, sabotaged, or killed through silence and inaction. In our work with school and district-based leaders, my colleagues John D’Auria, Matt King and I have often noticed that this lack of follow-through results from the avoidance or inability to face conflict openly and make it a creative source of energy among educators. This in turn derives from the underdeveloped “emotional intelligence” of leaders (Goleman 1999). The ability to read first one’s own and others’ feelings is essential to the work of change, especially in workplaces that are as loosely managed as schools. So we have elevated this aspect of leadership out for special treatment in our courses and coaching work. It lays the foundation for the changes and progressive development in the Professional Learning Community.

We are taking the position that a vital aspect of leadership is to help expose conflict and view it as the engine of creativity and learning. Successful leaders get “people on the executive team to listen to and learn from one another.” Leaders who do this realize that conflict left uncovered will fester anyway. “A leader has to have the emotional capacity to tolerate uncertainty, frustration, and pain . . . he or she has to raise tough questions without getting too anxious.” Such leaders can “cook the conflict” so the pot doesn’t boil over, but the issue stays on everyone’s front burner at an acceptable level of anxiety. This is because such leaders know that solutions to challenging problems “lie in the collective intelligence of employees at all levels, who need to use one another as resources, often across boundaries, and learn their way to those solutions” (Heifitz and Laurie 2001). Leaders must learn how to make the undiscussable discussable (Barth 2002).

Academic focus, shared beliefs, and the powerful, productive relationships weave together in the warp and weft of how adults behave with one other and with students, how they plan, and how they reflect. These three qualities and the practices that go with them become built into the operations of the whole school, into the talk between educators as they conduct daily business, and most particularly, into the operation of teams of teachers who share students or content. You can see and hear the three qualities (or their absence) simultaneously at a team meeting. For important evidence of a school that is improving student achievement, look at teams, their talk, their staffing and their access:

- teams of teachers who share students or content, how they interact, what they do with their time
- talk and modus operandi of the team leaders who work with teachers directly and in groups
- access and reaching out to the Common Core of Professional Knowledge about Teaching and Learning (Appendix A)

They also become built into the way a building's instructional leaders (call them coaches, staff developers, directors, or department chairs) talk with individual teachers and groups of teachers. (See Appendix B) These conversations, of course, are dependent on the building being staffed so that there are *enough trained instructional leaders to cause all the teachers to have frequent high quality conversations about their teaching practices and their results with students, leading to observation and critique of one another's practice.*

Implications for Building Effective Professional Learning Communities

It is the central job of school leadership, especially the principal and supporting central office staff, to build the three qualities of Academic Focus, Shared Beliefs, and Powerful, Productive Relationships into the fabric of the school, its people, and their practices and their organization.

If you take the principal and other key building leaders out of the picture as a committed and skillful force for these qualities, then no successful PLC will form. The possibilities of all other forces combined (state education law and policy, standardized testing and accountability, central office staff development, parent and community pressure) to raise student achievement are fatally weakened.

The prime influence on the knowledge and skills of building-based leaders to grow these qualities is the central office by its: (a) recruiting and hiring of leaders; (b) supervision and evaluation of leaders; and (c) support and staff development of leaders. Leadership must start at the top. The prime determinants on how much energy the central office puts into developing building leadership are the commitment and priorities of the superintendent and top administrators to do so.



Let us pause for a moment to consider the role of supervision and evaluation in improving teaching and what leaders do to carry out this function.

Very few schools have adequate infrastructure (read as sufficient personnel) to make teacher evaluation serve as an effective vehicle for improving instruction. Because of the hectic and unpredictable workload of school administrators, evaluation is too infrequent and often too superficial to have much impact on teacher learning. The best of administrators do make good use of the sparse quality time they get with each of their teachers in an evaluation cycle. They observe and analyze well, and they have productive conferences. In addition, they make frequent 15-minute visits to classrooms and have short, useful conversations with many teachers entirely aside from evaluation. But this is still not enough. Therefore, the improvement of teaching, which can be aided by good evaluation, must rely on other systems.

The complexity of teaching requires that we put in place in each school district an infrastructure of people who are instructional experts. They are building-based and available full-time to work: with beginning teachers on learning how to teach, with experienced teachers on how to teach their content better, and with all teachers on how to deal with problems and pursue their goals for instructional improvement. This infrastructure cannot be developed through attending only to better teacher evaluation; it must also create new mechanisms for supervision. So let us separate conceptually the processes for supervision from those of evaluation.

Let us agree that the purpose of teacher evaluation shall be to maintain high, minimum standards of teacher performance. Make sure no one falls below the line of proficient performance; make sure that the line is high; ensure that children will not be damaged or be victims of malpractice through incompetence.¹³

In contrast, the purpose of supervision is the improvement of instruction. It is not the only vehicle, but it is a powerful one, and is substantially undeveloped in most schools. Supervision means receiving high

¹³ This is no small feat, requiring skill, courage, and central office back-up. Elsewhere (Saphier 1993) I have described the procedures, the forms, and the political process to create a teacher evaluation system that accomplishes the separation of supervision and evaluation. These are evaluation systems that put the emphasis squarely on professional growth, evaluation systems that can also be fair, humane, and decisive in dealing with poor teaching.

quality feedback from someone who knows what they are talking about. Supervision means engaging in challenging and data-based dialog about one's teaching decisions with another educator. And supervision means having someone you can rely on for honest, supportive questioning and problem solving.

So let us put a "Staff Development Teacher" in each school (Montgomery County, MD); or put a "Director of Instruction" who is part of the administrators' unit in each K-8 school (Boston, MA); or put a "coach" in literacy and mathematics in every building (New York City); or give special training to an assistant principal and make sure they spend 80% of their time in classes with teachers. It does not matter so much what these supervisory positions are called: match the title to the culture. It does matter that they be very good at their work. It does matter that they have professional expertise at using, articulating, and at observing and analyzing for the items in the common core of professional knowledge. It particularly matters that the culture of the school be highly developed around honesty, openness, inquiry, and constant professional growth. Thus, for the principal it means ensuring constant attention to this culture. No one else can shepherd the effort (though all must contribute to it). No one else can make sure the instructional specialists I have been writing about here are deployed well and operate efficiently.

This profile of Professional Learning Community implies three different kinds of leadership, and none of us can be equally adept at all three: (1) drivers of academic focus, (2) spiritual leaders with shared beliefs, and (3) leaders who display developed emotional intelligence for building powerful, productive professional relationships. Leaders need to be aware that all three are necessary and need to find others in their communities to complement their strengths and fill in for their weaknesses. Without attention to all three qualities, cultures of improvement are incomplete, and gains will not endure.

Academic Focus and Shared Beliefs without Productive Relationships will be hollow and vulnerable. The elements of commitment will reside in the rhetoric and perhaps even the behavior of the devoted few, but will not spread across the faculty without the right Relationships.

Shared Beliefs and Productive Relationships without Academic Focus will fall short because we are not sure where to aim our efforts and probably will not even be aiming at the same targets.

Productive Relationships and Focus without Shared Beliefs will not produce the energy and staying power to work in difficult situations, in inner cities, and with our most needy children.

Our work is educating all our students to be good citizens who reach proficiency targets with academic skills . . . *all* our students. “Leave no child behind” says our most recent education reform law. We need powerful organizations to do that. So let us design our school improvement efforts around Academic Focus, Shared Beliefs, and Productive Relationships, all supported by emotional intelligence.

If this is the right cast for what school culture is, (or its 21st century update, Professional Learning Community) then we need to act on it. We already know that schools with strong Professional Learning Communities improve instruction rapidly and thus get better student results. Building and strengthening these features of the school organization and its human environment constitutes the main job of leadership. Therefore, the education, certification, and evaluation of leaders must be designed around how to lead in this way — the knowledge and skills of cultural leadership. A good map of the components is the starting point. That is the point of this second “big rock”.

Building Professional Learning Community is not work for the faint of heart or for those who seek simple answers. It is not the work of heroes either. Heroes have their place but we do not need more of them just now. We need more full-hearted people who are willing to be honest with one another and learn from their mistakes—determined people who will band together to believe in children and in their own capacity to reach them.

Now on to our final “rock”—what we must do to make the profession attractive and competitive enough to attract and retain able people.

“Big Rock” #3: Higher Salaries and Differentiated Career Paths for Teachers

One main reason for the low level of teaching expertise is that good people in teaching do not stay in the classroom long enough to acquire the necessary professional and practical knowledge. Many who do manage to acquire it leave anyway after a few years because they cannot afford to stay. An American practicing in a demanding knowledge-based profession with five years of experience deserves to make \$70,000 a year if he/she is performing at a high level and getting results for clients. But \$38,000 is what an experienced teacher with a spouse and two young children will likely make in an American city. Most idealistic, skilled, effective young people who consider teaching never enter at all because they see the economic handwriting on the wall.

Matthew Miller (2004) makes the case for raising teacher salaries by half for staff serving disadvantaged children, and by half again for those who are most effective. Tony Milanowski's (2003) survey data shows that such a raise is about what it would take to attract today's college graduates into teaching as a career. Miller shows that the national price tag would be \$30 billion annually, which is only a 7% increase in K-12 spending. That is one-quarter of our current annual expenditures in Iraq; only 1.4% of our normal federal budget (U.S. Federal Government Budget 2003); half what we spend on pornography (Federal Reserve Bank of Minneapolis 2000) and gambling (Forster Research, Cambridge 1998; American Gaming Association 2003). This investment would make a tremendous *life difference* to a huge number of our children and produce positive ripple effects to our entire population.

Current administration proposals, to eliminate the estate tax, cost about \$30 billion (Miller 2005). Why not trade this gift to the wealthy for revolutionizing the conditions of teaching?

In addition to salaries, a career path for service at the building level that promises increased responsibility for instructional leadership and further salary for that increased responsibility would make a significant difference in recruitment and retention (Milken 1999; Wise 2004).

This third “big rock” of higher salaries and differentiated career path for teachers will help pull the capable people we need into teaching. It will end the revolving door of personnel in schools for poor children that so hampers our improvement efforts now. Paying teachers and school leaders competitive wages will not, of course, by itself, ensure good education for all our children. Attracting more educated and ambitious people into the profession will not automatically create good teachers or good leaders. We still need the solid focus on expertise argued in an earlier section. However, without this national commitment to increasing salaries for teachers, all our other efforts are consigned to produce slow-motion and small-scale changes. We will continue to have small numbers of extraordinary schools created by dedicated individuals in high poverty areas. They have been discovered in every corner of our nation whenever researchers have sought them out from Ron Edmonds (1978) through the 2004 study of high performing high schools (NASSP 2004): schools that erupt into brilliance and fade from the scene because the infrastructure of expertise and leadership is not there to sustain them. *To bring this effort to scale across the nation requires more good teaching than the current unequal system will ever create by itself.*

“There are probably a hundred things we need to do for these [low performing] schools, and 10 big things that could make a difference, but if you could focus on only one thing, the most important would be teacher quality. The teacher question is so vital that the Hart-Rudman Commission, the same group whose report presciently stressed America’s vulnerability to major terror attacks, defined teacher quality as an issue of *national security*. ...With research showing that half the achievement gap facing poor children is due not to poverty or family conditions, but to systematic differences in teacher quality, the question of teacher recruitment in poor schools is more than just the biggest issue in education. It’s the next frontier for social justice.” (Miller 2004)

Raising salaries in the manner proposed here calls for a performance-based system for evaluating teachers, connected to student results, but not tied to a numbers game of standardized test scores or so output-oriented that it oversimplifies the incredible complexity of interactive teaching (Saphier, Simon and Weast in Essay 3).

Matthew Miller’s proposal for raising the salaries of teachers in poor communities is spelled out in detail in his article in *American Educator* (2004). “The federal government would raise salaries for every teacher in poor schools in America by 50 percent. But this offer would

be conditioned on two fundamental reforms. First, teachers and their unions would have to agree to raise the pay of the top half of performers in the teacher corps (and those in shortage specialties) *another 50 percent on average*. Second, the unions would have to streamline the dismissal process for poor performing teachers to a fair, swift, four-to-six month period."

The salary raises for high performing teachers would not be simply "merit pay" tied to student achievement. Accomplished teachers would be in charge of the instructional program for teams of their colleagues. A lead teacher "would lead the team with the assistance of another senior colleague. Other members of the team would include two novice teachers who intend to commit themselves to a teaching career; two under-prepared teachers, who want to serve but may not be committed to teaching as a career; and six half-time student teachers who are completing teacher preparation. The team would also include four interns who work half time for half pay as they conclude their initial preparation to teach." (Wise 2004)

Lowell Milken's model (1999) has two master teachers (\$70,000 per annum) in an elementary school that was formerly staffed by 24 regular classroom teachers. These master teachers teach children 10 hours a week and spend the rest of their time facilitating curriculum development, leading staff development, conducting peer feedback, and doing demonstration lessons.

Twelve mentor teachers (\$30-60,000 per annum) are in charge of small clusters of associate teachers with whom they team teach. They collaborate with colleagues to develop benchmark lessons and observe and provide peer assistance for colleagues.

Twelve associate teachers (\$25-35,000) are early career teachers who have full-time teaching responsibilities under the supervision of the mentor teachers with whom they often do side-by-side teaching.

Twelve paraprofessionals (\$15- 21,000) work in the classes under the direction of associate and mentor teachers.

Milken's differentiated staffing plan does not actually raise dollar cost for the elementary school profiled at all. However, he needs to join his proposal to Miller's (2004) to create a career path desirable enough to retain the energetic and the able in the profession.

The system could be phased in only for new hires in districts, with currently employed teachers continuing to work till retirement under the terms of their old contract if they so desired, but eligible for the new arrangement (which, of course, many would choose.) This two-tiered system would smooth transition issues but work rapidly, given the current turnover of teachers in poor areas.

I want to emphasize that raising salaries is a background condition for improving teaching, not a pathway for doing it. The development of widespread teaching expertise in a school district requires an infrastructure of human resources that is currently absent from most districts' planning, staffing, or budgeting. The average professional development budget in American school districts is under 1% of total personnel expenditures, which is, of course, ridiculous by industry standards of 7 to 10%. How in these circumstances could any school organization be an engine for improved teaching and learning?

Therefore, budgets for development of personnel must rise at least to the 5% level. The one urban district that sustained such expenditures over an eight-year period was District #2 in New York City. Connecticut did so over fifteen years. Both are the two shining examples in the nation that showed improved achievement of urban children (Elmore 1999; Darling-Hammond 1996).

Implications of Higher Salaries and Professional Standards

The implications for professionalization of teaching are profound. With this kind of money going into salaries and staff development, public pressure for knowledge-based teacher education and certification would be irresistible. Independent licensing boards would be called for to fairly uphold high standards of entry into the profession. Teaching would become an eleven-month job with an eight-hour day on site, thus allowing for much more job embedded professional development time. And teacher evaluation within school districts would have to be both knowledge-based and tied to student performance in some responsible way.

Essay 3 will describe what such a teacher evaluation system looks like, drawing on the four years of work and three years of refinement that have gone into creating a Professional Growth Cycle in Montgomery County, MD. This cycle has formal evaluation as an embedded element of a system that emphasizes professional growth and a focus on student achievement. It includes knowledge-based perfor-

mance review of teacher behavior and examination of student results in a responsible way. And it was developed from scratch with a close and high functioning Union/School District partnership.

Raising educators' salaries on a significant scale and differentiating instructional leadership positions will take years of coalition building and a return to the moral conscience of our social contract. The world view of John Adams and our other founding fathers blended individualism and freedom with community and fairness to one's neighbors. We need to reawaken that conscience to get the policy changes and commitment that will produce a good education system for our urban and rural poor.

We also need to show how doing so is much less expensive than letting a two-tiered school system continue: one for the affluent and one for the poor. For example, currently the support for a prisoner in American jails costs on average \$30,000 per year. Our prison population is two million. That is 60 billion dollars a year and is double the level we spent in 1980 when we had one million prisoners. Given the strong correlation of incarceration to elementary reading level, it would seem that an educated citizenry could reduce this prison expenditure significantly. It would certainly reduce the additional \$80 billion a year that US industry spends to develop basic literacy skills in its employees!

Well documented is that poor children's schools are underfunded to meet the needs of their higher English Language Learner and Special Education populations and that their teachers earn less while working in less supportive environments (Hancock vs. Driscoll 2004). This is, indeed, inequality. No wonder our poor children remain behind and their upward mobility remains stifled.

The job is not only to gain public attention and acceptance of the impressive impacts of expertise in teaching but also to convince the economically comfortable that it is in their interest to pay for teaching expertise for other people's children, including poor children. That is not an easy sell. We have to make the case that the jobs, the lifestyle, and the standard of living of the affluent depends in real ways on better education for our least advantaged students. Therefore, it is incumbent on all of us in the educational community to deal more directly with business groups in each state and with legislators at the state and national levels. We have to organize non-profit advocacy groups and through them, reach out to our major foundations like Carnegie, Broad, Rockefeller, Gates and so many others who want to

leave a positive mark on the national landscape. They are doing a great deal of good, but they are not focused enough on the essential “big rocks” for education reform.

People are selfish and generous at the same time, as well as brave and fearful. We are all inclined simultaneously to live in our own small, protected worlds and to reach out to the needy only if we can see them. It is up to us to bring out these generous sides of our fellow citizens. It is up to us to keep the moral possibilities before our policy makers so that they, the voting public, and beyond them, the powerful, the wealthy, the influential can reach into their best selves to rectify the imbalances in education so as to sustain our democracy.

While the years pass, those of us within education in policy and leadership roles must continue to act with the resources we have *now* to make significant progress on getting the first two “big rocks” of teaching expertise and strong leadership into the jar. We can do so in our own workplaces, our own districts, states, and colleges. No school, district or city has to wait for salaries to rise in order to build teaching and leadership expertise that can get results for children right now.

Afterword: Practical Note to School Leaders for Implementation

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his monograph is aimed first at policy makers and high level leadership teams within school districts because it calls for prioritizing and focusing resources on the things that my colleagues and I at Research for Better Teaching and Teachers 21 feel are most important. It is an argument, a polemic, an attempt to persuade. Thus, it is not a “how to” piece. In our training and consulting work, we deal every day with leaders in schools directly on the “how to’s” all the way from building courageous conversations and robust dialog into team meetings to “cleaning up the streets” in a secondary school. Our repertoire around these wide-ranging issues has been informed and enlarged by the many skillful leaders we have worked with over the past 30 years.

Whenever one lays out the “Big Picture” of a complex problem (and improving a school for poor and underperforming children is indeed a complex problem), the number of variables can be overwhelming. It has been our experience that a leader needs a short list of places to focus—a small number of project centers on which to hang the practices and structures outlined above in order to feel a sense of direction and be able to manage the complexity of moving an institution forward. “Academic Focus, Shared Beliefs, and Powerful, Productive Relationships” are conceptual categories for holding big ideas, not concrete projects to work on.

“Teams that work and work on important things” is a project center. And it suggests specific actions (e.g., observe teams and give feedback to team leaders; teach them about agendas and good meeting practices; give them the task of creating common assessments; do a study group for team leaders on courageous conversations; make arrangements for quarterly retreats where teams analyze student data; bring in staff development on analyzing students results in simple yet powerful ways; and ask one team to pilot a “lesson study”).

You can see how working on effective teams becomes a project center that enables the principal to work on all three qualities of the Profes-

sional Learning Community (See Appendix B). Without adequately developed interpersonal skills and emotional intelligence, the principal will not get too far in this “project center”. Thus, we see once again, the significance of educating leaders in how to build powerful, productive relationships, have robust dialog, and build the confidence and interpersonal skills of others.

What follows are recommendations for the dozen or so highest leverage project centers for a school leader. This particular list of priorities comes from 30 years of making these choices with leaders in various districts, and a track record of excellent success in some districts with continuity and staying power in their leadership.



Teaching Expertise

Improve the teaching expertise of all the teachers.

- Embed systematic and continual learning from the **common core of professional knowledge** — and a common language for talking about it — in teacher induction, evaluation, supervision, and professional development.
- **Organize the management of the whole district around adult development** based on the common core of professional knowledge about teaching and learning, since that is the key to increasing student achievement.
- Grow an **infrastructure of expert building-based instructional leaders** who spend most of their time with teachers on examining practice in relation to student learning.

High-functioning Teams

- Develop high-functioning operational teams that *work* (i.e., that operate fluently with trust, conflict, commitment, accountability for each other, and focus on results) and that *work on important things like*:
 - using common assessments and exemplars of proficiency
 - doing detailed analysis of quarterly assessments
 - deprivatizing practice and conducting weekly examination of teaching and learning together
 - supporting aligned and accessible curriculum materials.
 - making annual SMART goals for improving student

achievement

- Develop the **emotional intelligence** of the principal and leadership team in each building along with their capacity for **courageous conversations, academic focus and shared beliefs**.
- Generate **urgency** and commitment that virtually **all students shall** achieve proficiency.
- Build "**effort-based ability**" into classroom practices and school structures.

Student Culture

- [Secondary schools] **Clean up the street culture**.
- Build a sense of **identity and pride** in belonging to this school.
- Build relationships where all students are **known and valued**.
- Build a **peer culture that values academic achievement**.
- Ensure well-developed systems for student **support of needy kids and a safety net for the highest need students**.
- Develop programs that show students **images of a better life through education** and nurture **hope** and effort.

Resources and Partnerships

- With **union-management partnership**, develop **school board support** for the centrality of expertise in leadership, teaching and learning, and clarity about the distinction between policy, monitoring, and micromanagement.
- Provide adequate resources for small class sizes where it matters and **reasonable class loads** at secondary levels.
- Maintain **continuity of leadership** in key positions for 5-7 years.

Appendix A: The Tasks of Teaching

The section immediately below summarizes the major findings for the tasks of teaching in generic pedagogy known to impact student learning. These are field-tested, research-validated tasks; and attention to many of them is missing in action from the preparation and evaluation of the majority of practicing teachers in the country.

I. Planning

A teacher carrying out the planning job well for daily lessons makes sure that:

- he/she clearly understands and, thus, can articulate the learning objective in terms of student performance and how it is appropriate for the curriculum and for the students.
- the lessons are designed around big ideas¹⁴ that are important. The students know what these big ideas are. The learning tasks are logically connected to the ideas (Wiggins and McTighe 1998).
- the students have adequate prior knowledge and skills to engage the current learning tasks (Alexander, Editor 1996). Thus, the teacher frequently analyzes her own classroom assessment data to find out which students do and which don't have adequate readiness. She also analyzes her learning materials and texts to identify assumptions of prior knowledge that students may not have.¹⁵
- the students have enough time to learn the material (Bloom 1968; Carroll 1963).
- the students have materials (displays, examples, manipulatives, texts) that make the learning accessible and do so in multiple ways.

¹⁴ A Big Idea like "A just society balances individual freedom and the common good." Good 21st century curricula for all subjects, even beginning reading and elementary mathematics, start from clear statements of big ideas (Wiggins and McTighe 1998).

¹⁵ For example, to understand in a text: "satellite state to the Soviet Union," students need to understand the general concept that a dominating country can have controlling influence over the decisions of another subservient country's government. Thus, the subservient country is a "satellite" of the dominating country. But in parallel, one needs to understand the vocabulary word "satellite." Understanding what "Prior Knowledge" is needed is another way to describe this relationship. This is knowledge that a teacher can use to predict, prevent, or understand student confusions.

- the teacher anticipates student misconceptions and takes steps to prevent them. (Eaton et al. 1984; Eylon and Linn 1988).
- the students know what good work on the task / assignment would look like [criteria; exemplars] (Frederiksen and White 1997).
- what the students are doing [the activity] could logically be expected to lead them to learn the intended learning [not as obvious as it seems.]
- the intended learning is consistent with what the curriculum is supposed to be and what the assessments are going to assess.
- the planned sequence of learning experiences the students are going through has continuity and a cumulative effect (Tyler 1949).

II. Instruction

A teacher carrying out this job well will make sure that the following tasks are accomplished:

- During instruction the students have to actively think about and use the ideas / skills being developed by talking about them with one another or using them in some other active way to solve a problem or answer a question (Applebee et al. 2003; Allington and Johnston 2001; Cazden 1992; Dillon 1988; Mehan 1979; Nystrand 1997). Thus, at appropriate points student thinking is made visible to the teacher and to other students through the design of the activities and interaction.
- The students know what the learning objective is and how the activity is supposed to help them learn or get better at it (Alexander, Frankiewicz, and Williams 1979; Lipsey and Wilson 1993; Waxman 1999; Wise and Okey 1983).
- The students see the relevance or importance of the intended learning (Marshall 1987).
- Students' current knowledge is activated and/or processing of new information is structured by Advance Organizers (Ausubel 1968; Lott 1983; Stone 1983).
- The students see the connection between what they're doing and their prior knowledge so the cognitive "Velcro" will more likely attach to the new material (Brewer and Treyns 1981; Hamaker 1986; Osman and Hannafin 1994; Pressley et al. 1990; Pressley et al. 1992).

- The students' understanding is checked frequently and broadly across all the students during instruction so they are not left behind while the teaching train rumbles on (Tobin and Capie 1982).
- Students experience an appropriate balance of higher-level questions despite the performance level of the class (i.e., no dumbing down of the thinking challenges even if academic skills are low) (Guzzetti et al. 1993; Redfield and Rousseau 1981; Wise and Okey 1983).
- The students experience a variety of learning experiences that allow for different learning styles.
- Design features from classical learning principles (e.g., Goal Setting; Practice; Contiguity) are built into student experiences where applicable to increase learning efficiency (See Saphier and Gower 1997, chapter on Principles of Learning.)
- Students are asked to identify similarities and differences between topics under study (Marzano et al. 2001).
- The students have to periodically summarize the meaning of the new learning at the end of instructional segments. [see six studies summarized in Marzano 2001. Average effect size 1.0 with average percentile gain of 34!] (Anderson and Hidi 1988/1989; Hattie et al. 1996; Rosenshine and Meister 1994).
- There are appropriate explanatory devices available to help students understand new and difficult skills and concepts. [like modeling thinking aloud; graphic organizers; imagery] (Aubusson et al. 1997; Griffin et al. 1992; Horton et al. 1990; Macklin 1997; McLaughlin 1991; Newton 1995; Pruitt 1993; Robinson and Kiewra 1996; Welch 1997; Willoughby et al. 1997).
- The students get frequent, detailed, corrective but non-judgmental feedback on their work. (Black and Wiliam 1998) [Effect sizes from .4 to .7 according to Marzano 2002] Bangert-Downs et al.1991; Hattie 1992; Lysakowski and Walberg 1981; Lysakowski and Walberg 1982; Scheerens and Bosker 1997; Trammel, Schloss and Alper 1994).

III. Motivation

A teacher carrying out this job well will make sure that the following tasks are accomplished:

- The students receive consistent messages in recurrent arenas of class life that their teachers believe in their ability to do quality work at high standards (Cotton 2001; Zimmerman and Blotner 1979).
- The students experience tenacity from their teachers in pressing them toward proficiency (Haberman 1995; Mitman and Lash 1988; Stipek and Daniels 1988).
- The students feel known and valued (Goldstein 1999; Noddings 1984; Tappan 1998; Sparks 2003; NRCIM 2003; Poplin and Weeres 1992; Resnick 1997; Combs 1982; McCombs and Whisler 1997).
- The students have regard and respect for their teacher (Lewis et al. 1996; Marzano and Pickering 2003b).
- The students perform engaging tasks that are thinking and problem-solving oriented and matched to their interests and developmental level.
- The students feel it is safe and supported to take intellectual risks and make mistakes (Haberman 1995).
- The students are taught to attribute success or failure to effort, not luck or task difficulty [average effect size .8 !] (Dweck 2000).
- The students get explicit instruction in how to exert effective effort (Ames 1987; VanOverwalle et al. 1989; Weinstein and Mayer 1986).
- The students know how to support and encourage one another to succeed (Schaps et al. in press; Bear 1998).
- The students have some ownership and choices in the rhythms of classroom life (Turner 1995; Emmer 1984; Emmer et al. 1981; Evertson et al. 2003; Doyle 1986) (Allington and Johnston 2001)

IV. Management

A teacher carrying out this job well will make sure that the following tasks are accomplished:

- The teacher's radar, body language and consequences are appropriately tuned to respond quickly and appropriately to off-task or disruptive behavior (Carr and Durand 1985; Emmer et al. 2003; Madsen et al. 1968).
- The students know exactly what the limits are, the rules mean, what the consequences are, and that they will be enforced consistently and without rancor (Jones 2000; Stage and Quiroz 1997; Brophy and Evertson 1976).
- The length of time segments at an activity and the kind of activity are a match for the students and the content.
- The arrangement of space supports the kind of student learning currently being done (Emmer 1984; Emmer et al. 1981; Evertson et al. 2003).
- The students experience no downtime, delay, confusion over directions, conflict over materials (Kounin 1970).
- The students receive an appropriate range of attention moves to maximize their engagement (Jones 2000; Stage and Quiroz 1997).
- The students know the routines and procedures of the room and can use them efficiently (Good and Brophy 2003; Evertson et al. 2003).
- Students are explicitly taught to work together and to self-manage in the fulfillment of academic tasks (Allington and Johnston 2001); (Taylor et al. 2000; Marzano et al. 2001).

The specific repertoire of ways to accomplish each of the tasks above is described elsewhere. (Saphier and Gower 1997 *The Skillful Teacher.*)

Each bullet above is only a “chapter heading” for each task of teaching. There dwells within each and every one of these 40 bullets a field of study in itself. For example, take the item “•Design features from classical learning principles are built into student experiences where applicable to increase learning efficiency.” There are at least 24 separate little packages of power from classical learning theory to which this bullet refers, each of which is worth study on it’s own, and each of which is known to increase the rate and durability of learning.

Some of the Principles of Learning are *small* and easily graspable, like “Close Confusers,” which says to not introduce two ideas that are easily confusable in time proximity to one another. Introduce one and allow it to be solidly established through application before introducing the close confuser (like the letter “b” and “d”. Another example: science text books often make the mistake of presenting “rotation” and “revolution” of the earth in the same page.)

Or the principle of “practice,” which says practice a new skill in small units, and practice it frequently for short periods of time after first being introduced to it. Then space out practice sessions further and further apart. But continue to practice deliberately after attaining mastery [“overlearning,”] otherwise the “curve of forgetting” will catch you by surprise!

But other principles from classical learning theory are *big* and take time to learn and use properly, like “Goal Setting”. This principle delineates a careful set of attributes and procedures for helping students learn to set goals that are clear, doable, and motivate one to fulfill them. Anyone interested in students’ ownership of their own learning needs to know this technology.

Another quite different example: for the item “•The students receive consistent messages in recurrent arenas of class life that their teachers believe in their ability to do quality work at high standards.” These messages are conveyed in a number of regularly recurring arenas where our language patterns send the messages. The arenas are such moments as when we:

- give students help,
- respond to student answers,
- convey assignments,
- deal with a student error.

Studying one’s language patterns and the embedded messages in how we handle these everyday events is quite a subtle and significant area of teacher skill (*The Skillful Teacher* – Expectations chapter). Since it is tied to one’s beliefs about students, it is not an area of study completed in a day!

Using the knowledge base outlined by the 40+ bullets is intellectually complicated, difficult, and demanding work. Acquiring professional knowledge takes considerable time and never quite ends, as is true for all real professions (e.g., medicine, engineering). Using this knowledge base well is required for teaching our children successfully, especially our poorest children who are academically behind. And it requires the conditions of a full profession to get our teachers able to do so.

Let us now turn to the final two areas of the professional knowledge base for teaching and learning.

V. Craft Knowledge for Teaching Specific Concepts and Skills – The Treasury of Subject-Specific Techniques for Making Learning Accessible to Students

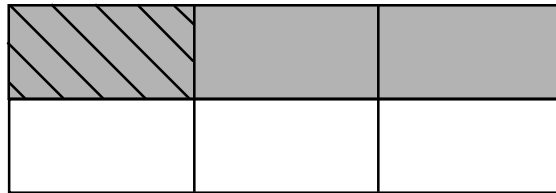
Over two decades ago, Lee Shulman (1984) coined the term Pedagogical Content Knowledge. This term described the knowledge teachers have of how to teach their particular content. This meant content-specific repertoires of activities, examples, stories, equipment, readings, analogies that make the concepts and skills accessible to students. Such knowledge is craft knowledge. It is accumulated slowly over years of experience, of experimentation, of trading ideas with colleagues, and from good professional development. Like the other domains of professional knowledge we have profiled above, pedagogical content knowledge consists of repertoires, not right or best ways. The “Running Record” is a good tool for error analysis in primary students’ oral reading, but it is not the only one. Knowing how to use that tool is a piece of pedagogical content knowledge. The important thing in reading instruction, however, is not that particular tool, but that a teacher have some way of carrying out the function that tool handles (i.e., consistently analyzing and recording students’ proficiency at the skills of reading and using that data to plan that student’s instruction). Here is another example of pedagogical content knowledge.

Students in the early grades of elementary school who have learned multiplication are used to an answer that is bigger than the numbers they multiplied together ($15 \times 15 = 225$). Thus, it is confusing in higher grades when they learn that multiplication of fractions doesn’t work that way. When you multiply fractions ($1/3 \times 1/2$), the answer is *smaller* than either of the fractions you started with ($1/3 \times 1/2 = 1/6$). How can this be?

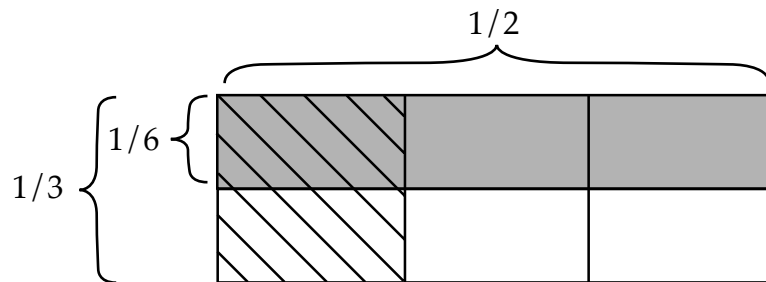
A diagram using a rectangle can illustrate what $\frac{1}{3} \times \frac{1}{2}$ means and how the answer is a smaller fraction. The rectangle below represents a whole divided into halves.



If one takes $\frac{1}{3}$ of the top half, one gets $\frac{1}{6}$ of the whole rectangle.



But “ $\frac{1}{3}$ of” something doesn’t feel like multiplication...it feels like you’re dividing. So another way to illustrate the operation of multiplication of fractions is to overlay a drawing of $\frac{1}{2}$ of the rectangle onto a drawing of $\frac{1}{3}$ of the rectangle. The overlap turns out again to be $\frac{1}{6}$.



A teacher who knows how to use this rectangle model provides many students with the insight they need for understanding the counterintuitive way multiplication of fractions works. And that piece of teacher knowledge is an example of content-specific pedagogical knowledge.

Proficiency in this area of professional knowledge means:

- The teacher can use a fund of age-appropriate activities, materials, examples, analogies, comparisons, and readings to make accessible the concepts and skills of the discipline in multiple ways.

The text above describes pedagogical content knowledge at the micro level; that is, individual devices, examples, etc. that can make content clear and understandable for students. At the macro level, there also exists a repertoire of instructional approaches that are particular to academic subjects. Knowing different approaches and how to mix and match them to students is particularly apparent in teaching young students to read. Allington (2002) has demonstrated that it is teacher expertise that distinguishes successful reading instruction, not the use of any particular program or curriculum.

When teachers are well-versed in content-specific pedagogical knowledge at the macro level:

- students experience instruction that draws on different approaches in proper proportion to their individual learning needs. This form of expertise is particularly important in elementary literacy instruction but it is applicable at any level and in any subject (see Joyce and Weil, *Models of Teaching*).

Note: This section only has two “bullets”. It is obvious, however, that if one drills down into any content-specific pedagogy, say 5th grade mathematics, with expert teachers of that content, one would have dozens of discrete “bullets” that should be available for everyone’s repertoire – dozens of specific materials and examples that are powerful to use for, say, teaching the meaning of the equals sign (“=”), which children commonly misunderstand to mean “perform an operation”...or “proportionality,” which students typically never learn at all! The same is, of course, true for every content area at every grade level. No wonder commentators from John Dewey to the present have bemoaned the fact we have no way to pass on the “treasuries” of experienced teachers to the next generation!¹⁶

VI. Understanding How the Ideas or Concepts in the Content are Connected – Hierarchical; Sequential; Parallel; Nested

There is another kind of knowledge related to the teaching of content that is different from the accumulated treasury of examples and instructional approaches we call pedagogical content knowledge. It is knowledge of how the concepts and skills one is teaching are con-

¹⁶ “The successes of excellent teachers tend to be born and die with them: beneficial consequences extend only to those pupils who have personal contact with the gifted teachers. No one can measure the waste and loss that have come from the fact that the contributions of such men and women in the past have been thus confined.” – *The Sources of Science in Education*, New York: Horace Liveright. 1929, p. 10.

nected to one another and how to bring these relationships to the attention of one's students. This includes an understanding of the network of concepts "that relate to the specific concept to be taught and of how that network is connected to the [content] in the yearlong curriculum as well as to the curricula of the previous and following years." (West and Staub 2003).

Mathematics is full of such networks, and understanding them profoundly effects a teacher's ability to teach for understanding. For example, Liping Ma (1999) points out that the concept of place value underlies the procedures for subtraction with regrouping and also the procedure for multi-digit multiplication. "The concept of place value, then, becomes a connection between these two topics." [p.119] – a connection that can influence and empower the teachers' teaching if the teacher understands the connection herself.

Teachers who understand these connections (be they sequence, hierarchy, parallel, or nested) don't keep them secret; they explicitly introduce them into their teaching. Stigler and Heibert found in the 1999 TIMMS video study that teachers from the highest performing nations in mathematics engaged students in the highest percentage of "rich mathematical problems that focus on *concepts and connections among mathematical ideas*." [italics not in original] (Stigler and Hiebert 2004).

This kind of knowledge about content is not assessed by teacher tests of content mastery typically used as a gateway for licensing. There is nothing wrong with such content tests, but they woefully underestimate the relationship between functional content mastery and the ability to teach that content to someone else. So for a well-developed teacher in this area it can be said that:

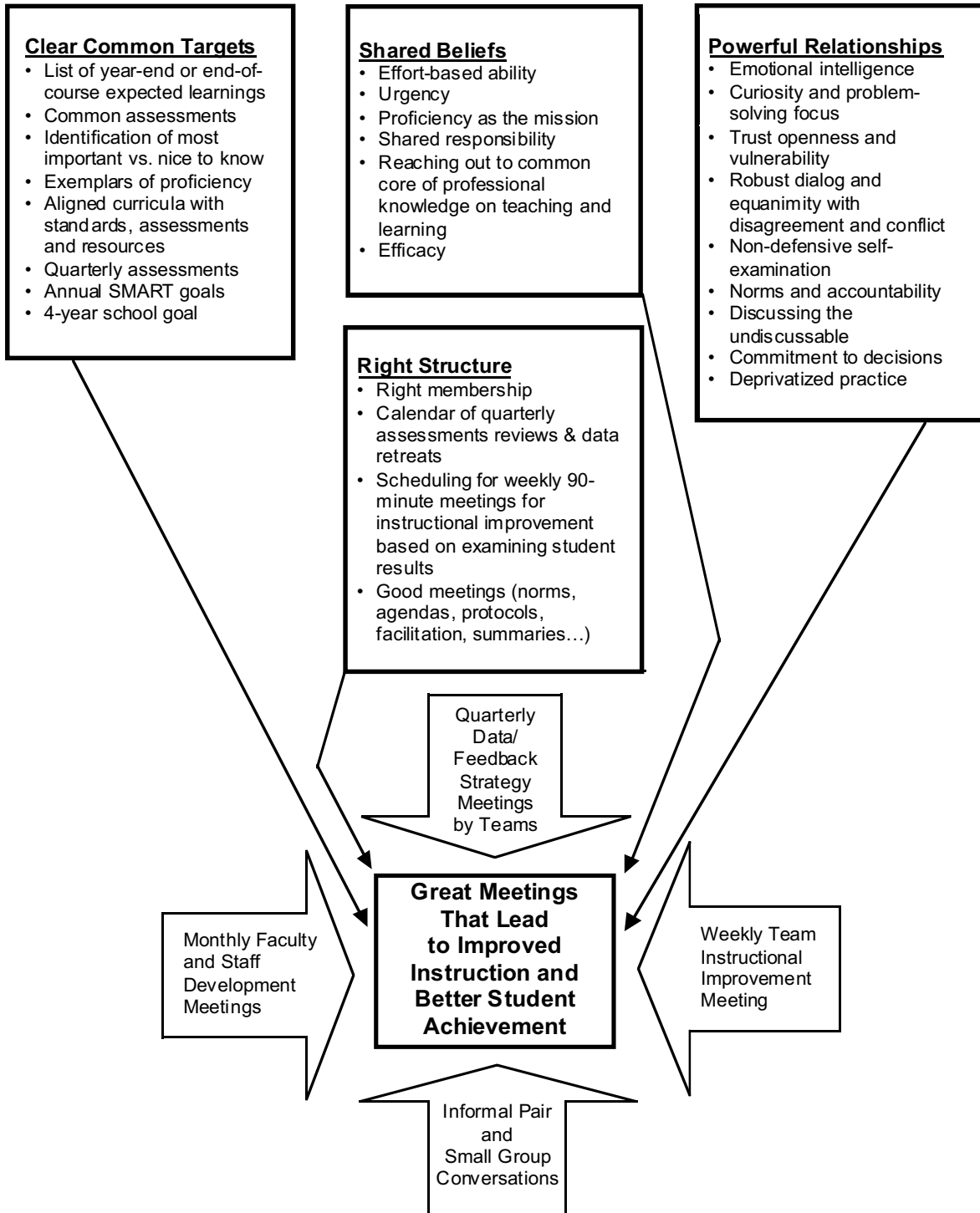
- The teacher knows the fundamental organizing ideas of the academic discipline—the "knowledge packages in the content" as Liping Ma says—and how they are connected to one another and intersect. These connections are an explicit part of a teacher's planning and are brought alive for the students.
- The teacher knows the prior knowledge hierarchy and sequence of learning that students typically need to master the content (e.g., see "21 Key Ideas about Fractions," Appendix D).
- The teacher knows the typical points of difficulty, confusion and also the misconceptions that are liable to arise in language, concepts, and interpretation.

The “21 Key Ideas about Fractions” at the end of this paper represent a concrete example for stimulating discussion about this kind of teacher knowledge—relationships of big ideas in the content.¹⁷ The point of this example, however, is to illustrate that there exists in *every* content area this same kind of knowledge about big ideas and their relationships. Understanding how to surface these relationships is essential for teachers to know explicitly and incorporate in their planning.

¹⁷ I believe that high school algebra teachers may also find some useful insights here into problems their students are having due to failure to learn these big ideas in elementary school. As some of our readers will surely testify, an elementary student can pass fraction tests all the way through the grades by memorizing algorithms, but run into trouble in algebra because he/she didn’t really understand the fundamental concepts of fractions.

Appendix B: High Functioning Teams

The Engine of Improvement in Schools That Gets Big Learning Gains for Their Students Is High Functioning Teams



Appendix C: On Becoming a Profession

A

profession has certain recognizable attributes. Though thousands of individuals who teach act in a highly professional manner, teaching is not now a profession.

Professions have:

- an acknowledged knowledge base, the nature of which is Areas of Performance, Repertoire, Matching (*all* true professional knowledge is so constituted).
- rigorous training and certification of members
- systematic enculturation of new members
- required and continuous learning regularly built-in to the work cycle
- culture of high consulting and collaboration
- high public accountability
- internal maintenance of high standards of practice
- consider themselves able to influence and responsible for client results
- members who make autonomous decisions guided by a canon of ethics

In a profession, leadership comes from a practitioner who is seen as the head practitioner: the Medical Director in a hospital; the Senior Partner in a law firm or an architecture firm. The “practice” (firm/hospital/HMO) hires an administrator for the business end. The Head Practitioner is the true leader of the organization.

Doctors are not scientists, at least not in their medical roles, because though they certainly draw on science, what they do is neither objective enough nor oriented to the production of new knowledge — nor should it be. And they are certainly not artists, since aesthetic principles and independent creativity have little or no place in practice, despite everything that has been said about the ‘art’ of medicine. But doctors are craftspeople of the highest order. Sometimes, like engineers, they lean very heavily on science. Sometimes, like diamond cutters, they seem to be coasting along on pure skill. And occasionally, like glassblowers or goldsmiths, what they do verges on art.

– Mel Konner, *Becoming a Doctor*,
Elisabeth Sifton Books/Viking, New York: 1987.

Committing to expert teaching based on knowledge is the foundation of professionalization. The focus on poor children is the social agenda based on the growing inequality in the country and the need to fulfill the promise of democracy, and equally on the economic need for an educated competitive workforce for a 21st century economy.

Appendix D: 21 Key Ideas About Fractions

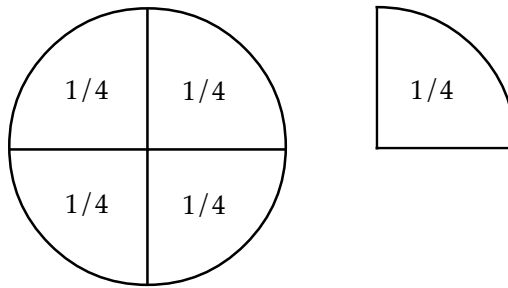
T

he following understandings are examples of the sixth kind of expertise in the common core of professional knowledge – Understanding How the Ideas or Concepts in the Content are Connected—Hierarchical; Sequential; Parallel; Nested . They are listed, roughly, in order of cumulative and increasing complexity. They are not written necessarily in kid language; but they do lay out the sequence of understandings kids need in order to master operations with fractions reliably. Failure to understand these big ideas forecloses success in algebra later on, even if youngsters fool us for a while by memorizing algorithms and developing work-around strategies.

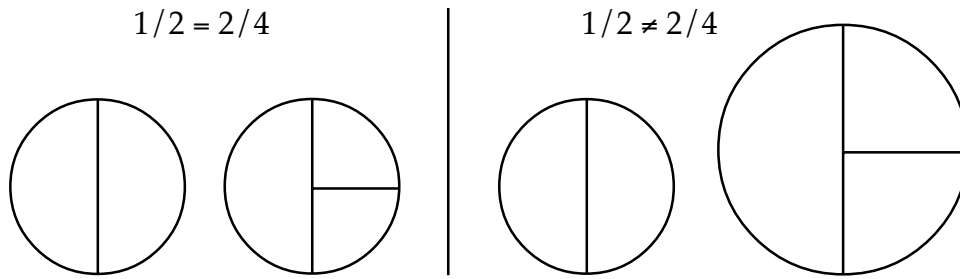
1. Fractional parts are equal shares or equal-sized portions of a whole thing or a whole set.
2. There are five ways of representing fractions or five visual models of what fractional parts mean: taking a fraction (1) of an area, (2) of a line, (3) of a set, and (4) of a three-dimensional object (volume). (A fifth way is as a ratio of sets. This comes later in the sequence).
3. Fractional parts have special names (e.g., thirds, fourths, fifths...) that tell how many equal parts of that size are needed to make a whole. (three thirds, four fourths, five fifths...)
4. The more equal parts required to make a whole, the smaller the parts. So for a given whole, a higher number of parts ($8/8$ ths vs $3/3$ rds) means each piece is a smaller size share.
5. The denominator (bottom part of the fraction) tells us how many equal parts into which the whole was divided. The numerator (top part of the fraction) tells us how many of those parts we've got (how many parts are being considered).
6. Fractions can be part of a set of discrete objects (a half dozen eggs... $3/4$ of the number of the children in the class). In this kind of case, the denominator refers to the number of equal sized groups into which the set is divided, and the numerator refers to the number of groups currently under consideration.

7. When you increase the numerator of a fraction and keep the denominator the same, you have more of the same size piece and thus a greater area/amount/quantity/volume overall.
8. When you keep the numerator the same and increase the denominator, you have the same number of pieces, but the pieces are smaller, and thus you have less of the whole thing/set/length/volume overall.
9. The equal shares that make up fractions don't have to be congruent (don't have to be identical in shape) but they must be equal in total area/number/length/volume (for the four cases.)
10. Fractions can represent an area/amount/length/volume larger than a whole.

$5/4$



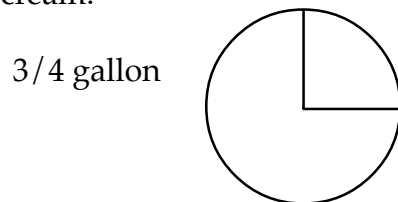
11. Two equivalent fractions ($2/3 = 4/6$) are two ways of describing the same amount/length/area/volume/relationship. It's just that you're using different size portions to add up to the same total amount. In fact, each fraction has not just two but an infinite number of symbolic (same value) representations; e.g., $1/2 = 2/4 = 3/6 = 4/8 = 5/10 \dots$
12. In fractions, you need to be talking about the same whole in order to compare two or more fractions. For example, when talking about $1/2$ of the object (or set or line we're referring to), the size of the whole is the determining factor in how big $1/2$ is. Suppose we want to say that $1/2 = 2/4$; the $1/2$ is half of something real (an object, a set). It's equal to $2/4$ of that particular thing or set, and not equal to $2/4$ of a different thing that's not the same size. When we're talking about equivalent fractions, $1/2$ is only equal to $2/4$, if we're talking about the same whole or wholes of the same size.



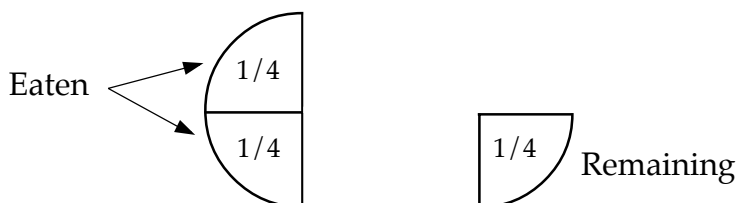
13. When you're talking about fractions, you're always talking about a relationship.
14. The whole doesn't have to be a "whole," as the following example illustrates.

The label of a fractional piece of the whole is determined by the whole that is the starting point of the problem. For example, consider the following: "There was $\frac{3}{4}$ of a gallon of ice cream in the freezer. (The whole that is the starting point is a *whole gallon of ice cream*, of which we now have $\frac{3}{4}$. So $\frac{3}{4}$ of a gallon becomes the new whole.) One day Paula came in with some friends and ate $\frac{2}{3}$ of the ice cream in the freezer. [That means: divide the ice cream you have at the start ($\frac{3}{4}$ gallon) into three parts (three quarters) and take two of them away 'cause Paula ate them (two quarters)]. How much ice cream is now left in the freezer?" Answer: $\frac{1}{4}$ of a gallon.

If we use manipulatives or draw a diagram and set out $\frac{3}{4}$ of a gallon, each of those three one-quarter sized pieces will be $\frac{1}{4}$ of a gallon of ice cream.



If we are figuring out the amount of this that was eaten that day, that is, $\frac{2}{3}$ of the ice cream, that would be $\frac{2}{3}$ of the $\frac{3}{4}$, or two of the three parts that are in the freezer.



Since each of these parts was worth $1/4$ and two of them are gone, that leaves $1/4$ remaining = $1/4$ of a gallon of ice cream. When we look at the single piece that is left, we see that it is $1/4$ of the gallon that was first brought home, even though it's $1/3$ of the amount of ice cream Paula and the Greedies found when they first came in. The hard part is to remember that the whole we are always working in reference to is the original gallon. Wow!

15. When we line up a set of fractions in order, from smallest to largest, we can use benchmarks to determine their relative value to each other; for example, determining which fractions mean more than $1/2$ and which mean less. Or we may ask ourselves about how close to zero a fraction is as opposed to how close to one.
16. Common fraction notation and decimal fraction notation are alternative ways of naming the same rational number. Decimal fractions are all fractions with ten or a power of ten as the denominator. Percentages are the same as decimal numbers to two places. The "whole" in percentages is always 100. The % sign at the end replaces the decimal point at the beginning. Common fractions, as opposed to decimals and percentages, can have any denominator (except zero).
17. Fractional notation can be another way of saying "divide two numbers. Find out how many of the bottom one (denominator) can fit into the top one (numerator)."
18. You can also divide two numbers where the one going in to the others is actually bigger! "3 divided by 5"...meaning if you divide 3 into 5 equal sized portions, how big will each be? (You have three big cookies and you want to give equal amounts of cookie to five people. How much would each person get?)
19. Fractions can express the ratio between two quantities (For every 3 girls there are 5 boys.)
20. Fractions can be operators (an instruction to operate) (i.e., a number that operates on another number in the sense of stretching or shrinking the magnitude of the number [a doll house is $1/12$ the size of a real house. How big is the real house]).
21. The preferred way of representing a fraction is with the smallest possible denominator you can; you can get this by getting the numerator and denominator so they have no common factors.

Thanks to Ellen Davidson, Lucy West, and the math coaches of NYC's District 2 for their critique and input on the 21 ideas above.

The approach of identifying Big Ideas in the teaching of mathematics is an organizing concept in John Van de Walle's book, *Elementary and Middle School Mathematics – Teaching Developmentally*. We have taken this approach and gone into depth with it for fractions only. Thanks to Dr. Van de Walle for his insight into the utility of this organizing principal for developing teachers' pedagogical knowledge.

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