Guiding Principles of the

Modern Red SchoolHouse Design:

Research-Based Solutions for

21st Century Schools

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The Modern Red SchoolHouse (MRSH) is a comprehensive, capacity-building school reform design that makes standards-driven instruction work for students and teachers. It's modern in its pedagogy, relying on research evidence in cognitive psychology and neuroscience to inform best practices, yet traditional in its commitment to student mastery of academic subjects.

The design emphasizes the use of data to inform instructional and organizational decisions and, at the same time, fosters a collegial environment where educators share a commitment to their students' well-being. It sets expectations for parent and community support that hark back to the legends of the little red schoolhouse, yet the design encourages schools to rely upon modern technology to foster that support.

Development of the MRSH design began in 1992 when the Hudson Institute was awarded a contract from the New American Schools Development Corporation (now New American Schools) to design and pilot a comprehensive design for 21st century schools. Practitioners from six school districts in Arizona, Indiana, New York, and North Carolina collaborated with Hudson Institute researchers to develop a design for schools that would enable all, rather than some, students to master high academic standards. The original design rested on the fundamental premise that realizing high academic standards for all students required school and classroom practices that allow students different paths (in time and instructional experiences) to reach the same standards (Kilgore & Pendleton, 1993).

Implementing the MRSH design generally requires three to five years of intense support from MRSH advisors. Like the students they serve, schools are understood to have different needs when they adopt the MRSH design—not only in terms of leadership and organization but also in terms of technology, instruction, and community and family partnerships. Training and support for implementing the design, then, are customized to meet those needs. The general objective is to build a staff's capacity to develop and continually adapt an effective instructional program that supports student mastery of high academic standards. For the leadership component, the ultimate objective is to build a school staff's capacity to reflect upon the effectiveness of its

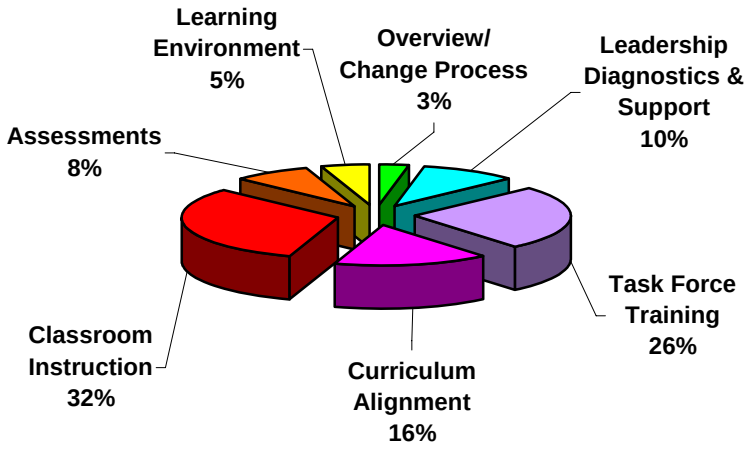
instructional programs and to make appropriate adjustments in school practices—that is, to have the capacity for continuous improvement.

Figure 1 shows the types of professional development activities at MRSH sites. In general, members of MRSH's team are on-site twenty to thirty days per year primarily working with teachers in small groups. Over half of the support to schools targets instructional issues that are central to developing high-performing schools. Organizational and leadership training constitute the remaining effort.

The professional development provided to schools working with MRSH reflects several premises regarding how one transforms school performance:

- Professional development activities should improve the capacity of educators to develop and sustain a high-performing school that serves all children;
- New practices and programs must support state and district expectations;
- The unique strengths and weaknesses of a school must inform the type of professional development activities that educators use;
- Professional development must address needs as perceived by the educators;
- Professional development works best when educators can establish long-term relations with trainers and experts; and
- Professional development involves doing the work of teaching and managing, not just listening or talking about it.

FIGURE 1
Focus of MRSH Training:
Percent of training typically devoted to various issues



This document provides a short overview of the research and guiding principles that give shape and substance to the design and inform the staff development provided to those adopting it.

Standards and Instruction

Research in a variety of disciplines makes one thing very clear: Improving student achievement begins by looking at what is taught from the point of view of the student. Does learning progress in a coherent manner? Does it provide students with the opportunity to master challenging academic content? On the other hand, are students taught the same thing, year after year? Sociologists find that equality of opportunity in education begins with *what* students have an opportunity to learn (Gamoran & Weinstein, 1998; Gamoran, 1996; Bryk, Lee, & Holland, 1993; Bishop, 1988; Garet & Delaney, 1988; Sebring, 1987; Dreeben & Gamoran, 1986; Schmidt, 1983; Coleman, Hoffer, & Kilgore, 1982; Barr, 1974). The use of academic standards should

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ensure that what students are taught constitutes a coherent opportunity to master challenging academic content.

For students from disadvantaged backgrounds, this issue is especially important. That is, disadvantaged students are more dependent on schools for their academic learning than are children from more socially advantaged backgrounds[1]. For that reason alone, MRSH developers knew that schools must begin any improvement effort by addressing the fundamental issue: What should be taught? In the early 1990s, partnering schools relied upon academic standards developed by MRSH. In the past five years, challenging academic standards have been established in nearly all states. The MRSH team now begins its partnership with schools by exploring these central questions of alignment: Does the content of the school's instruction match the content of the state standards? Are there gaps or redundancies? How does student work show mastery of these standards?

What is taught must form a coherent whole and constitute increasingly sophisticated mastery of skills and subject matter (Newmann, et al., 2001). David T. Gordon, writing about the research from the Consortium on Chicago School Research (2002), says that researchers discovered that lessons on the parallelogram in 1998 were being taught essentially the same in the 2nd, 5th, 8th, and 10th grade classes—offering a 2nd grade lesson. Moreover, Cliff Adelman (1999), studying a nationally representative sample of high school transcripts from the 1980s, found students skipping around in their course enrollments in mathematics. He even found students enrolled in remedial mathematics and calculus in the same semester. To form a coherent whole, what is taught must be sequenced to ensure that students have the necessary prior knowledge and encounter the challenge of increasingly sophisticated new concepts.

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[1] Given that students from disadvantaged backgrounds have less opportunities to learn outside of school—with computer games, attending summer camps, vacationing in historical places—what is taught at school is even more important to them than the average child (Heyns, 1978).

Once alignment with standards is evaluated, one can address the "how" of teaching. For if teachers are teaching, but students are not learning, then *how* one teaches is obviously an issue. At the secondary level, how students are taught is often a bigger barrier to learning than what is taught.

Debates about pedagogy—the how of teaching—haunt most educators. Educators, as well as the public, often have strong convictions about how students should be taught. As a consequence, many discussions of pedagogy often become exchanges with high volume, but poor reception. Too much static in the transmission makes it hard for folks to hear one another.

The debates on pedagogy revolve around three enduring issues that I discuss in some depth below:

- What do we expect students to be able to do with what they learn?
- How should students be motivated to learn?
- What is the role of a teacher in the learning process?

What do we expect students to be able to do with what they learn?

Public debates about the best or worst instructional strategies give too little attention to what we want students to do with what they learn. Yet, research evidence from the cognitive and neurosciences is fairly clear: Best practices in instructional strategies differ depending on how one expects the learner to use what they are learning. Do we want them to be able to recite, upon request, a given procedure or set of facts? Do we want them to do well on next week's history test? Well sure, that's great, but hardly enough for states to justify the investment of billions of taxpayers' dollars. In the larger scheme of things, MRSH developers thought the American public would agree: Students should learn in ways that allow them to remember what they've learned for a long time, and to be able to use whatever they've learned in future academic pursuits as well as in their daily lives.

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Remembering things: Steven Pinker, author of *How the Mind Works* (1997), notes that our brains are marvelously efficient machines; we remember what we use frequently—be it telephone numbers or basic addition facts. Cognitive scientists find that rehearsals are a critical activity for recalling facts and procedures.

Rehearsal strategies include what educators often refer to as "drill and kill"—a label that carries quite a bit of baggage. Bad reputation notwithstanding, there are appropriate times to use rehearsal strategies: when the knowledge or skills need to be used automatically and when the same signal or prompt will be used when that skill or knowledge is needed (Bransford, Brown, & Cocking, 1999; Hasselbring, Goin, & Bransford, 1987; Belmont & Butterfield, 1971; DeGroot, 1965). For instance, playing a musical instrument, driving a car, keyboarding, dribbling a basketball, and multiplying numbers as part of a larger mathematical problem require one to recall facts and procedures instantly, with no conscious reflection. Drivers who need to think through the physics of motion before they apply the brakes are dangerous. Applying brakes at the right time needs to be automatic.

Procedural knowledge is usually acquired through rehearsals. "'I' before 'E', except after 'C,' or when sounded like 'A' as in 'neighbor' and 'weigh'" is a sentence that many of us learned in lieu of rehearsing every single word with adjacent "I's" and "E's." And, silly as it seems, as a rule, it proves to be fairly effective. We could apply the rule in our writing until the spelling became automatic. Rehearsing this procedure allowed us to manage some fairly arbitrary spelling rules. Having math facts available to us automatically can be important in our consumer transactions, and they are essential in many negotiations in business. Of equal importance, automaticity of many skills is required for advanced learning in many fields (Beck, et al., 1991; Beck, McKeown, & Gromoll, 1989; LaBerge & Samuels, 1974).

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Thus, if one wants to think that *all* learning involves the exhilaration of discovering new understandings about the universe, think again. Some essential parts of learning are about drill, diligence, and discipline.

For children, learning how to make your brain do what you want is empowering. Students who learn strategies, rather than just drills, for recalling information allow themselves to win twice: First, they remember what they need to know; second, they have strategies for the future (Brown & Campione, 1994, 1996; Linberg, 1980; Brown & DeLoache, 1978). Expert chess players, for instance, have an advantage because they rely upon recognizing the patterns of pieces on the board, not individual moves or the position of particular pieces (Bransford, Brown, & Cocking, 1999). Similarly, practice in recall that includes seemingly silly strategies can be applied in a variety of adult situations. Anyone over 40 would welcome a strategy for remembering the names of new acquaintances.

Relying exclusively, however, on rehearsals (i.e., practice, drill, and repetition without such strategies) can be a very time consuming way to teach and thus often inefficient. Moreover, only a limited part of what we want students to know and be able to do comes with the same signal or prompt in everyday life. So, educators should evaluate carefully how students will use the knowledge before relying solely on rehearsal of facts or procedures.

An early neuroscience experiment on memory (Craik & Tulving, 1975) sought to evaluate the effectiveness of various strategies that people used to remember things. The researchers considered three strategies: mnemonic, structural, and semantic. With mnemonic, people grouped the words they were to recall by sound: can, pan, ran, etc. For structural, participants grouped the words alphabetically. For semantic, words were grouped by meaning—say, all the animal names into one group, cooking utensils into another. Organizing words semantically proved to be the superior method. Thus, rates of memory are substantially better when words are grouped into categories with meaning.

This experiment is one of many that points to one general finding: Improving memory begins by improving understanding. Thus, if you need to remember something for a long time, but it doesn't need to be automatic, then understanding it (giving it meaning) is the best way to do it (Bransford, Brown, & Cocking, 1999; Schwartz, et. al., 1999; Brown & Day, 1984; Wertheimer, 1959).

Improving memory begins by improving understanding.

In the cognitive sciences, the value of understanding in recall has long been in evidence. Katona's classic studies from the 1960s, reported in *Organizing and Memorizing (1967)*, provide some of the clearest evidence that if one understands a principle, one can remember it for a longer time than if one has merely memorized a procedure by repeating it numerous times.

Using card tricks, Katona conducted a series of experiments on long-term recall in an attempt to evaluate the efficacy of memorization versus understanding. He summarizes the issue quite succinctly:

> In memorizing, the time required for learning depends on the number of repetitions. Learning takes longer for much material than for a small amount. On the other hand, learning by understanding is independent of the amount of material, since the understanding of a trick with a very few cards is sufficient to ensure knowledge of the trick with a very large number of cards. Therefore, memorizing is a quicker method of learning only when a small amount of material is concerned. For a large amount and for more complex material, meaningful learning is much easier and much more acceptable to the subjects than memorizing. (Katona, 1967)

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Thus, research evidence is fairly clear: Nothing beats repetition, drill, and practice for those things one needs to do almost automatically long into our adulthood. When material is extended or complex, however, teaching for understanding is much more efficient—that is, our ability to remember is strong for a longer period of time with this method, and it takes less time to learn it than with rehearsal strategies.

In practice, MRSH encourages educators to individualize rehearsal activities, i.e., drill and practice. Establishing a learning environment that allows students to use computerized drill and practice customized to their specific weaknesses, or just flash cards and specifically designed games, is essential. Practice time should not only be individualized but also designed to fill slack time that usually occurs during the school day. Most of the class time

that requires all students to focus on the same activity, on the other hand, should be devoted to interactions, presentations, and discussions that advance the understanding of concepts—where both long-term memory and the ability to use what we've learned are achieved.

Using what we've learned: Behaviorists conducted some of the first scientific research on learning in the early part of the 20th Century. They began their work seeking to find out what types of rewards (or punishments) were most effective in creating desired responses—and thus Pavlov's famous dogs. Later, though, as they tightened their focus on human learning, they sought to figure out what types of stimulus brought the desired "response"—where the stimulus could be a question or a problem. They consistently failed to find evidence that people could transfer what they had learned in one context to a new situation. Their research showed that one needed to use the same stimuli to evoke the response, whether they were facts or procedures. So, for instance, a word problem used to evaluate mathematical knowledge needed to look quite similar to the problems students were given during instruction. In fact, some thought it was unfair to evaluate student learning unless the test used the same stimulus as that used when teaching a student (Cohen, 1987).

Not surprisingly, researchers and real folks did not find this a very satisfying outcome. That's why research such as Katona's was so important. After all, what's the use in learning something if you are not able to apply it to new situations?

Thus, researchers began to focus on the problem of "transfer," not only because adults who had learned many mathematical principles in formal schooling were seldom able to apply them in everyday life, but also because people who had never been to school developed some fairly sophisticated ways of counting things in daily life—yet, they, too, could not apply their strategies to new situations. Clearly, just learning about numbers in a "real life" situation would not create transfer any better than formal schooling (Scribner, 1990).

The process of transfer has analogies to a subject catalog at a library or a search engine for the Internet. In each case, a keyword or phrase should link us to relevant information. If the linkages in a catalog or search engine use

only books (not journals, video, or other media) and only the titles of those books, a lot of relevant information is omitted. So a person interested in finding information about children's health would discover only books that had those two words in the title. A good deal of information about children's health would be left out. Similarly, our brains may supply only a few of the connections possible when asked to recall what we know about a topic. The stuff we forgot to include would be, to use the terminology of cognitive scientists, "inert" or inaccessible. And, what good does it do to know something if you can't "call it up" when you need it?

Advocates of a constructivist approach to learning seek to address the problem of inert knowledge and, more generally, the challenges of teaching for understanding. Constructivists generally begin with the premise that each individual must construct his or her own meaning of concepts, linking prior knowledge to experiences with new concepts. Constructivists argue that learners should be actively engaged in authentic (or real-world) projects that allow them to acquire understandings that can be transferred to novel situations. Many teachers are encouraged to create real-world activities, such as a classroom store, to teach general principles of a discipline.

While it's clear that the constructivist approach advances the cause of being able to apply what we know to new situations, research on teaching for application (or transfer) provides some cautionary tales. Simply providing students with experiences with "real life" situations where a concept is used is usually inadequate. Instead, such experiences must be combined with some approaches more commonly associated with the approach of behaviorists: Students need links with a bigger picture—some "teacher talk" that helps students make connections and organize the general principles evident in the specific application.

Research, then, shows that students need *both* of the approaches common to behaviorists and constructivists in order to be able to apply a concept to a new situation. Learning in a particular context needs to be generalized to a class of related problems with the similarities and differences articulated. For instance, if students are asked to design a playground, the experience needs to include more generalized reflection on the scientific

principles used to design safe and enjoyable places for people. Then, students would be more able to apply the general principles to building, say, a shopping mall.

Good academic standards should help establish generalized principles that students need to learn from specific learning activities. And, good instruction requires that teachers help students make those connections.

An important fact must be kept in mind: When designing instruction that will enable students to apply what they've learned to new situations, the least effective method of instruction is one that merely teaches in one context or case (in fact, it can reduce students' ability to transfer information). Just providing abstract principles is better, but learning those principles in multiple contexts is best (Bransford, Brown, & Cocking, 1999).

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How should students be motivated to learn?

Learning is ultimately a voluntary act. Listening, observing, and thinking are private acts that are essential activities in learning that no one can force upon another person. One can look attentive, for instance, yet not hear a word spoken. One must somehow be motivated to learn in order for these critical acts of learning to occur. Among educators, the question typically is framed as follows: To what degree should teachers rely upon intrinsic versus extrinsic rewards to encourage student learning?

Early in the 20th Century, behavioral researchers focused on extrinsic rewards educators could use. Public schools were often organized to provide rewards to learners—grades, graduation requirements, and recognition ceremonies. Eligibility requirements for sports exist because of the assumption that students need some reward—or extrinsic motivation—to learn. While these practices may have had a powerful effect on many students in earlier generations, they have seldom engaged a significant portion of the population of low-achieving students from disadvantaged circumstances.

Progressives in education, most often associated with the work of John Dewey, approached motivation differently. They argue that learning occurs best when students are motivated intrinsically—that is, a child's natural curiosity should direct his or her learning. The intrinsic interest in the subject or the pleasure that arises from mastery will, they argue, enable learning to occur. In fact, when people of any age are intrinsically motivated to learn, they do listen and read more carefully, work longer and harder to understand something, and if they experience the emotional excitement of learning—an important attribute of intrinsic motivation—then they will remember what they've learned for a long time.

While learning that is led by a student's current interest is certainly a powerful experience that in many cases provides a learner with deep understandings, students must have sufficient prior knowledge to understand complex principles. Unfortunately, a learner's natural curiosity can take many unpredictable directions that may or may not allow him or her to have the necessary prior knowledge to master essential principles of science before, say, completing twelve years of formal schooling. Gaps in knowledge can and do occur, and the ability of teachers to build upon children's prior knowledge is especially challenging when each student arrives with a unique "package" of prior knowledge.

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Research evidence from the 1980s suggests that relying on intrinsic motivation has limitations in general practice. In the late 1970s, high school students had a broad range of courses from which they could choose to enroll. Academic requirements were at a minimum. By 1979, 42 percent of the high school students were enrolled in a general track with few required courses, and it neither prepared them for entry into the work force nor to complete college (*A Nation at Risk*, 1983). Many disadvantaged students don't have information about the importance of academic

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learning to their future options. Ruby Payne (1998) argues that our most disadvantaged youth often enter schools from a world of seemingly random events that can limit one's curiosity about how things happen or change. Moreover, adolescents from all walks of life are often more concerned about the more immediate pleasures of clothes and cars than their long-term opportunities as adults (Grant, 1988; Powell, Farrar, & Cohen, 1985; Cusick, 1983; Coleman, Hoffer, Kilgore, 1982). Thus the dilemma: If one accepts that a standards-driven system is the preferred method of determining what should be taught and acknowledges the power of intrinsic motivation in the learning process, then one must accept that educators have an essential role in cultivating such an interest.

If one doesn't insist upon drawing the boundaries between extrinsic and intrinsic motivation with too fine a line, teachers can, in fact, affect the degree to which a student becomes intrinsically motivated to learn. The oldest research tradition on student motivation shows time and again that teachers who are passionate about the subjects they teach have a contagious effect on their students. Passion, however, is quite like charisma—it is hard to train people to become "passionate." Unlike charisma, which, by definition, is visible to other people, passion about learning can be invisible in, say, some otherwise shy teachers. It is unrealistic to expect all teachers to be able to demonstrate passion with overt enthusiasm, so other strategies must be considered.

First and foremost, all teachers can cultivate a passion for learning by the beliefs they bring to the classroom. Shepard (2001) reports that motivational research finds that students who believe that academic achievement is determined by fixed ability are more likely to work toward "performance goals," that is, for grades, to please the teacher and to appear competent. "Performance-oriented students tend to pick easy tasks and are less likely to persist once they encounter difficulty" (Stipek, 1996). Students who attribute academic success to their own efforts are more likely to adopt learning goals, which means they are motivated by an increasing sense of mastery and by the desire to become competent. Not surprisingly, "students with a learning orientation are more engaged in school work…and

Cultivating a passion for learning begins with the beliefs that students and educators bring to the classroom.

develop deeper understanding of subject matter (Wittrock, 1986)." Teachers cultivate a learning orientation when they express confidence in the role of effort in mastery of complex concepts.

Consider the aerobics instructor who has students with wide ranges in proficiency. Those with low levels of proficiency are encouraged to understand that people have different levels of experience with athletic challenges, and that, with extra effort, they can demonstrate an adequate level of proficiency. The confidence that the instructor exhibits actually creates a commitment among those with lower levels of proficiency to persist and make the extra effort. Progress toward that goal is praised just as often as exceeding it.

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Second, motivation is better when educators treat mistakes as a normal part of learning, and their feedback reflects an absolute goal rather than some accomplishment relative to other students (Shepard, 2001; Stipek, 1996). Simple words—"oh, that often happens the first time someone tries this," or "it's not unusual for someone to make that mistake"—allow a student to see his or her mistake clearly, and, yet, sustain a willingness to try again. Without such support, students lacking a strong history of success in school may be especially inclined to abandon making an effort. Just a few comments from a teacher can sustain and direct a student's effort when he or she might otherwise quit trying.

Finding ways to link what needs to be learned with students' existing interests is another obvious way to cultivate a student's intrinsic interest in learning. To make those linkages, an educator must be fluent in the social history and culture in which his or her students live. Elementary school teachers in Harlem teaching about the European Renaissance can integrate the history of the Harlem Renaissance—thereby stimulating increased student interest and

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understanding. Similarly, the pop culture of students—from SpongeBob SquarePants® to Power Puff Girls®—holds numerous resources for motivating students in their academic learning. A cautionary tale, though, must be that teachers cannot assume that they know those interests, but rather work from evidence given by the students themselves.

An important implication of this motivational challenge is that schooling must be organized in ways that give teachers sufficient freedom to construct learning experiences that include links to children's interests and cultural background. Districts and schools that limit instruction to scripted programs developed for the average student fail to provide that freedom.

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Finally, assessment strategies can also cultivate motivation. Learning that leads to a public performance (Sizer, 1984) or a product that will be appreciated in the community, such as a newspaper (Wigginton, 1986), can be especially motivating. Publishing a paper or magazine provides a wealth of opportunity for instruction, and it also results in an activity or product that can excite otherwise indifferent students. Designing and planning a community garden can be rich with opportunities in science and mathematics. With proper guidance, community volunteers can bring plans into reality. Such strategies are especially effective for students who have come to ignore traditional incentives, such as grades. Learning opportunities in these situations, however, must be carefully planned to ensure that students extract general principles and acquire competencies that allow them to meet academic standards—a problem discussed earlier. Each student must be able to demonstrate that they've mastered the essential concepts.

Motivation, then, becomes an important responsibility in a standards-driven environment, and teachers have a variety of strategies—from the convictions they demonstrate to the links they can make with a student's interests and cultural background as well as the types of activities they construct for learning. The challenge is to integrate these opportunities into the routines of teaching and learning.

What is the role of the teacher in the learning process?

Efforts to transform classroom instruction into powerful education experiences have led theorists of learning to contrast teacher-centered with student-centered instruction. Teacher-centered instruction occurs when instructors lecture in class, organizing the material students need to master in digestible tidbits. Students are viewed as receptacles into which new knowledge is poured. Critics contend that students often memorize tidbits, yet lack the ability to use these tidbits or remember them for long periods of time.

Student-centered instruction begins with the proposition that all learners construct their own knowledge and that the role of the teacher is to provide experiences and activities that allow students to develop their own understanding of how things work. Generally, educators are encouraged by experts to increase the use of student-centered instruction—primarily because of the evidence that students learn best when they actively construct their own understandings. Critics of student-centered learning contend that such learning leads to an unacceptably high number of students who are "off task" (i.e., not engaged), wallowing in misconceptions that are never corrected, and treating differences in perceptions and conclusions as mere differences of opinion.

On the other hand, research evidence is clearly supportive of two principles of instruction associated with student-centered theory: New learning must be linked with prior experience, and students have a deeper understanding of concepts and retain what they learn longer if they actively organize the material themselves. That said, "prior experience" is a much broader concept than advocates of student-centered theory often allow. It includes prior academic knowledge, social experiences outside the classroom as well as experiments or activities within the classroom. In essence, teachers must link the new with the familiar. Similarly, actively "organizing material" may be strictly an intellectual task that reconstructs or rearranges the "new material" into a meaningful set of connections—using outlines, webs, path diagrams, matrices, or other tools for systematizing and visualizing patterns and relationships.

Teachers must make the link between the new and the familiar.

Research evidence, summarized in *How People Learn* (Bransford, Brown, & Cocking, 1999), supports the critics of both teacher-centered and student-centered approaches to instruction. Lecture-based instruction, where students memorize facts and procedures, tends to produce unwanted outcomes: (a) Students cannot use what they learn in new situations, and (b) Students forget what they learned fairly quickly. Student-centered learning is intended to solve those problems. Research evidence, though, suggests that relying on student activities exclusively can be worse than just using lectures. Students, in fact, need help in discerning organizing concepts and making connections. Moreover, they can, in fact, cleave to misconceptions for years.

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Bransford, Brown, and Cocking (1999) argue that if students learning science "are given problems to solve on their own…it is highly unlikely that they would have spent time efficiently." Instead, these researchers argue, students should work with a tutor (which could even be a computer-based system) "to rehearse appropriate practices" and identify the underlying principle at work.

Teaching strategies that rely upon *both* methods are more likely to give students the capability of applying what they've learned as well as remembering what they've learned (Schwartz, et al., 1999). In fact, learning is best achieved with what MRSH developers call teacher-led learning. Studies from the 1980s show that students learn more in classes where they spend considerable time being taught or supervised by their teachers, rather than doing seatwork while the teacher sits at his or her desk, or rather than engaging in discovery learning without benefit of questions or suggestions from the teacher (Muijs & Reynolds, 2000; Lampert, 1988; Galton, 1987; Brophy & Good, 1986).

Teacher-led learning involves six critical actions: engaging students' interest (discussed earlier); linking new learning with prior knowledge; providing students with "the big picture" and where what they are learning fits into it; establishing opportunities for students to experience, organize, and apply new concepts; uncovering (and correcting) misconceptions students may

have about the concepts, principles, or facts; and nurturing their understanding of excellence.

Teachers must take responsibility for providing students with the big picture.

The research shows that teachers must take responsibility for providing students with the big picture—how what they are learning fits into the landscape of that discipline. (Why are we doing this? How does this fit with what we already know?) Experts in any given field have an organized body of knowledge in their discipline. Bransford, Brown, and Cocking (1999) refer to its mastery as "knowing the landscape," which is to say that an expert knows the relationships among various concepts and pieces of knowledge, and how the big ideas in their discipline fit together in that landscape.

Textbooks, as currently written, can be major barriers to gaining a sense of the landscape. Both the National Research Council and the American Association for the Advancement of Science find that science textbooks, for instance, overemphasize facts (the names of the planets closest to Earth) and give too little attention to the big ideas (such as space and time). When developing a scope and sequence—or reviewing one from a text—educators need to evaluate the degree to which connections are made among various concepts and facts (Bransford, Brown, & Cocking, 1999).

Wiggins (1993) talks about the need for students to link what they are learning to essential questions. (Is there enough to go around, e.g., food, clothes, water? When is a law unjust?) The National Science Education Standards (NSES) emphasize students' need to learn unifying concepts, such as change and continuity. Historians often talk about enduring issues, such as individual and community, liberty and order, and diversity and unity. For literature, the landscape includes enduring themes that writers address and genres that emerge in certain cultures and periods of history. Well-written academic standards should provide guidance on the landscape students need to see in order to organize their learning.

Research in cognitive psychology and neuroscience is fairly compelling: In order for students to understand, apply, or even just remember something, they need to be able to make sense of it using their prior

experiences. Thus, instruction must be student-centered insofar as the prior experiences and culture of students are used to help students make sense of whatever scientific principle or historical issue one hopes for students to master. Fortunately, introducing new concepts in terms of a student's prior experiences is also a means to increase student interest in learning.

Research also shows that teachers must actively seek to uncover misconceptions. H. Jackson Brown in *Live and Learn and Pass It On* (2000) entertains us with what children think they've learned at various ages. One seven year-old reports, "I've learned that when I eat fish sticks, they help me swim faster, cause they are fish." Research on teaching, especially science, demonstrates how misconceptions, much less humorous than the effects of fish sticks, create barriers to understanding principles or concepts. Teachers cannot teach by just telling students something, or even just demonstrating. Effective instruction must be inquisitive—asking students to explain, clarify, or make predictions about the concept under scrutiny. Only then can teachers uncover the particular misconceptions hiding in the minds of their students.

Effective instruction must be inquisitive.

Finally, research evidence suggests some responsibilities for teachers that are not naturally embedded in either the student-centered or teacher-centered approach to learning. In general, these responsibilities follow one general notion: Teachers much teach in ways that students come to know excellence. They do this by providing frequent feedback, by helping students learn how to evaluate the adequacy of their own work, and by coaching students as they seek to apply principles and procedures to new problems[2].

The role of the teacher in the learning process, then, is an active one—not exclusively constructivist or traditional.

Traditional approaches to educating children generally keep the criteria for excellence a secret—giving the advantage to children whose parents know the secret. The constructivist approach is generally quite leery of a notion of excellence, interpreting different levels of

[2] These skills of self-reflection are referred to as meta-cognitive skills by scholars of learning.

performance as developmental differences among children. Both approaches create dangerous outcomes.

Simple fairness in opportunity to learn dictates that what constitutes excellence—and even adequacy—be public knowledge in school settings. As evident from the research on motivation, making standards of excellence accessible allows a student to see how his or her efforts should be directed—buttressing a student's desire to learn. Posting and discussing rubrics that describe excellence in a generic context (such as writing) or for a specific project or assignment (such as an analysis of *Hamlet*) allow students to review their own performance against a benchmark of excellence. Teachers can help students use rubrics to evaluate their own performance and make appropriate adjustments or improvements in their work. Developing rubrics as a classroom activity allows students to develop skills in evaluating excellence.

Making standards of excellence accessible allows a student to see how his or her efforts should be directed.

Knowing excellence also includes skills in learning—monitoring what makes sense, considering how new information is consistent with what one has learned in other contexts, and knowing how one learns best and adapting accordingly. Students acquire these skills slowly, but more consistently if educators guide students in this type of self-reflection.

The role of the teacher in the learning process, then, is an active one—not exclusively student-centered or teacher-centered.

In summary, applying research on learning to practice, school improvement efforts begin with what is taught. School-based research allows teachers to identify gaps and redundancies in terms of their state standards and in the current learning experiences of students across grades and subjects. State assessment data are used to evaluate strengths and weaknesses in student achievement. Using that evidence, MRSH advisors help teachers to develop collaboratively, across subjects and grades, a scope and sequence for learning that aligns with state standards.

Using materials from a variety of sources, educators design instructional activities that meet the profile of teacher-led learning—that is, lesson plans that engage students' interests, build on students' prior experiences, provide students with the big picture, and pursue interactions with students to uncover misperceptions. Those lessons also provide strategies to help students organize and systematize new knowledge for themselves and allow students to know excellence as it applies to their work. Students are active learners, but teachers are also active in helping students construct understandings that will be accurate, enduring, and useful.

Designing a coherent and effective instructional program usually requires changes in organizational practice that allow educators to use time differently and to develop appropriate support systems for them as well as their students. Thus, organization and leadership strategies are important to the MRSH design—an issue addressed in this next section.

School Leadership and Organization

A number of school practices and community support systems are affected when schools seek to ensure that all students demonstrate proficiency in academic standards. First and foremost, it requires that school leaders have some level of control or influence over school and classroom practices—which we refer to as site-based decision-making. Second, it requires that those affected by change have some voice in shaping the change—in other words, some participative management. Third, leadership must focus on instruction in a standards-driven school. And, finally, all the stakeholders must acquire strategies for managing change, for frustrations inevitably arise when substantial change occurs.

Site-based decision-making

Evidence from research in cognitive psychology regarding effective instruction (Bransford, Brown, & Cocking, 1999) as well as evidence from organizational literature (Darling-Hammond, 1990; Senge, 1990; Deming & Walton, 1988; Hall, 1982) suggests that many decisions are better made (both

in terms of efficiency and quality) at a school site rather than as a district-wide policy. Every school is situated in a unique environment with varying types of resources (community service agencies, business partners, volunteer profiles). To mandate, then, that all schools will hire, say, a school psychologist may create redundancies in some schools—where one school is already being serviced by a community psychologist in their building or neighborhood. Thus, the original developers of the MRSH design sought to find ways that schools could exercise some meaningful influence on staffing, the organization of the school day, the design of instruction, and the acquisition of materials and equipment.

Obviously, the scope of autonomy given to schools varies across districts. Even in instances where district superintendents are committed to site-based decision-making, barriers remain. Tradition and habit often drive the actions of the central office staff; the new responsibilities given principals create risks they may want to avoid; teachers, understandably, may not think it is worth their time; and often state laws set tight boundaries on the range of autonomy schools can exercise.

MRSH advisors work within the scope of autonomy accorded schools and help principals identify whatever site-based authority exists. Even in highly bureaucratized school districts, some meaningful measure of control over the school practices can be achieved by astute management of a district's policies (as in staffing) or by direct requests for a specific change in practice (such as bus schedules).

Participative management

Separate from site-based decision-making is the issue of participative management; that is, involving some or all of the staff in the decision-making process. The effects of using participative management in schools on the quality of decisions (Murphy & Beck, 1995; Friedkin & Slater, 1994; Weiss & Cambone, 1994; Chrispeels, 1992; Chapman & Boyd, 1986; Rosenholtz, 1985) and student achievement (Leithwood & Menzies, 1998; Robertson & Briggs, 1998) are somewhat mixed. Yet, when one looks across research in all types of organizations, making good decisions requires the wisdom and perspective of

persons throughout the organization (Deming & Walton, 1988). Many problems can be avoided when many people are consulted about the options. It may save an administrator's time to use the public address system to call a student to the office, but it also disrupts the learning of hundreds of other students.

Just as important, though, research on participative management is especially clear about one thing: Effective change—change that actually takes root in an organization—requires that those affected by the change be consulted. Research on school reform (Sebring & Bryk, 2000; McLaughlin, 1987; Rosenholtz, 1985) as well as organizational studies (Pfeffer, 1997; Drucker, 1986; March & Simon, 1958; Coch & French, 1948) show that participative management, even of limited scope, increases the likelihood that decisions will be implemented more completely and adapted to local circumstances.

Urban school district leaders, under pressure for quick change, are most likely to rely heavily on top-down (rather than participative) decision-making strategies. Yet, research on urban school reform is littered with instances where principals sought to buffer teachers from new expectations or where teachers found ways to close their doors and maintain their current practices. School staff reason, often quite sensibly, that the pressure for change will disappear when the inevitable change in leadership occurs. At best, staff often choose to mold a new mandate to create the least disturbance to existing practice (McLaughlin, 1987).

The inability of leaders to convert mandates or new policies into action, MRSH developers claim, is a critical barrier in most efforts to change practices in public schooling. For change to occur, those implementing the decision must own it. As Drucker (1986) explains, "It [implementing a decision] requires that any decision become 'our decision' to the people who have to convert it into action. This in turn means that they have to participate responsibly in making it" (p. 365). If people are able to evaluate alternatives in terms of how they will improve the quality and efficiency of their work, it is likely that the decision will be better than ones devised in isolation by a manager.

MRSH advisors encourage principals not only to establish a leadership team, but also six or so task forces focused on core issues composed of teachers and parents. Teachers often claim that their long-term commitment to the MRSH design began with their experience on a task force. Similarly, that structure allows schools to recruit politically significant people in their neighborhoods—people from social or medical services, small businessmen, and area school board members. These community representatives can become not only active committee members but also ardent advocates of the school in the often turbulent urban school environment (Resnick, NSBA, 2000). Not surprisingly, the role and effectiveness of these task forces have proven to be dependent on the support and direction of the principal and other significant administrators (Hallinger, Murphy, & Hausman, 1992). Task forces are central to effective implementation of the MRSH design.

Teachers often claim that their long-term commitment to the MRSH design began with their experience on a task force.

For participative management, then, the MRSH design expects some minimum consultative role for a leadership team and task forces regardless of the principal's current practice. Given that principals do vary in their leadership styles and dispositions and that school histories affect the readiness for and interest in participative management, the design allows for considerable variation across sites in the level of influence and control given to teachers.

A leadership team with task forces provides a principal access to many ways of looking at issues and generates the commitment needed to implement changes. Through routine interactions, principals should also help teachers create a culture of collegial review and build the capacity for continuous improvement.

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Instructional leadership:

Elmore (2000) defines the responsibilities of an administrative leader as:

> "…enhancing the skills and knowledge of people in the organization, creating a common culture of expectations about the use of those skills and knowledge, and holding people accountable for their contributions to the collective results." (p. 15)

What remains unclear is the degree to which these administrative responsibilities can be delegated to others in the school. Can a principal, for instance, just make certain that the structure and resources needed to enhance skills and knowledge are present, or does he or she need to engage personally in enhancing that knowledge? Friedkin and Slater (1994) find, for instance, that the degree to which teachers seek advice from their principal affects school performance. Moreover, accountability systems, of most any sort, place "the buck stops here" sign on the principal's desk.

On the other hand, Stinchombe's (1965) classic analysis of organizations would suggest that there are multiple ways to meet certain essential organizational functions. And clearly, good leaders do hire staff that compensate for their weaknesses, so why couldn't principals do that for instructional leadership? Most principals often lack the training and preparation to assume every responsibility associated with instructional leadership. More often, they deliver the resources and create the culture needed for teachers to provide powerful instruction (Senge, et al., 2000).

While some specific tasks of instructional leadership, such as instructional coaching, may be delegated to others, a principal must organize his or her time and attention in ways that clearly communicate the priority he or she gives to student learning.

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The National Association of Elementary School Principals (2001) proposes six standards for what principals should know and be able to do as instructional leaders. The focus of these standards is on student learning and academic success. They include:

- Leading schools in a way that puts student and adult learning at the center of all efforts;
- Promoting the academic success of all students by setting high expectations and high standards and organizing the school environment around school achievement;
- Creating and demanding rigorous content and instruction that ensures student progress toward agreed-upon academic standards;
- Creating a climate of continuous learning for adults that is tied to student learning;
- Using multiple sources of data as a diagnostic tool to assess, identify, and apply instructional improvement; and
- Actively engaging the community to create shared responsibility for student and school success.

  (p. 6-7)

Nearly all of these standards require leaders to act in ways that communicate the priority they give to student and adult learning. That communication would be evident in how administrators use time at faculty meetings, the degree to which they are engaged in training sessions for their teachers, how often they visit classrooms to discover what students are learning, whether they hold staff accountable for their contributions, and their efforts to recognize success stories, big and small, in student learning. Thus, regardless of what others do, principals must personally convey the importance they attach to the quality of instruction and learning in their schools.

It is essential that principals personally convey the importance they attach to the quality of instruction and learning in their schools.

Managing the change process

A school staff must see a compelling need for change. Urgency should be real, not contrived. Even with a sense of urgency, though, change is difficult.

Educators, more than most professionals, experience frequent shifts of what experts say is best for children. After several of these cycles, it's hard not to feel like a patient at the dentist's office. First, we're told to brush our teeth

up and down; several years later, it's sideways. Then, the hygienist insists circles are best. After many years of switching, it is easy to ignore the apparent shift in best practice. Educators, like those patients, may be tempted to shrug their shoulders and think, "Will they ever make up their minds?"

For all professionals, resistance to change often seems sensible. Every significant change in practice usually means that one's performance gets worse before it gets better. Even with the best instructions, one confronts instances where one or more of the following must be said: But I didn't know; I just assumed; it never occurred to me. Such confessions are frustrating to anyone who takes pride in doing things right.

Even with the best instructions, one confronts instances where one or more of the following must be said: But I didn't know; I just assumed; it never occurred to me.

When we change what we do or how we do things, we encounter the problem economists call "sunk costs." For instance, for every additional year we use a particular tool—such as an overhead projector—we become better at using it. Replacing that projector with computer software like PowerPoint®, may prove, in the end, to be better, but one has to invest time in developing the new slides, become comfortable with a new set of buttons, and learn new ways of walking and talking with this technology. The time one has invested in becoming fluent with the overhead projector represents the "sunk costs" one cannot recover.

On the other hand, no professional wants to deprive his or her clients, in our case students, of what's best just because it's too much trouble—thus, the significance of evidence-based practices. Those who would propose change have the responsibility of providing scientifically-based evidence about the effects of the alternative practices. Almost as important, educators should be provided evidence that the effort will deepen their understanding of teaching and learning or at least give them skills they can transfer to a variety of educational challenges. If those conditions are met, then educators have a responsibility to help manage change in ways that support others when their frustration is great.

Evaluating evidence on student learning: Recent federal legislation emphasizes the need for educators and policymakers to rely upon scientifically-based evidence in making decisions. Does this mean that every change in practice must be supported by randomized trials on thousands of students—such as is done with medical treatments—before they are used?

Anyone who works in schools knows that schools are messy places to conduct classical experiments—where students and/or teachers are randomly assigned to experimental or control groups. If the experimental and control groups are within the same school, then most individuals can tell to which group they belong. That is, it is hard to have placebos like medical science, where neither patients nor doctors know who is in the experimental or control group. A teacher assigned to a control group for classroom practices will find it hard to resist adopting a "treatment" practice he or she sees working for students in other classrooms. Yet, the ability of the researcher to evaluate the effects of the treatment depends upon the teacher *not* doing so. And, of course, parents rightfully may not want their child to participate in something deemed an "experiment." Classical experimental designs can seldom make the perfect link to the realities of the classroom.

Thus, it is important to view scientifically-based research as having various levels of credibility and excellence. As a guide for evaluating the level of credibility of scientifically-based research, we adapted the criteria specified by recent federal legislation into these essential considerations—

Anecdotal versus systematic data? A parent's story about how a child's performance improved or a teacher's story about how a student's behavior changed when he or she did something differently is usually quite compelling. Changes in school or district practices, however, should not be based simply on testimonials, regardless of their compelling nature. Educators need evidence that has been collected systematically—that is, observations on *all* children in a school or classroom (or a random sample of those students) should be used to establish evidence of effectiveness.

One-time success versus repeated successes? Every educator knows at least one principal or teacher who can make most any new strategy a success.

Perhaps they supplement any "treatment" with other practices that make the real difference. Maybe a principal's enthusiasm inspires classroom teachers to just work harder. Those factors could actually create improvements, rather than the treatment itself. Thus, it's important that changes in school and classroom practices be based upon data showing that student achievement has been improved in a variety of settings and circumstances. Even experimental designs require that a researcher have numerous trials.

Can you verify or must you trust? Educators should have more confidence in conclusions when they can verify the evidence used by researchers. There are two ways, in general, to verify results—both of which are important. Can you independently check the outcomes of the research? Does the researcher give you enough information to allow you to replicate the procedures he or she used to see if you obtain the same results?

Today, for instance, most state education departments have Web sites where one can obtain data on individual schools' performance on state assessments. Thus, anyone could independently verify the results obtained by a researcher using that data, provided that the schools or districts were identified. Or, if a researcher uses a public database to draw conclusions from a national sample of schools, the researcher should provide sufficient information that would allow someone else to verify the findings using the same database. In experimental designs, a researcher must provide enough detail on the procedures, conditions, and tests that would allow another researcher to repeat the process to see if he or she obtains the same results.

All robust scientific progress relies heavily on other researchers' ability to replicate and verify the work of others.

Grade level improvement versus student improvement? It is not uncommon for districts and states to assess school improvement in terms of changes observed over time at a given grade level. That's not such a bad thing, if you have a large number of students. But for schools with, say, 100 students at each grade level, just looking at the grade level performance can be very misleading. The problem, of course, is that one is comparing two different groups of students: third-graders in 2000 with those in 2001. Any experienced

teacher knows that there are random—and not so random—reasons why one cohort of students is different from another. It is a difference that has nothing to do with the quality of his or her teaching. The smaller the group of students in the analysis, the more likely such quirks will be visible. It is better, then, to have data on the same students over time, where individual gains can be evaluated. Evaluating student improvement is always better than focusing on grade level performance over time.

Given many of the rules regarding confidentiality, though, it is often difficult for researchers to gain access to student level data. If so, they should make cross-grade comparisons to come closer to student improvement measures, use data over three or more years, or look at school-wide changes.

Comparison groups, random assignments, or random selection? One of the important rules of scientifically-based research is that one should be able to eliminate other explanations for the changes one may observe. Classical experimental designs address this by trying to make the subjects (or schools) in the treatment and the control groups very similar. Ideally, the only difference should be that one group receives the "treatment" and the other does not. This is accomplished by assigning subjects randomly to the two groups—making prior differences in the groups simply random.

Survey researchers randomly select respondents in order to represent the differences among the population they study. They eliminate other explanations by determining if a pattern they see is the same for all types of people.

If we think about such "treatments" as comprehensive school reform, however, the situation gets especially complicated. It doesn't seem reasonable or fair to have schools go through a long and deliberative process to decide which comprehensive school reform design to choose, and then expect them to wait to see if they are randomly selected to actually implement the program. Consequently, one has to ask, "What are other methods that help one to eliminate the other explanations?" Comparing performance at schools implementing programs against similar schools that are not implementing is one way. Comparing the implementing school against district performance is

another. In each case though, it is harder to say that the comparison schools are similar than if one had been able to just randomly select schools.

Do other researchers value the research? Researchers regularly review each other's work—both in the process of just doing the analysis and also as part of evaluating whether the research results should be published in journals or presented at national conferences. One indication, then, that the results are robust is whether the results have been presented at a research conference, or better yet, whether they have been published in a peer-reviewed journal. Journals do, however, differ in their purpose and often differ in their standards for evidence. Thus, even laypersons need to have some sense of what counts as solid evidence.

Evidence that the learning needed will improve my professional skills: Is it useless to learn new strategies or adopt new texts when another instructional strategy soon will replace what was once new? Studies in learning word processing software show that prior learning does transfer. That is, after you've learned one word processing system, it's easier to master the second one—editing icons and procedures will differ, but having learned the range of options you have in editing will make the second learning experience easier.

Professionally, though, a change in practice should deepen one's understanding of what constitutes good teaching. An educator's capacity to evaluate new alternatives or pose solutions to old problems should increase. Given what we know about applying what we've learned to a new situation, it is obvious that any change in practice should involve a thorough understanding of *why* the change is better than what we've been doing. Just as with student learning, if teachers learn a new procedure with no rationale, there is only a small chance that they will be able to apply what they've learned to new or novel situations in the life of schooling.

Creating an environment supportive of change: Just as advocates of change have certain responsibilities, so, too, do those accepting the challenges of change. Researchers have found a predictable cycle of commitment and enthusiasm that people experience in changing strategies or tools. Initially, most people are enthusiastic, but as they confront the grim reality of frustration

when something doesn't work, they are disillusioned or embarrassed. In fact, change usually falters if everyone in an organization undergoing change hits the bottom at the same time.

Organizations that are successful with change create an open environment where not only frustrations can surface (rather than just simmering inside us), but also where folks can support each other through the rough spots. Just knowing that others have the same problems can create patience, and shared laughter about those frustrations can ride individuals of the ordinary anxieties that arise. Leaders must create a safe environment with time for reflection.

Managing change, then, requires, first and foremost, compelling evidence that the proposed change will make a difference in those outcomes we value as professionals, i.e., student learning. Second, the proposed change must improve our capacity to work as professionals. Finally, managing change requires that we accept responsibility for helping colleagues out of the inevitable doldrums that emerge when we try to do things differently.

MRSH training support and mentoring for school leaders

During the first year of implementation, MRSH advisors support a school's leadership by providing strategies for managing organizational change, conducting a diagnostic of school performance, mentoring, and training of task forces.

School staff learn to anticipate the peaks and valleys of enthusiasm and frustration they will encounter as they adopt new practices and technologies. Teachers identify strategies they will use to help themselves and others through those periods of frustration.

Given that teachers are expected to work more intimately and routinely with their colleagues, the school staff also learn about the strengths and needs of different personality types. With the use of the Myers-Briggs Type Indicator® (MBTI), teachers acquire ways of understanding their own behavior and that of others—giving them a shared vocabulary for understanding

differences and fostering effective strategies for dealing with them. Principals use the MBTI data to form task forces—enhancing the likelihood that a balance of various talents exists within each group.

Prior to beginning any work at a school, MRSH advisors conduct a diagnostic visit to profile student achievement and existing practices at the school. Teacher and administrator interviews, classroom visits, and a building walk-through provide data for the MRSH team to develop a plan of work for the first year that not only advances implementation of the design but also addresses immediate needs.

Each principal is assigned a mentor for the implementation phase who is also responsible for the training and support of the school's leadership team. The content of the principal mentoring varies, depending upon the experience, skill, and disposition of the administrator. For novices, it may focus initially on the fundamentals of setting expectations for teachers and students. More experienced principals may begin with efforts to refine skills in monitoring standards-driven classrooms and managing the larger environment. In all cases, though, mentors work with principals to establish and orient the leadership team and task forces—seeking to ensure that the membership is inclusive of various social and structural networks among teachers and that it balances the skills and talents within each task force.

As with principal mentoring, leadership team training is customized to match the level of experience of team members. Topics may include conflict resolution, development of task force agendas, communication plans, decision-making procedures, problem-solving strategies, and developing coalitions to support change. A critical component of this training is to establish consensus on the respective roles and responsibilities of the team and principal and to ensure a shared understanding of the sphere of influence accorded to the leadership team. State and district policies, as well as the dispositions of principals, influence variations in the shape and form of leadership teams.

A critical component of leadership training is to establish consensus on the respective roles and responsibilities of the team and principal and to ensure a shared understanding of the sphere of influence accorded to the leadership team.

Some or all members of the leadership team serve as chairpersons of task forces. While the MRSH design proposes six task forces (standards and assessment, curriculum, technology, community and parent partnerships, organization and finance, and professional development), schools are allowed to vary the number (combining or adding) as long as all essential functions are covered. During the first two years of implementation, task forces receive extensive assistance in developing a plan of action that supports student learning. Training, again, is customized and can be both procedural and substantive.

Embedded in the work of the task forces are core elements of the design. General goals are shared across task forces in a given school at each stage of implementation—supporting teachers as they design instruction, for instance, the organization and finance task force should evaluate ways to increase common planning time for teachers, while the technology task force should identify ways for all teacher teams to have the hardware, software, and computer skills for designing instructional units.

Specific activities at each site, however, are only partially shared with other sites. For instance, curriculum and parent partnership task forces almost always work together to establish routine practices that allow parents to support student learning and community members to support teachers' work in designing instruction. Beyond that, participating sites develop different approaches to community and parent partnerships that reflect the needs of students and the resources of communities they serve. MRSH provides assistance in identifying those diverse factors, developing a comprehensive plan of involvement that reflects the interests and skills of parents, and adapting strategies to address the students' academic needs. Community volunteers may be recruited to support the instructional program, help establish a consortium for early childhood education or social service support, or mentor students.

Conclusion

MRSH is, first and foremost, a capacity-building design that seeks to support educators in their efforts to create and sustain high-performing schools that enable all students to become high achievers. MRSH educators achieve instructional coherence at their schools through aligning instruction with their state standards. Attention to what is taught is fundamental.

The MRSH design resolves some of the well-worn debates about effective instruction through a careful analysis of the evidence. The debate about the efficacy of "drill and practice" is resolved by assessing what is expected from the learning experience. Teachers must evaluate the intended use of the learning that is expected of students, for effective teaching strategies differ depending on what students are expected to do with what they learn. Remembering facts and procedures for a long time can be taught using practice and rehearsals. These strategies are uniquely effective for things that should be fairly automatic—like multiplication tables and keyboarding. On the other hand, teaching for understanding is effective both for things a student needs to remember for a long time as well as for improving his or her ability to apply what is learned to new situations.

The debate about the significance of intrinsic motivation in learning takes a new turn with the introduction of standards. Stimulating a student's interest in a topic or concept is a non-negotiable responsibility of teachers working in a standards-based environment. With less opportunity to follow students' interests, teachers must seek out ways to motivate students. Fortunately, motivation is not simply achieved by compelling or passionate presentations, but it can also be stimulated when one creates an environment where effort makes sense. If students are encouraged to believe that their own efforts (rather than ability) allow them to achieve academic success, they become more engaged in school work. Conversely, simply motivating students with extrinsic rewards—grades, candy, or status—does little to activate the hunger for learning that children need to prosper as students and adults.

Finally, the debate regarding the relative effectiveness of behaviorist versus constructivist approaches to education is well-informed by research in

the cognitive sciences. Essential elements of teaching are found in each approach. A teacher must maintain active involvement in student learning. Research evidence suggests a particular mix of those two approaches. MRSH encourages teacher-led learning that requires educators to—

- Engage students' interests,
- Link new learning with prior knowledge,
- Provide the larger landscape of knowledge into which a given lesson fits,
- Establish opportunities for students to organize, experience, and apply new concepts,
- Engage students in ways that help uncover (and correct) misconceptions, and
- Nurture students' understanding of excellence.

Given the evidence on effective practices in organizational change, MRSH training fosters a collegial climate focused on student learning, where educators refine their leadership skills through a governance structure that involves educators, community leaders, and parents in evidence-based plans for continuous improvement.

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