BECOMING A High Reliability School

. . . The Next Step in School Reform

ROBERT J. MARZANO

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Table of Contents

About Marzano Research Laboratory

Marzano Research Laboratory (MRL) is a joint venture between Solution Tree and Dr. Robert J. Marzano. MRL combines Dr. Marzano's forty years of educational research with continuous action research in all major areas of schooling in order to provide effective and accessible instructional strategies, leadership strategies, and classroom assessment strategies that are always at the forefront of best practice. By providing such an all-inclusive research-into-practice resource center, MRL provides teachers and school leaders with the tools they need to effect profound and immediate improvement in student achievement.

About the Author

Robert J. Marzano, PhD, is the cofounder and CEO of Marzano Research Laboratory in Centennial, Colorado. Throughout his forty years in the field of education, he has become a speaker, trainer, and author of more than thirty books and 150 articles on topics such as instruction, assessment, writing and implementing standards, cognition, effective leadership, and school intervention. His books include *The Art and Science of Teaching, Leaders of Learning, On Excellence in Teaching, Effective Supervision,* the *Classroom Strategies* series, *Using Common Core Standards to Enhance Classroom Instruction and Assessment, Vocabulary for the Common Core*, and *Teacher Evaluation That Makes a Difference*. His practical translations of the most current research and theory into classroom strategies are known internationally and are widely practiced by both teachers and school leaders. He received a bachelor's degree from Iona College in New York, a master's degree from Seattle University, and a doctorate from the University of Washington.

Introduction

Ushering in the New Era of School Reform

The framework presented in this white paper has taken over four decades to develop. From one perspective, it is the sum total of a number of research and development efforts I have been involved in throughout a career in education that began in 1968. Many of those efforts are cited throughout the text as support and documentation for the recommendations I make. Stated differently, the framework presented in this paper is the sum total of works I have authored with many fine colleagues to whom I owe a great debt of gratitude. Those works include the list articulated in table I.1 (pages 2–3).

From another perspective, the framework presented here is based on what I consider to be the clear guidance from the research regarding how to improve the effectiveness of U.S. schools. Stated differently, I believe that a careful reading of the research literature provides a compelling picture of what to do to help U.S. schools move to the next level of effectiveness in terms of enhancing students' achievement. This, of course, is an optimistic view of the future of K–12 education. It was not that long ago that the future looked anything but optimistic.

A Pessimistic View From the Past

In the book *What Works in Schools* (Marzano, 2003b), I briefly outline the litany of criticisms of U.S. education during the 20th century:

> Criticisms of public education and their accompanying reform efforts flourished for the first five decades of the century. However, it is the criticisms and reform efforts of the second half of the century that most profoundly affect us today. The first of these was spawned by the

Table I.1: Marzano Works That are the Basis for the Framework

1. *Vocabulary for the Common Core*
   (Marzano & Simms, 2013b)
2. *Using Common Core Standards to Enhance Classroom Instruction and Assessment*
   (Marzano, Yanoski, Hoegh, & Simms, 2013)
3. *Teacher Evaluation That Makes a Difference*
   (Marzano & Toth, 2013)
4. *Coaching Classroom Instruction*
   (Marzano & Simms, 2013a)
5. *Becoming a Reflective Teacher*
   (Marzano, 2012a)
6. *Teaching and Assessing 21st Century Skills*
   (Marzano & Heflebower, 2012)
7. *Leaders of Learning: How District, School, and Classroom Leaders Improve Student Achievement*
   (DuFour & Marzano, 2011)
8. *Effective Supervision: Supporting the Art and Science of Teaching*
   (Marzano, Frontier, & Livingston, 2011)
9. *The Highly Engaged Classroom*
   (Marzano & Pickering, 2011)
10. *Formative Assessment and Standards-Based Grading*
    (Marzano, 2010a)
11. *On Excellence in Teaching*
    (Marzano, 2010b)
12. *Teaching Basic and Advanced Vocabulary: A Framework for Direct Instruction*
    (Marzano, 2010c)
13. *Designing and Teaching Learning Goals and Objectives*
    (Marzano, 2009)
14. *District Leadership That Works: Striking the Right Balance*
    (Marzano & Waters, 2009)
15. *Designing and Assessing Educational Objectives: Applying the New Taxonomy*
    (Marzano & Kendall, 2008)
16. *Making Standards Useful in the Classroom*
    (Marzano & Haystead, 2008)
17. *The Art and Science of Teaching: A Comprehensive Framework for Effective Instruction*
    (Marzano, 2007)
18. *The New Taxonomy of Educational Objectives*
    (Marzano & Kendall, 2007)

19. *Classroom Assessment and Grading That Work*
    (Marzano, 2006)
20. *School Leadership That Works: From Research to Results*
    (Marzano, Waters, & McNulty, 2005)
21. *Building Background Knowledge for Academic Achievement: Research on What Works in Schools*
    (Marzano, 2004)
22. *Classroom Management That Works: Research-Based Strategies for Every Teacher*
    (Marzano, 2003a)
23. *What Works in Schools: Translating Research into Action*
    (Marzano, 2003b)
24. *Classroom Instruction That Works: Research-Based Strategies for Increasing Student Achievement*
    (Marzano, Pickering, & Pollock, 2001)
25. *Designing a New Taxonomy of Educational Objectives*
    (Marzano, 2001)
26. *Transforming Classroom Grading*
    (Marzano, 2000)
27. *Content Knowledge: A Compendium of Standards and Benchmarks for K–12 Education*
    (Kendall & Marzano, 2000)
28. *Essential Knowledge: The Debate Over What American Students Should Know*
    (Marzano & Kendall, 1999)
29. *A Comprehensive Guide to Designing Standards-Based Districts, Schools, and Classrooms*
    (Marzano & Kendall, 1996)
30. *New Approaches to Literacy: Helping Students Develop Reading and Writing Skills*
    (Marzano & Paynter, 1994)
31. *Assessing Student Outcomes: Performance Assessment Using the Dimensions of Learning Model*
    (Marzano, Pickering, & McTighe, 1993)
32. *A Different Kind of Classroom: Teaching with Dimensions of Learning*
    (Marzano, 1992)
33. *Cultivating Thinking in English and the Language Arts*
    (Marzano, 1991)
34. *A Cluster Approach to Elementary Vocabulary Instruction*
    (Marzano & Marzano, 1988)
35. *Dimensions of Thinking: A Framework for Curriculum and Instruction*
    (Marzano et al., 1988)

> launching of Sputnik in 1957. Shocked by this event, the U.S. public began to question the rigor and viability of our schools. Indeed, influential figures such as Admiral Hyman Rickover (1959) forwarded the position that public education was weakening the intellectual capacity of our students. Rickover's book, *Education and Freedom*, made direct links between the security of the nation and the quality of education. (Marzano, 2003b, pp. 1–2)

The 1960s saw no respite from the harsh criticisms. As a result of the Civil Rights Act of 1964, a cornerstone of President Johnson's "war on poverty," a nationwide survey was undertaken involving 640,000 students, 60,000 teachers, and 4,000 schools. The resulting report, *Equality of Educational Opportunity*, was published in 1966 (Coleman et al., 1966). Although written by a team of researchers, the report became known as the "Coleman Report" in deference to the senior author, James Coleman. The overall conclusions in the report were not very flattering regarding K–12 education in the United States:

> Taking all of these results together, one implication stands above all: that schools bring little to bear on a child's achievement that is independent of his background and general social context; and that this very lack of an independent effect means that the inequalities imposed on children by their home, neighborhood, and peer environment are carried along to become the inequalities with which they confront life at the end of school. (p. 325)

The report had a profound and negative effect on the perception of the utility and effectiveness of K–12 schools.

In the 1970s, this negative perception was underscored by Christopher Jencks and his colleagues in the report *Inequality: A Reassessment of the Effect of Family and Schooling in America*, which was based on a reanalysis of the Coleman data (Jencks et al., 1972). Among the conclusions reported by Jencks and his colleagues were the following:

- Schools do little to lessen the gap between rich students and poor students.
- Schools do little to lessen the gap between more and less able students.
- Student achievement is primarily a function of one factor—the background of the student.
- Little evidence exists that education reform can improve a school's influence on student achievement.

The criticisms of K–12 education from the 1960s and 1970s were repeated and exacerbated in the 1980s. As Peter Dow (1991) explains in his book, *Schoolhouse Politics: Lessons from the Sputnik Era*:

> In 1983 educators and the general public were treated to the largest outpouring of criticism of the nation's schools in history, eclipsing even the complaints of the early 1950s. Nearly fifty reports totaling more than six thousand pages voiced a new wave of national concern about the troubled state of American education. They spoke of the fragmented state of the school curriculum, the failure to define any coherent, accepted body of learning, the excessive emphasis on teaching isolated facts, and the lack of attention to higher order skills and concepts. They called for more individualism of instruction, the development of a closer relationship between teachers and students, and methods that encourage the active participation of the student in the learning process. (p. 243)

As I describe in *What Works in Schools*:

> Again, a single report laid the foundation for the outpouring of criticism. Without a doubt, *A Nation at Risk: The Imperative for Educational Reform*, issued by the National Commission on Excellence in Education, was considered by some as proof that K–12 education had indeed devolved to a state of irreversible disrepair. (Marzano, 2003b, p. 3)

The report, *A Nation at Risk*, went so far as to warn that "the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a nation and a people" (National Commission on Excellence in Education, 1983, p. 5). Clearly, the 1960s, 1970s, and early 1980s saw great pessimism with respect to K–12 education in the United States.

An Optimistic View of the Future

While some of what was reported in the literature previously cited sheds light on valid areas of weakness in U.S. education, the overall conclusion that U.S. schools were impotent to enhance student achievement was not a valid generalization for three reasons:

- **Reason #1:** Those studies that have been interpreted as evidence that schools do not significantly affect student achievement do, in fact, support the potential impact of schools when interpreted properly.

- **Reason #2:** Highly effective schools produce results that almost entirely overcome the effects of students' backgrounds.

- **Reason #3:** The research on school effectiveness *considered as a whole* paints a very positive image of schools' impact on student achievement.

These reasons are discussed in some depth in *What Works in Schools* (Marzano, 2003b) and therefore are not explicated further here. However, it is worth expanding on the third reason, which basically notes that the literature on school effectiveness is overwhelmingly positive, especially from the 1980s to the present. More specifically, the research taken in the aggregate

provides clear guidance as to actions schools can take to dramatically increase their effectiveness. That research includes, but is not limited to, the following works: Brookover, Schweitzer, Schneider, Beady, Flood, & Wisenbaker, 1978; Brookover, Beady, Flood, Schweitzer, & Wisenbaker, 1979; Edmonds, 1979a, 1979b, 1979c, 1981a, 1981b; Madaus, Kellaghan, Rakow, & King, 1979; Rutter, Maughan, Mortimore, Ouston, & Smith, 1979; Purkey & Smith, 1982; Walberg, 1984; Good & Brophy, 1986; Elberts & Stone, 1988; Mortimore, Sammons, Stoll, Lewis, & Ecob, 1988; Raudenbush & Bryk, 1988; Stringfield & Teddlie, 1989; Levine & Lezotte, 1990; Bosker, 1992; Bryk & Raudenbush, 1992; Scheerens, 1992; Wang, Haertel, & Walberg, 1993; Creemers, 1994; Luyten, 1994; Rowe & Hill, 1994; Bosker & Witziers, 1995, 1996; Raudenbush & Willms, 1995; Rowe, Hill, & Holmes-Smith, 1995; Sammons, Hillman, & Mortimore, 1995; Goldstein, 1997; Scheerens & Bosker, 1997; van der Werf, 1997; Wright, Horn, & Sanders, 1997; Sammons, 1999; Reynolds & Teddlie, 2000a, 2000b; Townsend, 2007a, 2007b; Bryk, Sebring, Allensworth, Luppescu, & Easton, 2010.

The most comprehensive effort to date to synthesize the research on school effectiveness is breathtaking in its scope. In his 2009 book, *Visible Learning,* John Hattie synthesized the findings from over 800 meta-analyses involving over 52,000 studies and over 145,000 effect sizes to identify and rank 138 factors that have significant correlations with student achievement. In 2012, Hattie updated his synthesis to include 115 additional meta-analyses involving 7,518 additional studies and 13,428 additional effect sizes. These additional findings prompted him to add 12 factors to his original list of 138 for a total of 150 ranked factors. Clearly, some of those factors are outside of a school's control. Table I.2 shows those factors from Hattie's list of 150 that fall outside a school's control.

Table I.2: Hattie's Factors Outside of the School's Control

Rank	Factor
20	Prior achievement
39	Pre-term birth weight
44	Home environment
45	Socio-economic status
51	Parental involvement
59	Self-concept
81	Creativity related to achievement
82	Attitude to mathematics/science
84	Ethnicity
101	Lack of illness
119	Personality
122	Family structure
133	Gender
141	Ethnic diversity of students
147	Welfare policies
149	Television
150	Mobility

While the factors in table I.2 are outside of a school's control, many important factors can be controlled or at least strongly influenced by a school. For example, consider the top one-third (the top 50) of Hattie's factors listed in table I.3. Those not shaded can be influenced by schools.

Table I.3: Hattie's Top 50 Factors

Rank	Factor
1	Self-reported grades/Student expectations
2	Piagetian programs
3	Response to intervention
4	Teacher credibility
5	Providing formative evaluation
6	Micro-teaching
7	Classroom discussion
8	Comprehensive interventions for learning disabled students
9	Teacher clarity
10	Feedback
11	Reciprocal teaching
12	Teacher-student relationships
13	Spaced vs mass practice
14	Meta-cognitive strategies
15	Acceleration
16	Classroom behavior
17	Vocabulary programs
18	Repeated reading programs
19	Creativity programs on achievement
20	Prior achievement
21	Self-verbalization and self-questioning
22	Study skills
23	Teaching strategies
24	Problem-solving strategies
25	Not labeling students
26	Comprehension programs
27	Concept mapping
28	Cooperative vs individualistic learning
29	Direct instruction
30	Tactile stimulation programs
31	Mastery learning
32	Worked examples
33	Visual-perception programs
34	Peer tutoring
35	Cooperative vs competitive learning

continued on next page →

36	Phonics instruction
37	Student-centered teaching
38	Classroom cohesion
39	Pre-term birth weight
40	Keller's Mastery Learning (PSI)
41	Peer influences
42	Classroom management
43	Outdoor/adventure programs
44	Home environment
45	Socio-economic status
46	Interactive video methods
47	Professional development
48	Goals
49	Play programs
50	Second/third-chance programs

As indicated in table I.3, 46 of the top 50 factors, or 92%, can be influenced by schools and the teachers within those schools. Additionally, virtually all of the factors in Hattie's list that can be influenced by schools fit in the model presented in this paper.

With this vast research base regarding factors that influence student achievement, what is the next step schools can take to dramatically increase their effectiveness? The purpose of this publication is to answer that question directly. I propose that a necessary condition to move schools to the next level of effectiveness is to adapt a high reliability perspective.

A High Reliability Perspective

The concept of a high reliability organization (HRO) has been in the literature for quite some time and the power of this perspective has been demonstrated in a number of venues and industries. G. Thomas Bellamy, Lindy Crawford, Laura Marshall, and Gail Coulter (2005) explain, "the literature on HROs describes how organizations operate when accidents or failures are simply too significant to be tolerated, where failures make headlines" (p. 385). Karl Weick, Kathleen Sutcliffe, and David Obstfeld (1999) further describe HROs as organizations that "take a variety of extraordinary steps in pursuit of error free performance" (p. 84). Bellamy and his colleagues offer the examples of electric power grids, air traffic control systems, prisoner confinement or transportation, commercial aircraft maintenance, nuclear power plants, and toxic chemical manufacturing as illustrative of HROs. They note that within these industries "the public expects fail-safe performance, and successful organizations adjust their operations to prevent failures" (p. 385). Bellamy and his colleagues explain the history of HROs as follows:

> The study of HROs has evolved through empirical investigation of catastrophic accidents, near misses, and organizations that succeed despite very trying and dangerous circumstances. Launched by Perrow's (1984) analysis of the nuclear accident at Three Mile Island, the literature

> evolved through discussions of whether such accidents are inevitable, as Perrow suggested, or might be avoided through strategies used by organizations that operate successfully in high-risk conditions (Bierly & Spender, 1995; Roberts, 1990). Although there are some similarities between this literature and research on organizational effectiveness and quality improvement, HROs "have been treated as exotic outliers in mainstream organizational theory because of their unique potentials for catastrophic consequences and interactively complex technology" (Weick et al., 1999, p. 81). (p. 385)

This is not to say that HROs are error free. As Bellamy and his colleagues explain, all organizations make mistakes, but "what distinguishes HROs is not the absence of errors but the ability to contain their effects so they do not escalate into significant failures" (p. 385).

Unfortunately, schools are not typically thought of as, nor do they aspire to be, HROs. However, there is nothing about a school that is inherently antithetical to becoming an HRO. In fact, in 1995, Stringfield called for a model of High Reliability Schools (HRS) that placed accountability for specific outcomes clearly at the school level. The transition to high reliability status for schools is not an easy one, though. I believe there are two things necessary to implement a high reliability perspective in K–12 schools: (1) a hierarchical structure to school factors and (2) the identification of leading and lagging indicators.

A Hierarchical Structure to School Factors

As described previously, the research on factors that influence student learning and can be influenced by schools is rich and many schools have used this research to enhance their effectiveness. Indeed, for decades, schools across the United States have been trying to improve their effectiveness relative to select factors (commonly referred to as "correlates"). While these efforts are laudable, they do not help a school become a high reliability organization (HRO). This is necessarily the case because an HRO, by definition, monitors errors for critical factors and immediately takes action to contain the negative effects of errors as quickly as possible. Simply trying to improve one's status relative to one or more of the school factors is a far cry from monitoring errors or breakdowns and then managing the negative effects of errors. Additionally, factors cannot be addressed in a random or haphazard fashion if a school is to approach high reliability status, since some factors are prerequisite to others. I believe this has been one of the primary problems with school effectiveness efforts of the past. After identifying a list of ten, twenty, or even more factors or correlates, a school's leader and educators begin working on all of them simultaneously or select a few to work on with little consideration of their interrelationships.

I propose that the factors identified in the research to date are best organized into five levels that represent a hierarchy when one takes a high reliability perspective; a school cannot operate fully as an HRO at one level if it is not already operating as an HRO at the previous level. These levels are depicted in figure I.1 (page 10).

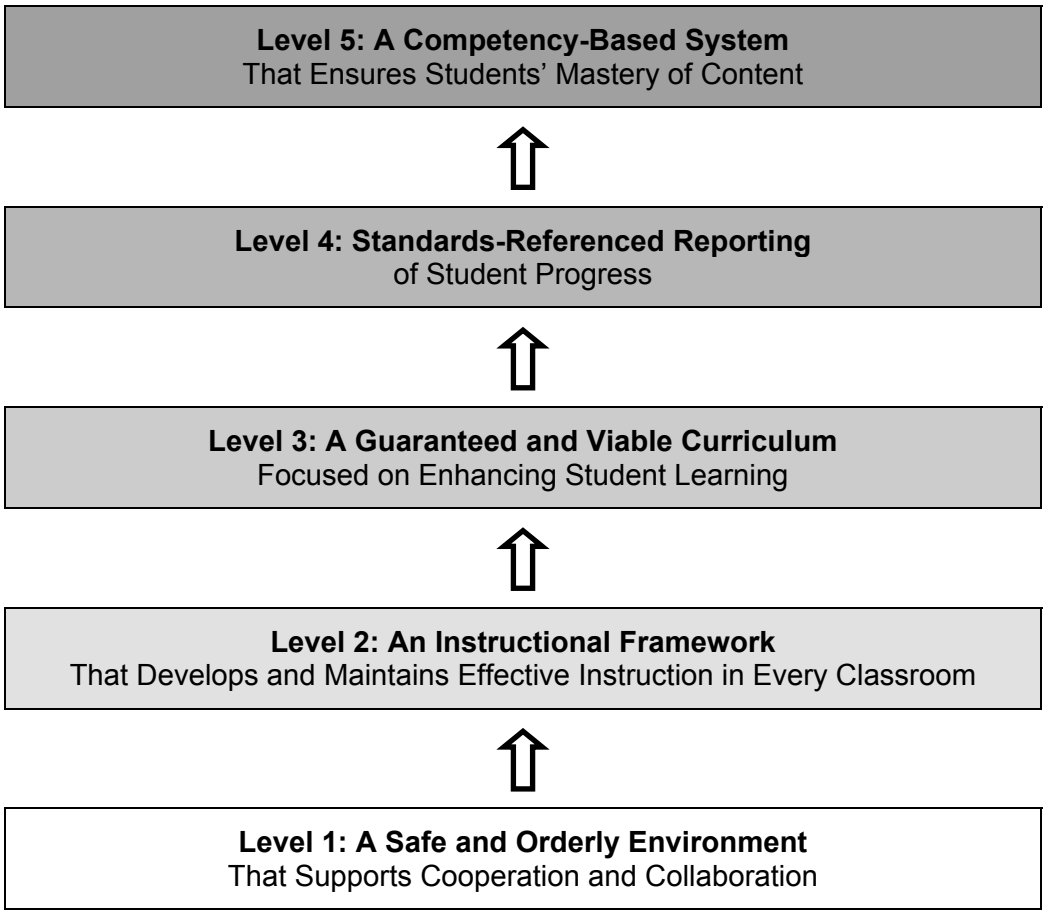

Figure I.1: Levels of operation for a high reliability school.

The hierarchical relationship of the levels depicted in figure I.1 has some intuitive appeal. Level 1 can be considered foundational to all other levels. If students and faculty do not have a safe and orderly environment in which to work, little if any substantive work can be accomplished. Level 2 addresses the single most commonly cited characteristic of effective schools: high quality instruction in every classroom. High quality instruction is a prerequisite for level 3, which addresses a curriculum that is both guaranteed and viable. Levels 1 through 3 are common fare among current efforts to make schools more effective. Level 4 moves into a more rarified atmosphere because it involves reporting individual students' progress on specific standards. At any point in time, the leader of a level 4 school can identify individual students' strengths and weaknesses relative to specific topics in each subject area. Level 5 schools exist in the most rarified atmosphere of all—one in which students move to the next level of content as soon as they demonstrate competence in the previous level. Matriculation, then, is not based on the amount of time a student spends in a given course but rather on his or her demonstrated mastery of content.

Identification of Leading and Lagging Indicators

For school leaders to effectively address and move their schools through the levels depicted in figure I.1, they must have clear and specific guidance. Such guidance can be provided in the form of leading and lagging indicators. These terms are common in the world of business but not in the world of education. As Ellen Foley and her colleagues (n.d.) explain:

> The term *leading indicators* originated in economic theory . . . but it need not be exclusive to economics. In fact, leading indicators may be *more* useful in fields such as education or public health, in which growth is not necessarily cyclical, but where progress can be sustained over time. The challenge for such fields is to develop sets of indicators that not only reflect key investments, but also incorporate measures of important conditions that are known to be associated with improvement. (p. 2)

Foley and her colleagues warn that a failure to collect information on both types of indicators impedes efforts to enhance a school's effectiveness:

> Collecting information only on lagging indicators, as one of our study informants told us, is like "playing the game with the scoreboard off. When the buzzer sounds at the end of the game, you flip the scoreboard on and say, 'Wait a minute. I thought we were ahead.'" These measures do not tell us whether the types of practices, people, strategies, materials, or technologies school districts are investing in are likely to lead to higher student academic performance. Leading indicators, on the other hand, prioritize key areas that are particularly helpful in assessing progress toward goals. While educators do need to monitor lagging indicators, they also need leading indicators to help them see the direction their efforts are going in and to take corrective action as soon as possible. (pp. 2–3)

Each of the five levels depicted in figure I.1 has leading and lagging indicators. To illustrate, consider the following examples for the first of eight leading indicators that define level 1:

- When asked, faculty and staff generally describe the school as a safe place.
- When asked, faculty and staff generally describe the school as an orderly place.
- Clear and specific rules and procedures are in place for the running of the school.
- Faculty and staff know the emergency management procedures and how to implement them for specific incidents.
- Evidence of practicing emergency management procedures for specific incidents is available.
- Evidence of updates to emergency management plans is available.

As shown here, leading indicators can involve both perceptions and actions. They help inform school leaders about specific issues that should be addressed and how much effort should be devoted to those issues. For example, if faculty and staff frequently complain that the school is unsafe, it is an indicator that school safety is an important issue that should be addressed. Similarly, if clear rules and procedures are not in place, it is an indication that school safety should be addressed. It is important to note that positive leading indicators do not necessarily mean that a school has achieved high reliability status regarding a specific issue. For example, if a school has well-established rules and procedures in place and faculty and staff generally report that the environment is safe, it does not necessarily mean that school is, in fact, safe—at least at the level required for high reliability status. To reach this level of assurance, lagging indicators such as the following must be used:

Lagging Indicator 1.1: Few, if any, incidents occur in which students' safety is compromised.

Lagging Indicator 1.2: Few, if any, incidents occur in which rules and procedures are not followed.

Lagging indicators are the evidence, then, for high reliability status. Leading and lagging indicators used in tandem provide the clarity and guidance that school leaders need to seek and attain high reliability status for each of the five levels.

Overview of the Chapters

The remainder of this white paper describes the leading and lagging indicators for each level depicted in figure I.1 (page 10) and recommended interventions for moving from one level to the next. More specifically, the leading and lagging indicators describe specific actions that school leaders must take to guide their schools through each of the five high reliability levels. The reader should note that the indicators described in the chapters are specific to the research and development work I have conducted throughout my career and there are undoubtedly many other indicators that can be used to satisfy the criteria for each level.

1

A Safe and Orderly Environment That Supports Cooperation and Collaboration

Level 1 addresses those factors that are considered foundational to any substantive change within a school. Quite obviously, if a school is not safe or orderly, all other activities suffer. If those within the school do not cooperate or collaborate, little progress can be made in enhancing a school's effectiveness. Level 1 has eight leading indicators:

Leading Indicator 1.1: The faculty and staff perceive the school environment as safe and orderly.

Leading Indicator 1.2: Students, parents, and the community perceive the school environment as safe and orderly.

Leading Indicator 1.3: Teachers have formal roles in the decision-making process regarding school initiatives.

Leading Indicator 1.4: Teacher teams and collaborative groups regularly interact to address common issues regarding curriculum, assessment, instruction, and the achievement of all students.

Leading Indicator 1.5: Teachers and staff have formal ways to provide input regarding the optimal functioning of the school.

Leading Indicator 1.6: Students, parents, and the community have formal ways to provide input regarding the optimal functioning of the school.

Leading Indicator 1.7: The success of the whole school, as well as individuals within the school, is appropriately acknowledged.

Leading Indicator 1.8: The fiscal, operational, and technological resources of the school are managed in a way that directly supports teachers.

Each of these leading indicators is well-grounded in the research literature. Of the books I have authored (listed in table I.1, pages 2–3), the following contain the most direct reviews of the research literature and recommended interventions for the leading indicators at level 1:

- *Leaders of Learning: How District, School, and Classroom Leaders Improve Student Achievement* (DuFour & Marzano, 2011)
- *Effective Supervision: Supporting the Art and Science of Teaching* (Marzano et al., 2011)
- *The Highly Engaged Classroom* (Marzano & Pickering, 2011)
- *On Excellence in Teaching* (Marzano, 2010b)
- *District Leadership That Works: Striking the Right Balance* (Marzano & Waters, 2009)
- *The Art and Science of Teaching: A Comprehensive Framework for Effective Instruction* (Marzano, 2007)
- *School Leadership That Works: From Research to Results* (Marzano et al., 2005)
- *Classroom Management That Works: Research-Based Strategies for Every Teacher* (Marzano, 2003a)
- *What Works in Schools: Translating Research into Action* (Marzano, 2003b)

As mentioned in the introduction, the framework described in this paper is quite compatible with Hattie's (2012) synthesis of the research into 150 factors that correlate with student achievement. As a result of his analysis of over 59,000 studies, Hattie identified an effect size of .40 as the "hinge-point" in terms of evaluating factors that should be considered as possible areas of intervention within a school. An effect size of .40 roughly indicates that the average achievement in a school that possesses a given factor is four-tenths of a standard deviation higher than the average achievement of a school that does not possess that factor. Table 1.1 lists Hattie's factors that are at or above the .40 hinge-point and directly relate to level 1.

Table 1.1: Hattie's Factors Related to Level 1 At or Above the Hinge-Point

Rank	Factor
12	Teacher-student relationships
16	Classroom behavior
25	Not labeling students
38	Classroom cohesion
41	Peer influences
42	Classroom management
47	Professional development
49	Play programs
52	Small-group learning
54	Concentration/persistence/engagement
56	Motivation
62	Teacher expectations
65	Cooperative learning
69	Reducing anxiety

Leading Indicators for Level 1

As described in the introduction, leading indicators provide evidence that a school is working on a particular level and is progressing through that level. The eight leading indicators that define level 1, along with examples of each indicator, are presented in table 1.2 (pages 16–18). Some of the examples of leading indicators in table 1.2 represent initiatives and activities that are already common fare in many schools. These include:

- A plan for emergency procedures
- Clear and specific rules and procedures
- The use of social media
- Coordination with law enforcement agencies
- Professional learning communities (PLCs)
- Data teams
- Recognition of school success
- Detailed budgets

Table 1.2: Leading Indicators and Examples for Level 1

Leading Indicator 1.1: The faculty and staff perceive the school environment as safe and orderly.

Examples:

- When asked, faculty and staff generally describe the school as a safe place.
- When asked, faculty and staff generally describe the school as an orderly place.
- Clear and specific rules and procedures are in place for the running of the school.
- Faculty and staff know the emergency management procedures and how to implement them for specific incidents.
- Evidence of practicing emergency management procedures for specific incidents is available.
- Evidence of updates to emergency management plans is available.

Leading Indicator 1.2: Students, parents, and the community perceive the school environment as safe and orderly.

Examples:

- When asked, parents and students generally describe the school as a safe place.
- When asked, parents and students generally describe the school as an orderly place.
- Clear and specific rules and procedures are in place for the running of the school.
- Social media are used to allow students to anonymously report potential incidents.
- The school leader has a means of communicating to parents about issues regarding school safety (for example, a call-out system).
- The school leader coordinates with local law enforcement agencies regarding school safety issues.
- The school leader engages parents and the community regarding issues of school safety.

Leading Indicator 1.3: Teachers have formal roles in the decision-making process regarding school initiatives.

Examples:

- The specific types of decisions on which teachers will have direct input are made clear.
- Data-gathering techniques are in place to collect information from teachers.
- Notes and reports that describe how teacher input was used when making specific decisions are in place.
- Electronic tools are utilized to collect and report teacher opinions regarding specific decisions (for example, Survey Monkey).
- Groups of teachers are targeted and utilized to provide input regarding specific decisions.

Leading Indicator 1.4: Teacher teams and collaborative groups regularly interact to address common issues regarding curriculum, assessment, instruction, and the achievement of all students.

Examples:

- Professional learning communities (PLCs) are in place.
- PLCs have written goals.
- The school leader regularly examines the PLCs' progress toward goals.
- Common assessments are created by PLCs.
- Student achievement and growth are analyzed by PLCs.
- Data teams are in place.
- Data teams have written goals.
- The school leader regularly examines each data team's progress toward goals.
- The school leader collects and reviews minutes, notes, and goals from meetings to maintain a focus on student achievement.

Leading Indicator 1.5: Teachers and staff have formal ways to provide input regarding the optimal functioning of the school.

Examples:

- Data collection systems are in place to collect opinion data from teachers and staff regarding the optimal functioning of the school.
- Data is archived and reports regularly generated regarding these data.
- The manner in which these data are used is made transparent.
- The school improvement team provides input regarding the school improvement plan.

Leading Indicator 1.6: Students, parents, and the community have formal ways to provide input regarding the optimal functioning of the school.

Examples:

- Data collection systems are in place to collect opinion data from students, parents, and the community regarding the optimal functioning of the school.
- Data is archived and reports are regularly generated regarding these data.
- The manner in which these data are used is made transparent.
- The school hosts an interactive website for students, parents, and the community.
- The school leader and teachers use social networking technologies (Twitter, Facebook) to involve students, parents, and the community.
- The school leader engages in virtual town hall meetings.
- The school leader conducts focus group meetings with students.
- The school leader hosts or speaks at community/business luncheons.

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Leading Indicator 1.7: The success of the whole school, as well as individuals within the school, is appropriately acknowledged.

Examples:

- When asked, faculty and staff generally report that the accomplishments of the school have been adequately acknowledged and celebrated.
- When asked, faculty and staff generally report that their individual accomplishments have been adequately acknowledged and celebrated.
- The school leader recognizes the accomplishments of individual teachers, teams of teachers, and the whole school in a variety of ways (for example, faculty celebrations, newsletters to parents, announcements, websites, social media).
- The school leader recognizes the success of individual departments.
- The school leader regularly celebrates the success of a variety of types of individuals (for example, teacher of the year, support staff employee of the year).

Leading Indicator 1.8: The fiscal, operational, and technological resources of the school are managed in a way that directly supports teachers.

Examples:

- When asked, faculty and staff generally report that they have adequate materials to teach effectively.
- When asked, faculty and staff generally report that they have adequate time to teach effectively.
- The school leader develops, submits, and implements detailed budgets.
- The school leader successfully accesses and leverages a variety of resources (for example, grants, title funds).
- The school leader manages time effectively in order to maximize focus on instruction.
- The school leader appropriately directs the use of technology to improve teaching and learning.
- The school leader provides adequate training for the instructional technology teachers are expected to use.

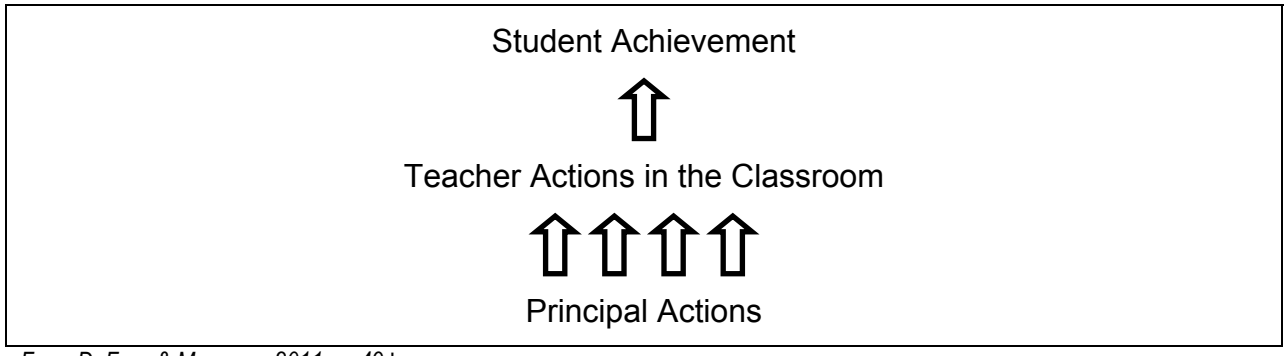
While all of the leading indicators for level 1 (as well as the other four levels) are useful endeavors, one of the purposes of this publication is to describe steps that a school can take to utilize the specific activities and interventions I have developed with colleagues over the last four decades. Consequently, for each level, I provide recommendations for specific initiatives that come directly from my work. I refer to these initiatives as *critical commitments*. A critical commitment does not automatically address all elements of a level but it does represent an initiative or activity that, when executed well, establishes what I believe to be a necessary

foundation for attaining high reliability status at a given level. I believe that the PLC process should be considered a critical commitment for level 1.

While the PLC process is sometimes thought of as a singular intervention to engage teachers in meaningful collaboration, when used to its full potential it can be the structure that makes possible the successful implementation of a variety of the leading indicators for level 1. Indeed, Richard DuFour and I (2011) maintain that the PLC process can change the basic dynamic of leadership within a school, allowing school leaders to have a more efficient and direct impact on what occurs in classrooms. We note:

> The principal of a K–5 building can now work closely with six teams rather than thirty individuals. The principal of a large high school can influence twenty team leaders directly rather than 150 teachers indirectly. In short, the PLC process provides a vehicle for focused interactions between principals and teachers. (p. 51)

DuFour and I explain that in the absence of the PLC process, a principal's influence on student achievement might be depicted as shown in figure 1.1.



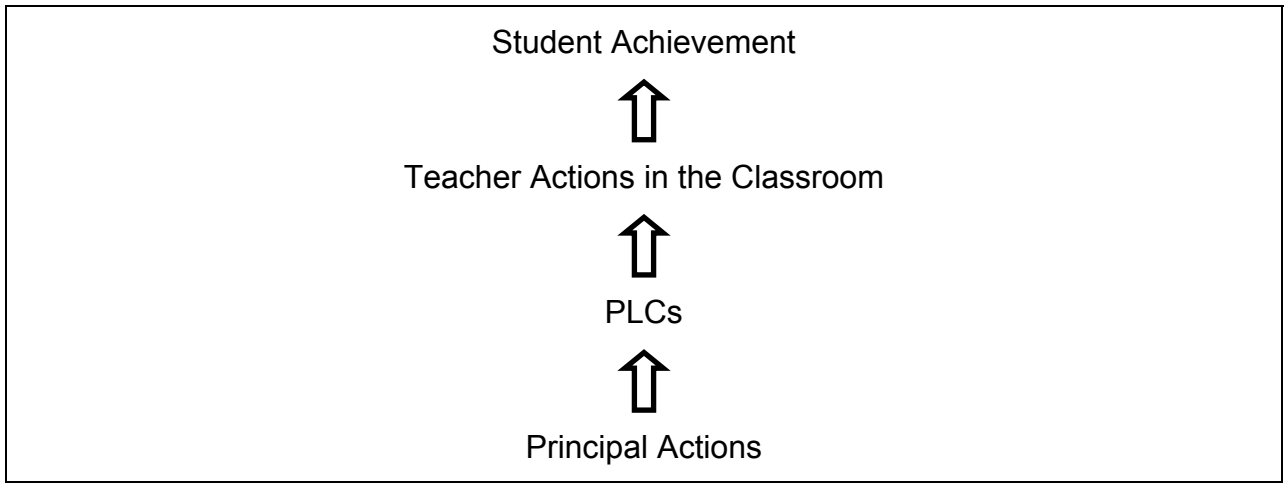
From DuFour & Marzano, 2011, p. 49.!

Figure 1.1: Typical relationship between principal behavior and student achievement.

Figure 1.1 indicates that in the absence of the PLC process, the principal's influence on student achievement passes through teachers. This has long been recognized in the research literature: the principal has an indirect influence on student achievement (see Marzano et al., 2005). DuFour and I further note that one of the more enlightening and disturbing aspects of the figure is that:

> Multiple lines of influence are depicted between the principal and teachers' actions. This is because traditionally there has been no way for principals to interact directly and concretely with teachers in a manner that influences their actions in the classroom. (p. 49)

The PLC process alters this basic dynamic. Within the context of the collaborative team structure of a PLC, the relationship between principal behavior and student achievement might be depicted as shown in figure 1.2.



From DuFour & Marzano, 2011, p. 52.!

Figure 1.2: Relationship between principal behavior and student achievement with PLCs.

As shown in figure 1.2, principals have a direct line of influence to collaborative teams, and collaborative teams have a direct line of influence to teacher actions in the classroom. In effect, use of the PLC process can render leadership more efficient.

I recommend the PLC process as a critical commitment because it is a vehicle for facilitating most, if not all, of the leading indicators for level 1. Obviously, the PLC process is directly related to leading indicator 1.4 because teachers interact to address issues regarding curriculum, assessment, and instruction. The PLC process can also be a powerful vehicle for leading indicator 1.7 because collaborative groups can be used to identify and recognize individuals whose students have made exceptional gains in their learning. Collaborative teams can be singled out and acknowledged as well as the school as a whole. The PLC process creates a foundation for leading indicators 1.1, 1.3, and 1.5 because collaborative teams can be used to identify and execute ways to make the school more safe and orderly, obtain teacher input into decisions regarding school policies, and provide input regarding how the school might function more effectively. Leading indicator 1.8 can also be addressed through PLCs as collaborative teams can be used to gather information from teachers about the use of fiscal, operational, and technological resources. Finally, leading indicators 1.2 and 1.6 relate to parents and the community. It is important that initiatives and activities be designed and executed specifically for those constituent groups and collaborative teams can aid in the design of those initiatives and activities.

Lagging Indicators for Level 1

As described in the introduction, lagging indicators articulate the criteria that must be met to demonstrate high reliability status for a given level. Lagging indicators for level 1 are listed in table 1.3.

Table 1.3: Lagging Indicators for Level 1

Lagging Indicator 1.1:	**Few, if any, incidents occur in which students' safety is compromised.**
Lagging Indicator 1.2:	**Few, if any, incidents occur in which rules and procedures are not followed.**
Lagging Indicator 1.3:	**Surveys of faculty and staff indicate high agreement that the school is safe and orderly.**
Lagging Indicator 1.4:	**Surveys of students, parents, and the community indicate high agreement that the school is safe and orderly.**
Lagging Indicator 1.5:	**Surveys of faculty and staff indicate high agreement that they have input regarding the optimal functioning of the school.**
Lagging Indicator 1.6:	**Surveys of students, parents, and the community indicate high agreement that they have input regarding the optimal functioning of the school.**
Lagging Indicator 1.7:	**Evidence is available regarding specific decisions that were made with input from faculty and staff.**
Lagging Indicator 1.8:	**Evidence is available regarding specific decisions that were made with input from students, parents, and the community.**
Lagging Indicator 1.9:	**Evidence is available for specific projects that were developed through collaborative efforts of teacher teams.**
Lagging Indicator 1.10:	**Materials and resources for specific classes and courses meet the state or district specifications for those classes and courses.**
Lagging Indicator 1.11:	**Time available for specific classes and courses meets the state or district specifications for those classes and courses.**

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Lagging Indicator 1.12:	**Evidence is available that adequate proportions of the school budget are focused on issues that directly support teaching and learning.**
Lagging Indicator 1.13:	**Evidence is available that specific accomplishments of the school and/or individuals within the school have been formally acknowledged.**
Lagging Indicator 1.14:	**Incidents indicating teacher dissatisfaction with the school (for example, teacher requests for transfers to other schools) are very low or nonexistent.**

Some of the lagging indicators in table 1.3 are perceptual in nature and can be addressed through simple survey techniques, many of which can be administered in the context of PLCs. For example, surveys might be developed to determine if faculty and staff perceive the school environment as safe and orderly, whether they believe they have proper input into the running of the school, and so on. However, to use these surveys as lagging indicators, appropriate criterion scores must be set. For example, the school might set as a criterion that 80% of teachers must have positive responses to the survey items to indicate that level 1 status has been met.

Other lagging indicators are much more concrete. For example, consider lagging indicator 1.2: *Few, if any, incidents occur in which rules and procedures are not followed*. Detailed records must be kept to establish clear criterion scores for indicators such as this. For example, a school's leader might decide that the school must average no more than one incident of a significant violation of school rules and procedures per month to be considered highly reliable for this lagging indicator. In the concluding chapter, I address how a school leader might identify the lagging indicators he or she will use and set criterion scores for high reliability status.

2

An Instructional Framework That Develops and Maintains Effective Instruction in Every Classroom

Level 2 addresses a central feature of effective schooling—the quality of teaching in classrooms. When a school reaches high reliability status for level 2, it can guarantee that quality teaching occurs in every classroom. Operationally, this means that variability in teacher quality within a school is quite low—every teacher uses effective instructional strategies. Indeed, one of the hallmarks of school systems around the world that produce the greatest gains in student learning is that they monitor and minimize the variability of instruction in their classrooms (Barber & Mourshed, 2007). Level 2 has six leading indicators:

Leading Indicator 2.1: The school leader communicates a clear vision as to how instruction should be addressed in the school.

Leading Indicator 2.2: Support is provided to teachers to continually enhance their pedagogical skills through reflection and professional growth plans.

Leading Indicator 2.3: Predominant instructional practices throughout the school are known and monitored.

Leading Indicator 2.4: Teachers are provided with clear, ongoing evaluations of their pedagogical strengths and weaknesses that are based on multiple sources of data and are consistent with student achievement data.

Leading Indicator 2.5: Teachers are provided with job-embedded professional development that is directly related to their instructional growth goals.

Leading Indicator 2.6: Teachers have opportunities to observe and discuss effective teaching.

Of the books I have authored, the following contain the most direct reviews of the research literature and recommended interventions for the leading indicators at level 2:

- *Teacher Evaluation That Makes a Difference* (Marzano & Toth, 2013)
- *Coaching Classroom Instruction* (Marzano & Simms, 2013a)
- *Becoming a Reflective Teacher* (Marzano, 2012a)
- *Effective Supervision: Supporting the Art and Science of Teaching* (Marzano et al., 2011)
- *The Highly Engaged Classroom* (Marzano & Pickering, 2011)
- *Formative Assessment and Standards-Based Grading* (Marzano, 2010a)
- *On Excellence in Teaching* (Marzano, 2010b)
- *Designing and Teaching Learning Goals and Objectives* (Marzano, 2009)
- *The Art and Science of Teaching: A Comprehensive Framework for Effective Instruction* (Marzano, 2007)
- *Classroom Management That Works: Research-Based Strategies for Every Teacher* (Marzano, 2003a)
- *What Works in Schools: Translating Research into Action* (Marzano, 2003b)
- *Classroom Instruction That Works: Research-Based Strategies for Increasing Student Achievement* (Marzano et al., 2001)
- *A Different Kind of Classroom: Teaching with Dimensions of Learning* (Marzano, 1992)

- *Dimensions of Thinking: A Framework for Curriculum and Instruction* (Marzano et al., 1988)

Factors from Hattie's (2012) list that most directly relate to level 2 and are at or above the hinge-point are listed in table 2.1.

Table 2.1: Hattie's Factors Related to Level 2 At or Above the Hinge-Point

Rank	Factor
4	Teacher credibility
5	Providing formative evaluation
6	Micro-teaching
7	Classroom discussion
9	Teacher clarity
10	Feedback
13	Spaced vs mass practice
21	Self-verbalization and self-questioning
23	Teaching strategies
27	Concept mapping
29	Direct instruction
30	Tactile stimulation programs
32	Worked examples
34	Peer tutoring
35	Cooperative vs competitive learning
46	Interactive video methods
47	Professional development
48	Goals
49	Play programs
52	Small-group learning
53	Questioning
57	Quality of teaching
65	Cooperative learning

Leading Indicators for Level 2

The leading indicators for level 2 are reported in table 2.2 (pages 26–28).

Table 2.2: Leading Indicators and Examples for Level 2

Leading Indicator 2.1: The school leader communicates a clear vision as to how instruction should be addressed in the school.

Examples:

- A written document articulating the schoolwide model of instruction is developed with input by teacher leaders.
- Professional development opportunities are provided for new teachers regarding the schoolwide model of instruction.
- When asked, teachers can describe the major components of the schoolwide model of instruction.
- New initiatives are prioritized and limited in number to support the instructional model.
- The schoolwide language of instruction is used regularly in faculty and department meetings.
- The schoolwide language of instruction is used regularly by faculty in their informal conversations.
- The schoolwide language of instruction is used regularly by faculty in their professional learning communities (PLCs).

Leading Indicator 2.2: Support is provided to teachers to continually enhance their pedagogical skills through reflection and professional growth plans.

Examples:

- Individual teachers have written statements of their pedagogical growth goals.
- Individual teachers keep track of their progress on their pedagogical growth goals.
- The school leader meets with teachers regarding their growth goals.
- When asked, teachers can describe their progress on their pedagogical growth goals.
- The school leader hires effective teachers.
- The school leader has a system in place to effectively evaluate the selection process for hiring new teachers.
- The school leader has a system in place to effectively evaluate and revise the new teacher induction program.
- The school leader retains effective teachers.
- When asked, the school leader can produce evaluation results, growth plans, and evidence of support for struggling teachers.

Leading Indicator 2.3: Predominant instructional practices throughout the school are known and monitored.

Examples:

- Walk-through data are aggregated so as to disclose predominant instructional practices in the school.
- When asked, the school leader can describe the predominant instructional practices in the school.
- When asked, teachers can describe the predominant instructional practices in the school.
- The school leader provides forthright feedback to teachers regarding their instructional practices.
- The school leader can describe effective practices and problems of practice.

Leading Indicator 2.4: Teachers are provided with clear, ongoing evaluations of their pedagogical strengths and weaknesses that are based on multiple sources of data and are consistent with student achievement data.

Examples:

- Highly specific rubrics are in place to provide teachers with accurate feedback on their pedagogical strengths and weaknesses.
- Teacher feedback and evaluation data are based on multiple sources of information including, but not limited to: direct observation, teacher self-report, analysis of teacher performance as captured on video, student reports on teacher effectiveness, and peer feedback to teachers.
- Teacher evaluation data are regularly used as the subject of conversation between school leaders and teachers.
- The school leader provides frequent observations and feedback to teachers.
- When asked, teachers can describe their instructional strategies that have the strongest and weakest relationships to student achievement.

Leading Indicator 2.5: Teachers are provided with job-embedded professional development that is directly related to their instructional growth goals.

Examples:

- Online professional development courses and resources are available to teachers regarding their instructional growth goals.
- Teacher-led professional development is available to teachers regarding their instructional growth goals.
- Instructional coaching is available to teachers regarding their instructional growth goals.
- Data are collected to link the effectiveness of professional development to improvement in teacher practices.
- When asked, teachers can describe how the available professional development supports their attainment of instructional growth goals.

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Leading Indicator 2.6: Teachers have opportunities to observe and discuss effective teaching.

Examples:

- Teachers have opportunities to engage in instructional rounds.
- Teachers have opportunities to view and discuss video-recorded examples of exemplary teaching.
- Teachers have regular times to meet and discuss effective instructional practices (for example, lesson study).
- Teachers have opportunities to interact about effective teaching via technology.
- Instructional practices are regularly discussed at faculty and department meetings.
- Video segments of instructional practices are regularly viewed and discussed at faculty and department meetings.
- Information is available regarding teachers' participation in opportunities to observe and discuss effective teaching.
- Information is available regarding teacher participation in virtual discussions regarding effective teaching.

As at level 1, many of the examples of leading indicators for level 2 are relatively common practices in many schools. Such practices include:

- Hiring and retaining effective teachers
- Gathering walk-through data
- Scoring teachers using rubrics that describe effective instruction
- Using online professional development sources
- Using instructional coaching
- Video-recording teachers

All of these activities are viable ways to focus on level 2 issues. However, I believe that the critical commitment essential to attaining level 2 status is an evaluation system whose primary purpose is teacher development.

Clearly, teacher evaluation is one of the major initiatives of the second decade of the 21st century. Indeed, it is such a robust movement that it can be used to address every issue relative to level 2 status, but to do so it must have a primary focus on teacher development. As I note in a 2012 article, "The Two Purposes of Teacher Evaluation" (Marzano, 2012b), states, districts, and schools all across the United States are busy developing or implementing teacher evaluation

systems. In the article I pose a question about the purpose of teacher evaluation that I believe every school and district should ask itself: Is the purpose of teacher evaluation primarily measurement or development?

In the article, I report the results of an informal survey administered to over 3,000 K–12 educators. That survey employed a simple scale with values ranging from 1 to 5. Educators who thought that measurement should be the sole purpose of teacher evaluation selected 1. Educators who thought that development should be the sole purpose of teacher evaluation selected 5. If an educator believed that the purpose of teacher evaluation should be half measurement and half development, he or she selected 3. Selecting 2 indicated a belief that measurement and development should be dual purposes but that measurement should be dominant, and 4 indicated a belief that measurement and development should be dual purposes but that development should be dominant. The results from the survey are depicted in table 2.3.

Table 2.3: Results from Informal Survey Regarding the Purposes of Teacher Evaluation

The purpose of teacher evaluation should be…	Results
5: Completely development	2%
4: Both, but development is more important	76%
3: Development and measurement are equally important	20%
2: Both, but measurement is more important	2%
1: Completely measurement	0%

As indicated in table 2.3, the vast majority of those who responded to the informal survey favored development as the primary purpose of teacher evaluation. I believe that a teacher evaluation system focused on development has three characteristics: (1) the system is comprehensive and specific, (2) the system includes a developmental scale, and (3) the system acknowledges and supports growth.

The System is Comprehensive and Specific

Comprehensive means the system includes all those elements that research has identified as associated with student achievement. *Specific* means the system identifies classroom strategies and behaviors at a granular level. Over the years I have developed a model designed to meet both criteria.

The model was first articulated in the book *The Art and Science of Teaching* (Marzano, 2007) and later expanded in the book *Effective Supervision* (Marzano et al., 2011). Other books have described the model's implications for teachers' self-analysis and reflection (*Becoming a Reflective Teacher*, Marzano, 2012a) as well as the implications of the model for coaching teachers (*Coaching Classroom Instruction*, Marzano & Simms, 2013a). In its entirety, the model addresses the domains of classroom instruction, planning and preparing, teacher self-reflection,

and collegiality and professionalism. Table 2.4 lists the 41 elements of the model that pertain directly to classroom instruction.

Table 2.4: 41 Elements of the Art and Science of Teaching Model That Pertain to Classroom Instruction

I. Routine Segments

A. Communicating Learning Goals, Tracking Student Progress, and Celebrating Success

1. Providing clear learning goals and scales to measure those goals
2. Tracking student progress
3. Celebrating success

B. Establishing and Maintaining Classroom Rules and Procedures

4. Establishing classroom routines
5. Organizing the physical layout of the classroom for learning

II. Content Segments

C. Helping Students Interact with New Knowledge

6. Identifying critical information
7. Organizing students to interact with new knowledge
8. Previewing new content
9. Chunking content into “digestible bites”
10. Group processing of new information
11. Elaborating on new information
12. Recording and representing knowledge
13. Reflecting on learning

D. Helping Students Practice and Deepen Their Understanding of New Knowledge

14. Reviewing content
15. Organizing students to practice and deepen knowledge
16. Using homework
17. Examining similarities and differences
18. Examining errors in reasoning
19. Practicing skills, strategies, and processes
20. Revising knowledge

E. Helping Students Generate and Test Hypotheses about New Knowledge

21. Organizing students for cognitively complex tasks
22. Engaging students in cognitively complex tasks involving hypothesis generating and testing
23. Providing resources and guidance

III. Segments Enacted on the Spot

F. Engaging Students

24. Noticing and reacting when students are not engaged
25. Using academic games
26. Managing response rates during questioning
27. Using physical movement
28. Maintaining a lively pace
29. Demonstrating intensity and enthusiasm
30. Using friendly controversy
31. Providing opportunities for students to talk about themselves
32. Presenting unusual or intriguing information

G. Recognizing and Acknowledging Adherence or Lack of Adherence to Rules and Procedures

33. Demonstrating "withitness"
34. Applying consequences
35. Acknowledging adherence to rules and procedures

H. Establishing and Maintaining Effective Relationships with Students

36. Understanding students' interests and background
37. Using behaviors that indicate affection for students
38. Displaying objectivity and control

I. Communicating High Expectations for All Students

39. Demonstrating value and respect for low-expectancy students
40. Asking questions of low-expectancy students
41. Probing incorrect answers with low-expectancy students

Adapted from Marzano et al., 2011, pp. 30–31.!

The 41 elements in table 2.4 are categorized according to the type of lesson segment in which they normally occur: routine segments, content segments, and segments enacted on the spot. Strategies that are used on a routine basis are listed under *routine segments.* These include five types of strategies (elements 1–5) organized into two subcategories: strategies that involve communicating learning goals, tracking student progress, and celebrating success, and strategies that involve establishing and maintaining classroom rules and procedures. Strategies that are used when students are interacting with content are listed under *content segments* and fall into three subcategories: strategies that help students interact with new knowledge, strategies that help students practice and deepen their understanding of knowledge they have previously been introduced to, and strategies that help students apply knowledge by generating and testing hypotheses. There are 18 types of strategies that are used when students interact with content (elements 6–23). Strategies that teachers must be prepared to use whenever they are needed, even though they might not have planned to use them in a given lesson or on a given day, are listed under *segments enacted on the spot*. These strategies fall into four categories: strategies for engaging students, strategies that acknowledge adherence or lack of adherence to rules and

procedures, strategies that build relationships with students, and strategies that communicate high expectations for all students. There are 18 types of strategies used in on-the-spot lesson segments (elements 24–41).

Each of the 41 elements has substantial research supporting its efficacy (see Marzano, 2007). Also, I believe that the model accurately represents the diversity of strategies that highly effective teachers employ. Such a comprehensive and detailed listing of instructional strategies makes perfect sense in the context of a teacher evaluation system focused on development.

An evaluation system designed primarily for measurement would not need to be as robust. In fact, many of the 41 elements in table 2.4 (pages 30–31) are unnecessary if the sole purpose of teacher evaluation is measurement. This is because some of the strategy areas listed in table 2.4 correlate with student achievement but are not absolutely necessary to be effective in the classroom. For example, consider academic games (element 25), which are certainly useful tools in enhancing student achievement (Hattie, 2009; Walberg, 1999). However, every teacher does not have to use academic games. Indeed, a teacher can produce dramatic gains in student learning without using games at all.

A teacher evaluation system focused on measurement alone would only involve those elements that cut across all grade levels, all subjects, and all types of students. In my model, there are 15 such elements, which are shaded in table 2.4 (pages 30–31). It is important to note that these 15 elements would not address the fine-tuned granular levels of behavior that distinguish true experts in the classroom from everyone else. As Nalini Ambady and Robert Rosenthal (1992) note, expertise occurs in "thin slices of behavior" (p. 257). To develop those thin slices of behavior that are characteristic of experts, teachers need feedback on all 41 elements listed in table 2.4. Using that feedback, teachers can identify areas of strength and weakness and then systematically begin improving their areas of weakness.

The System Includes a Developmental Scale

The second characteristic of a teacher evaluation system that focuses on development is that it employs a scale or rubric that teachers can use to guide and track their skill development. Such a scale would articulate developmental levels, like those shown in table 2.5.

Table 2.5: Developmental Scale

Innovating (4)	Applying (3)	Developing (2)	Beginning (1)	Not Using (0)
The teacher adapts or creates a new version of the strategy or behavior for unique student needs and situations.	The teacher uses the strategy or behavior and monitors the extent to which it affects student outcomes.	The teacher uses the strategy or behavior but does so in a somewhat mechanistic way.	The teacher uses the strategy or behavior incorrectly or with parts missing.	The teacher should use the strategy or behavior but does not.

From Marzano, 2012a, p. 37.

Not using indicates that a teacher is not aware of a particular strategy or is aware of it but has not tried it in his or her classroom. For example, if a teacher were unaware of strategies for engaging students in friendly controversy (element 30 in table 2.4, page 31), he or she would be at the not using level.

At the *beginning* level, a teacher knows about a strategy and uses it in the classroom, but exhibits errors or omissions in its execution. For example, a teacher using the strategy of friendly controversy is at the beginning level if he or she simply asks students to state their opinions about a topic. Although students are performing one component of the strategy, stating their opinions, they are not supporting their opinions with evidence or disagreeing respectfully with others, which are also important components of the strategy.

At the *developing* level, the teacher uses the strategy without significant errors or omissions and with relative fluency. At the *applying* level, a teacher not only executes a strategy with fluency, but also monitors the class to ensure that the strategy is having its desired effect. A teacher using the friendly controversy strategy at the applying level would verify that students are backing up their opinions with evidence and disagreeing in a controlled and respectful manner. It is at the applying level and above that a strategy has the potential of producing large gains in student learning.

Finally, at the *innovating* level, the teacher monitors the class to ensure that a strategy is having its desired effect with the majority of students and makes necessary adaptations to ensure that all student populations are experiencing the strategy's positive effects. To reach all students, a teacher might have to make adaptations for English language learners or for students who are lacking in important background knowledge for the topic being addressed. One might think of the innovating level as that at which the teacher is effectively differentiating instruction (Tomlinson & Imbeau, 2010).

The scale in table 2.5 is specifically designed with teacher development in mind. It enables teachers (commonly with the aid of a supervisor or instructional coach) to pinpoint their current level of performance for a specific strategy, set goals for operating at higher levels within a given period of time, and then achieve those goals as part of their personal growth plan.

The System Acknowledges and Supports Growth

The third characteristic of an evaluation system focused on teacher development is that it explicitly acknowledges and rewards teacher growth. Each year, teachers identify elements (from the 41 listed in table 2.4, pages 30–31) on which to improve. Then they chart their progress on the selected elements, or growth goals, throughout the year. In addition to being scored on their current level of proficiency with the various elements within the model—I refer to these ratings as "status" scores—teachers are scored on the extent to which they achieve their growth goals. For example, assume a teacher selects three elements from table 2.4 on which to improve over the year. Attaining his or her growth goals for all three elements would earn the highest growth score, attaining two of three goals would earn the next highest growth score, and so on. At the end of the year, teachers would have two summative scores: an overall status score and an overall growth score. Both of these scores would be considered when assigning teachers to a

summative category of effectiveness regarding their teaching at the end of the year (for example, highly effective, effective, needing improvement, or not acceptable). Such a system would communicate to teachers that the school expects—and rewards—continuous improvement.

A teacher evaluation system that focuses on teacher development can be highly instrumental in satisfying the six leading indicators for level 2. For example, having a system that is comprehensive and specific greatly facilitates attainment of a clear vision of instruction (leading indicator 2.1) and clear and ongoing evaluations of teachers' pedagogical strengths and weaknesses (leading indicator 2.4). Use of a developmental scale helps teachers enhance their pedagogical skills (leading indicator 2.2) and provides evidence regarding the predominant instructional practices used throughout the school (leading indicator 2.3). Acknowledging and supporting growth naturally leads to a school providing job-embedded professional development (leading indicator 2.5) and providing opportunities for teachers to observe and discuss effective teaching (leading indicator 2.6).

Lagging Indicators for Level 2

The lagging indicators for level 2 are listed in table 2.6.

Table 2.6: Lagging Indicators for Level 2

Lagging Indicator 2.1:	**A document describing the school's instructional model is available.**
Lagging Indicator 2.2:	**Survey data indicate that teachers are well aware of the school's instructional model and their status within that model.**
Lagging Indicator 2.3:	**Evidence exists that the school leader has a demonstrated record of hiring and retaining effective teachers.**
Lagging Indicator 2.4:	**Evidence is available that teacher growth in pedagogical skill is consistent and meets or exceeds acceptable levels.**
Lagging Indicator 2.5:	**Evidence is available that teacher growth in pedagogical skill is related to the professional development opportunities provided by the school.**
Lagging Indicator 2.6:	**Evidence is available that the average level of teacher pedagogical skill meets or exceeds acceptable levels.**
Lagging Indicator 2.7:	**Evidence is available that any teacher who is below acceptable levels of pedagogical skill and/or growth is adhering to a detailed growth plan.**

Lagging Indicator 2.8:	**The distribution of teachers' pedagogical statuses is consistent with measures of student growth within the school.**
Lagging Indicator 2.9:	**Survey data indicate high levels of agreement that the school in general and the evaluation system in particular are designed to help teachers improve their pedagogical skills.**
Lagging Indicator 2.10:	**Evidence exists that teachers who have demonstrated little or no desire to develop or maintain high levels of pedagogical skill are counseled out of the profession or terminated in extreme cases.**

Again, some of the lagging indicators are perceptual in nature such as:

- Survey data indicate that teachers are well aware of the school's instructional model and their status within that model.
- Survey data indicate high levels of agreement that the school in general and the evaluation system in particular are designed to help teachers improve their pedagogical skills.

As at level 1, perceptual data can be systematically gathered through surveys offered within PLCs. Of course, to use perceptual data as a lagging indicator, criterion scores regarding favorable perceptions would have to be established. The majority of the lagging indicators for level 2 are not perceptual and require recordkeeping that is not commonly available in schools today. For lagging indicator 2.4, records would have to be kept regarding teacher growth scores and those scores correlated with student growth. For lagging indicator 2.5, records would need to be kept on the professional development opportunities in which teachers engaged. For lagging indicator 2.6, the distribution of teacher status scores would have to be continually updated and examined. In short, to establish criterion scores for the lagging indicators for level 2, detailed records in areas like the following must be kept and examined: teacher retention, teacher dismissal, teachers' current status regarding specific instructional strategies, teachers' growth on specific instructional strategies, and teacher participation in professional development activities. While certainly labor-intensive to collect, such data forms the basis of evidence that a school has reached level 2 high reliability status.

3

A Guaranteed and Viable Curriculum Focused on Enhancing Student Learning

Level 3 addresses the extent to which a school's curriculum provides opportunities for all students to learn challenging content that is aligned with national and state standards. Level 3 has six leading indicators:

Leading Indicator 3.1: The school curriculum and accompanying assessments adhere to state and district standards.

Leading Indicator 3.2: The school curriculum is focused enough that it can be adequately addressed in the time available to teachers.

Leading Indicator 3.3: All students have the opportunity to learn the critical content of the curriculum.

Leading Indicator 3.4: Clear and measureable goals are established and focused on critical needs regarding improving overall student achievement at the school level.

Leading Indicator 3.5: Data are analyzed, interpreted, and used to regularly monitor progress toward school achievement goals.

Leading Indicator 3.6: Appropriate school- and classroom-level programs and practices are in place to help students meet individual achievement goals when data indicate interventions are needed.

The bedrock for level 3 high reliability status is a guaranteed and viable curriculum. The concept of a guaranteed and viable curriculum was addressed in the book *What Works in Schools* (Marzano, 2003b). Although the phrase was first coined in that book, research had been accumulating for years supporting its importance. Perhaps the most direct research is that regarding opportunity to learn (OTL). The concept of OTL was introduced by the International Association for the Evaluation of Educational Achievement (see Wilkins, 1997) when it became a component of the First—and then, later—the Second International Mathematics Study (FIMS and SIMS respectively) (see Burstein, 1992; Husen, 1967a, 1967b).

The logic behind OTL is that all students should have equal opportunities to learn the content of the items being used to assess their achievement:

> One of the factors which may influence scores on an achievement examination is whether or not students have had an opportunity to study a particular topic or learn how to solve a particular type of problem presented by the test. (Husen, 1967b, pp. 162–163)

OTL is a very simple concept: If students do not have the opportunity to learn the content expected of them, there is, of course, little chance that they will. As it relates to level 3 high reliability status, OTL addresses the extent to which the curriculum in a school is "guaranteed." Operationally, this means that the curriculum provides clear guidance regarding the content to be addressed in specific courses and at specific grade levels. Additionally, it means that individual teachers do not have the option to disregard or replace content that has been designated as essential to a specific course or grade level. This constitutes the "guaranteed" part of a guaranteed and viable curriculum. But what about the viability of the curriculum?

The criterion of viability is equally as important and, in fact, a necessary condition for having a guaranteed curriculum. Viability means that the content teachers are expected to address can be adequately addressed in the time teachers have available for instruction. Unfortunately, for years, K–12 education has ignored the problem of too much content in their standards. My colleagues and I (Marzano et al., 2013) commented on the proliferation of content that resulted from the standards movement of the 1990s: "As different subject-matter organizations developed standards for their specific content areas, each group of specialists identified *everything* they thought students should know and be able to do in their fields" (p. 2). As a result, the standards developed by subject-matter organizations during the 1990s presented far too much content for teachers to address. Stated differently, the curriculum recommended or implied by the standards initiatives of the 1990s was by definition not viable and, therefore, could not be guaranteed.

The Common Core State Standards (CCSS) initiative sought to alleviate the problem of too much content in previous standards efforts:

> The National Governors Association (NGA) and the Council of Chief State School Officers (CCSSO) met in 2009 and agreed to take part in "a state-led

> process that will draw on evidence and lead to development and adoption of a common core of state standards . . . in English language arts and mathematics for grades K–12" (as cited in Rothman, 2011, p. 62). Other organizations also contributed to the effort, among them Achieve, the Alliance for Excellent Education, the James B. Hunt Jr. Institute for Educational Leadership and Policy, the National Association of State Boards of Education, the Business Roundtable, ACT, and the College Board (Rothman, 2011). These organizations created a set of three criteria that would guide the design of the CCSS. (Marzano et al., 2013, p. 6)

One of the three criteria established was that "the new standards should be fewer, clearer, and higher than previous standards. That is, there should be *fewer* standards statements, they should be *clearer* (unidimensional and concrete), and they should encourage students to use *higher*-level thinking" (Marzano et al., 2013, p. 6). While the CCSS effort did succeed in reducing the amount of content in mathematics and English language arts, not all agreed that the new standards were completely viable and useful to K–12 schools (for a discussion, see Marzano et al., 2013).

In addition to a curriculum that is guaranteed and viable, level 3 status requires a curriculum that enhances student learning. This means that in addition to traditional content, the curriculum also addresses skills that help students learn. This emphasis is explicit in the CCSS, particularly in the Standards for Mathematical Practice and the college and career readiness (CCR) anchor standards in English language arts. My colleagues and I (Marzano et al., 2013) note that these standards involve "mental processes that could be directly taught to students and then used to apply mathematics and ELA content in meaningful ways" (p. 23). Many of these standards represent metacognitive skills. Level 3 high reliability status, then, requires significant tightening and focus in the school curriculum and how it is used by teachers.

Of the books I have authored, the following contain the most direct reviews of the literature and recommended interventions at level 3:

- *Vocabulary for the Common Core* (Marzano & Simms, 2013b)
- *Using Common Core Standards to Enhance Classroom Instruction and Assessment* (Marzano et al., 2013)
- *Teaching and Assessing 21st Century Skills* (Marzano & Heflebower, 2012)
- *Formative Assessment and Standards-Based Grading* (Marzano, 2010a)
- *Teaching Basic and Advanced Vocabulary: A Framework for Direct Instruction* (Marzano, 2010c)
- *Designing and Teaching Learning Goals and Objectives* (Marzano, 2009)

- *Designing and Assessing Educational Objectives: Applying the New Taxonomy* (Marzano & Kendall, 2008)
- *Making Standards Useful in the Classroom* (Marzano & Haystead, 2008)
- *The New Taxonomy of Educational Objectives* (Marzano & Kendall, 2007)
- *Classroom Assessment and Grading That Work* (Marzano, 2006)
- *Building Background Knowledge for Academic Achievement: Research on What Works in Schools* (Marzano, 2004)
- *What Works in Schools: Translating Research into Action* (Marzano, 2003b)
- *Transforming Classroom Grading* (Marzano, 2000)
- *Content Knowledge: A Compendium of Standards and Benchmarks for K–12 Education* (Kendall & Marzano, 2000)
- *A Cluster Approach to Elementary Vocabulary Instruction* (Marzano & Marzano, 1988)

Table 3.1 lists those factors from Hattie's (2012) list that are at or above the .40 hinge-point and directly related to level 3.

Table 3.1: Hattie's Factors Related to Level 3 At or Above the Hinge-Point

Rank	Factor
3	Response to intervention
14	Meta-cognitive strategies
17	Vocabulary programs
19	Creativity programs on achievement
22	Study skills
26	Comprehension programs
32	Worked examples
33	Visual-perception programs
36	Phonics instruction
43	Outdoor/adventure programs
47	Professional development
61	Writing programs

Leading Indicators for Level 3

The leading indicators for level 3 are reported in table 3.2.

Table 3.2: Leading Indicators and Examples for Level 3

Leading Indicator 3.1: The school curriculum and accompanying assessments adhere to state and district standards.

Examples:

- The written curriculum is analyzed to ensure that it correlates with state and district standards (for example, the CCSS, if applicable).
- The written curriculum adequately addresses important 21st century skills (for example, college and career readiness [CCR] skills and mathematical practice skills from the CCSS).
- The curriculum taught in classrooms (that is, the taught curriculum) is analyzed to ensure that it correlates with the written curriculum.
- Assessments are analyzed to ensure that they accurately measure the written and taught curricula.
- School teams regularly analyze the relationship between the written curriculum, the taught curriculum, and assessments.
- When asked, teachers can describe the essential content and standards for their subject area(s) or grade level(s).

Leading Indicator 3.2: The school curriculum is focused enough that it can be adequately addressed in the time available to teachers.

Examples:

- Essential elements of content are identified.
- The amount of time needed to adequately address the essential elements is examined.
- Teams regularly meet to discuss the progression and viability of documents that articulate essential content and timing of delivery (for example, pacing guides, curriculum maps).
- Essential vocabulary is identified at all levels (that is, tiers 1, 2, and 3).

Leading Indicator 3.3: All students have the opportunity to learn the critical content of the curriculum.

Examples:

- Tracking systems that examine each student's access to the essential elements of the curriculum are in place.
- Parents are aware of their child's current access to the essential elements of the curriculum.
- All students have access to advanced placement courses.
- The extent to which all students have access to necessary courses has been analyzed.
- The school leader ensures that teachers have completed appropriate content training in their subject-area courses.
- A system of direct vocabulary instruction is available at all levels (that is, tiers 1, 2, and 3).

continued on next page →

Leading Indicator 3.4: Clear and measurable goals are established and focused on critical needs regarding improving overall student achievement at the school level.

Examples:

- Goals are established as a percentage of students who will score at a proficient or higher level on state assessments or benchmark assessments.
- Goals are established for eliminating differences in achievement for students at different socioeconomic levels.
- Goals are established for eliminating differences in achievement for students of differing ethnicities.
- Schoolwide achievement goals are posted so that faculty and staff see them on a regular basis.
- Schoolwide achievement goals are discussed regularly at faculty and staff gatherings.
- Faculty and staff can describe the schoolwide achievement goals.
- Faculty and staff can explain how goals eliminate differences in achievement for students of differing ethnicities.
- Faculty and staff can explain how goals eliminate differences in achievement for students at different socioeconomic levels, English language learners, and students with disabilities.
- Improvement goals are assigned to various departments and faculty.
- Goals are established for eliminating the achievement gap for all students.
- Goals are established for eliminating differences in achievement for English language learners.
- Goals are established for eliminating differences in achievement for students with disabilities.
- Goals address the most critical and severe deficiencies.
- Timelines contain specific benchmarks for each goal, including the individual(s) responsible for the goal.

Leading Indicator 3.5: Data are analyzed, interpreted, and used to regularly monitor progress toward school achievement goals.

Examples:

- Overall student achievement is regularly analyzed.
- Student achievement is examined from the perspective of value-added results.
- Results from multiple types of assessments are regularly reported and used (for example, benchmark assessments, common assessments).
- When asked, faculty and staff can describe the different types of reports available to them.
- Reports, graphs, and charts are regularly updated to track growth in student achievement.
- School leadership teams regularly analyze school growth data.
- Data briefings are conducted at faculty meetings.

Leading Indicator 3.6: Appropriate school- and classroom-level programs and practices are in place to help students meet individual achievement goals when data indicate interventions are needed.

Examples:

- Extended school day and extended school week programs are in place.
- Extended school year programs are in place.
- After-school programs are in place.
- Tutorial programs are in place.
- The school schedule is designed so that students can receive academic help while in school.
- Individual student completion of programs designed to enhance their academic achievement is monitored (that is, gifted and talented, advanced placement, STEM, and others).
- Response to Intervention measures and programs are in place.
- Enrichment programs are in place.

Of the leading indicators listed in table 3.2, many are already commonly employed in schools. These include:

- Assessments are aligned to the curriculum
- Essential content has been identified
- Goals are established as a percentage of students who will score at a proficient or higher level on state assessments or benchmark assessments
- Overall student achievement is regularly analyzed
- School leadership teams regularly analyze school growth data
- After-school programs are available
- Tutorial programs are in place
- Response to Intervention measures and programs are in place

I believe there are three critical commitments important to achieving level 3 high reliability status: (1) continually monitoring the viability of the curriculum, (2) a comprehensive vocabulary program, and (3) direct instruction in knowledge application and metacognitive skills.

Continually Monitoring the Viability of the Curriculum

Given the focus of level 3, an obvious and necessary initiative is continually monitoring the viability of the curriculum with respect to the amount of available time for instruction. In fact, this should probably be the starting place for any school that seeks level 3 high reliability status. Two approaches to such an audit are discussed in the book *What Works in Schools* (Marzano, 2003b). One involves asking teachers to estimate the number of hours it would take to address the essential content within the curriculum and then comparing the total hours from this estimate with the hours available for instruction. The second involves asking teachers to estimate the number of class periods it would take to address the essential content and then comparing this total with the class periods available. These simple actions done continually will help a school avoid the pitfall of taking on too many new programs that include new content.

A Comprehensive Vocabulary Program

Taken at face value, it might seem that a comprehensive vocabulary program is not a critical aspect of a guaranteed and viable curriculum that enhances student learning. However, both research and common sense indicate that vocabulary development is critical to enhancing student learning. Stated differently, vocabulary knowledge is so foundational to content knowledge that it should be a focal point of the curriculum.

Numerous studies have documented the relationship between vocabulary knowledge and academic achievement:

> The relationship between vocabulary and academic achievement has been acknowledged for decades. In 1941, Mary Katherine Smith estimated that students scoring in the 50th percentile on standardized tests knew 6,000 more words than those scoring in the 25th percentile. William Nagy and Patricia Herman (1984) calculated the same gap to be between 4,500 and 5,400 words, adding that "the distance between the median and the bottom of the range is more than twice that large" (p. 7). A number of researchers (Baumann and Kame'enui, 1991; Becker, 1977; Stanovich, 1986) have found evidence that vocabulary is a key factor affecting academic achievement and Richard Anderson and William Nagy (1993) stated that "one of the most consistent findings of educational research is that having a small vocabulary portends poor school performance and, conversely, that having a large vocabulary is associated with school success" (p. 2). As noted previously, the importance of students' vocabulary knowledge cannot be stated too strongly. (Marzano & Simms, 2013b, pp. 6–7)

A question that immediately surfaces in any discussion of vocabulary instruction is: Which vocabulary terms should be the subject of direct instruction? Certainly, not all terms students encounter should be taught directly. There are a variety of perspectives on this issue, and some have proposed that formally identifying vocabulary that will be taught directly is so problematic

as to be not worth the effort (for a discussion, see Marzano, 2004, 2010c). Fortunately, viable solutions have been proposed.

Beck and McKeown (1985) explain that vocabulary terms can be thought of in three tiers. The first tier includes those terms that are very frequent in the English language—the most basic terms in the language which are encountered frequently enough that students commonly learn them in context. Tier 2 terms are those that are important to understanding a language but appear infrequently enough in general language usage that they will probably not be learned in context. Tier 3 terms in the Beck and McKeown schema are subject-matter specific—terms that are important to academic subject areas but not as frequently found in general use in the language.

What are the Tier 1, 2, and 3 Terms?

In a series of works, my colleagues and I have identified the tier 1, 2, and 3 terms. The tier 1 and tier 2 terms were identified in the book *Teaching Basic and Advanced Vocabulary* (Marzano, 2010c). There are 2,845 tier 1 terms and 5,162 tier 2 terms. Tier 1 and tier 2 terms are found in the general vocabulary. Tier 3 terms are specific to academic subject areas. They were first identified in the book *Building Background Knowledge for Academic Achievement* (Marzano, 2004). The number of tier 3 terms for various subject areas is reported in table 3.3 (page 46).

As shown in table 3.3 (page 46), there are 7,923 tier 3 terms. When added to the 2,845 tier 1 terms and 5,162 tier 2 terms, the total number of terms is 15,930. However, some 900 terms can be found in more than one tier. This brings the total down to 15,000 terms. In effect, schools now have a corpus of 15,000 terms that can be used to develop the foundational vocabulary knowledge for any student at any level in any subject area.

A reasonable approach to direct vocabulary instruction would have the following characteristics:

1. Direct instruction in the tier 1 terms only for those students who need it.

2. Direct instruction in the tier 2 terms for all students as a regular part of instruction in the English language arts.

3. Direct instruction in tier 3 terms as part of instruction in subject-area classes.

This is not to say that all 15,000 terms should be targeted for direct instruction. Indeed, students can be guaranteed a firm grounding in tier 2 and tier 3 terms without any student experiencing direct instruction in more than about 300 terms per year. This amounts to direct instruction in less than 10 terms per week, including all major subject areas (for a discussion, see Marzano, 2004, 2010c). Instruction in the tier 1 terms can occur quite efficiently and quickly if terms are taught in semantic clusters—groups of related terms (see Marzano, 2010c). Again, not all students would require direct instruction in tier 1 terms. In fact, instruction in tier 1 terms is usually necessary only for some English language learners and for some students who come from home environments not highly conducive to developing background knowledge (see Marzano, 2010c).

Table 3.3: Tier 3 Terms in 17 Subject Areas

Subject Area	(K–2)	(3–5)	(6–8)	(9–12)	Totals
Mathematics	80	190	201	214	685
Science	100	166	225	282	773
English Language Arts	83	245	247	223	798
History					
General History	162	560	319	270	1,311
U.S. History	0	154	123	148	425
World History	0	245	301	297	843
Geography	89	212	258	300	859
Civics	45	145	210	213	613
Economics	29	68	89	155	341
Health	60	68	75	77	280
Physical Education	57	100	50	34	241
The Arts					
Arts General	14	36	30	9	89
Dance	18	24	42	37	121
Music	14	83	67	32	196
Theater	5	14	35	13	67
Visual Arts	3	41	24	8	76
Technology	23	47	56	79	205
Totals	**782**	**2,398**	**2,352**	**2,391**	**7,923**

From Marzano, 2004, p. 115.

Direct Instruction in Knowledge Application and Metacognitive Skills

As described previously, the CCSS place an emphasis on explicit instruction in knowledge application and metacognitive skills. This emphasis is not new or unique to the CCSS. Over the past few decades, mental processes that could be used to apply content in meaningful ways have been called by many other names, such as thinking and reasoning skills (Marzano & Pollock, 2001), habits of mind (Costa & Kallick, 2009), learning and innovation skills (Partnership for 21st Century Skills, 2012), workplace demands (U.S. Department of Labor, 1991), dimensions of learning (Marzano & Pickering, 1997), dimensions of thinking (Marzano et al., 1988), and transferable knowledge (Pellegrino & Hilton, 2012), among others.

Knowledge application and metacognitive skills can be organized into two broad categories of skills: cognitive and conative. *Cognitive skills* are those needed to effectively process information and complete tasks. *Conative skills* allow a person to examine his or her knowledge and emotions in order to choose an appropriate future course of action. There are ten cognitive skills and seven conative skills that have considerable research behind their efficacy and should be the subject of explicit instruction within the guaranteed and viable curriculum. Each skill is briefly described in table 3.4.

Table 3.4: Cognitive and Conative Skills

Cognitive Skills
Generating conclusions involves combining known information to form new ideas.
Identifying common logical errors involves analyzing information to determine how true it is.
Presenting and supporting claims involves providing evidence to support a new idea.
Navigating digital sources involves using electronic resources to find credible and relevant information.
Problem solving involves accomplishing a goal in spite of obstacles or limiting conditions.
Decision making involves using criteria to select among alternatives that initially appear to be equal.
Experimenting is the process of generating and testing explanations of observed phenomena.
Investigating involves identifying confusions or contradictions about ideas or events and suggesting ways to resolve those confusions or contradictions.
Identifying basic relationships between ideas involves consciously analyzing how one idea relates to others.
Generating and manipulating mental images involves creating a picture of information in one's mind in order to process it more deeply.
Conative Skills
Becoming aware of the power of interpretations involves becoming aware that one's thoughts, feelings, beliefs, and actions are influenced by how one interprets situations.
Cultivating a growth mindset involves building the belief that each person can increase his or her intelligence and abilities.
Cultivating resiliency involves developing the ability to overcome failure, challenge, or adversity.
Avoiding negative thinking involves preventing one's emotions from dictating one's thoughts and actions.
Taking various perspectives involves identifying the reasoning behind multiple (and often conflicting) perspectives on an issue.
Interacting responsibly involves being accountable for the outcome of an interaction.
Handling controversy and conflict resolution involves reacting positively to controversy or conflict.

Adapted from Marzano et al., 2013, pp. 26–44.

The three critical commitments described above provide a strong foundation for addressing the six leading indicators for level 3. Continually monitoring the viability of the curriculum directly addresses leading indicator 3.2 and provides a foundation for addressing leading indicators 3.1, 3.3, and 3.5. A comprehensive vocabulary program and explicit instruction in knowledge application and metacognitive skills facilitate leading indicators 3.4 and 3.6.

Lagging Indicators for Level 3

The lagging indicators for level 3 are listed in table 3.5.

Table 3.5: Lagging Indicators for Level 3

Lagging Indicator 3.1:	**Curriculum documents are in place that correlate the written curriculum to state and district standards (for example, the CCSS, if applicable).**
Lagging Indicator 3.2:	**Curriculum documents are in place correlating the written curriculum to the skills important to 21st century learning (for example, college and career readiness [CCR] skills and mathematical practice skills from the CCSS).**
Lagging Indicator 3.3:	**Information is available correlating what is taught in classrooms (that is, the taught curriculum) and the written curriculum.**
Lagging Indicator 3.4:	**Information is available examining the extent to which assessments accurately measure the written and taught curricula.**
Lagging Indicator 3.5:	**A written list of essential elements is in place.**
Lagging Indicator 3.6:	**A written list of essential vocabulary is in place for all levels (that is, tiers 1, 2, and 3).**
Lagging Indicator 3.7:	**A curriculum audit document is in place delineating how much time it would take to adequately address the essential elements.**
Lagging Indicator 3.8:	**All students have a prescribed program of study that documents access to courses.**
Lagging Indicator 3.9:	**Written goals are available specifying the percentage of students who will score at a proficient or higher level on state assessments or benchmark assessments.**

Lagging Indicator 3.10:	**Written goals are available specifying the elimination of differences in achievement for students at different socioeconomic levels.**
Lagging Indicator 3.11:	**Written goals are available specifying the elimination of differences in achievement for students of differing ethnicities.**
Lagging Indicator 3.12:	**Written goals are available specifying the elimination of the achievement gap for all students.**
Lagging Indicator 3.13:	**Written goals are available specifying the elimination of differences in achievement for English language learners.**
Lagging Indicator 3.14:	**Written goals are available specifying the elimination of differences in achievement for students with disabilities.**
Lagging Indicator 3.15:	**Written timelines are available containing specific benchmarks for each goal, including the individual(s) responsible for the goal.**
Lagging Indicator 3.16:	**Reports, graphs, and charts are available for overall student achievement.**
Lagging Indicator 3.17:	**Evidence is available showing that reports, graphs, and charts are regularly updated to track growth in student achievement.**
Lagging Indicator 3.18:	**Evidence is available that students who need instructional support outside of the regular classroom have had access to and taken advantage of such support.**

At level 3, none of the lagging indicators are perceptual in nature. Therefore, survey data would not suffice. Most of the lagging indicators manifest as written documents. For example, a curriculum audit document would provide direct evidence of the viability of the curriculum. A document that is regularly updated tracking the courses taken by students could be used to provide evidence that students in need of instructional support are taking the necessary courses to improve their achievement, and so on.

4

Standards-Referenced Reporting of Student Progress

Level 4 addresses the extent to which a school's reporting system clearly identifies specific topics for each subject area at each grade level and each student's current status on each reporting topic. Level 4 contains the following two leading indicators:

Leading Indicator 4.1: Clear and measureable goals are established and focused on critical needs regarding improving achievement of individual students within the school.

Leading Indicator 4.2: Data are analyzed, interpreted, and used to regularly monitor progress toward achievement goals for individual students.

As mentioned in the introduction, a school that reaches level 4 high reliability status operates in a rarified atmosphere because it reports student achievement at a level of detail that surpasses overall letter grades. Specifically, the school reports student achievement for specific topics within each subject area. Such a system is referred to as "standards-referenced" but is frequently confused with a standards-based system. John Kendall and I (Marzano & Kendall, 1996) highlight this distinction as critical to well-informed school reform efforts. We note:

> In a standards-based system, students must demonstrate that they have met the standards at one level before they are allowed to pass on to the next level. In a standards-referenced system, students' standings relative

> to specific standards are documented and reported; however, students are not held back if they do not meet the required performance levels for the standards. This provides students and parents with highly specific information about students' standing relative to standards but allows students to progress through the system even if they have not met specific standards. (p. 190)

At level 4, a school is standards-referenced as opposed to standards-based. This is not to say that being standards-based is inadvisable. Indeed, being standards-based is the essence of the next level.

Of the books I have authored, the following contain the most direct reviews of the literature and recommended interventions at level 4:

- *Using Common Core Standards to Enhance Classroom Instruction and Assessment* (Marzano et al., 2013)
- *Leaders of Learning: How District, School, and Classroom Leaders Improve Student Achievement* (DuFour & Marzano, 2011)
- *Formative Assessment and Standards-Based Grading* (Marzano, 2010a)
- *Designing and Teaching Learning Goals and Objectives* (Marzano, 2009)
- *Designing and Assessing Educational Objectives: Applying the New Taxonomy* (Marzano & Kendall, 2008)
- *Making Standards Useful in the Classroom* (Marzano & Haystead, 2008)
- *Classroom Assessment and Grading That Work* (Marzano, 2006)
- *Designing a New Taxonomy of Educational Objectives* (Marzano, 2001)
- *Transforming Classroom Grading* (Marzano, 2000)
- *A Comprehensive Guide to Designing Standards-Based Districts, Schools, and Classrooms* (Marzano & Kendall, 1996)

Table 4.1 lists those factors from Hattie's (2012) list that are at or above the .40 hinge-point and directly related to level 4.

Table 4.1: Hattie's Factors Related to Level 4 At or Above the Hinge-Point

Rank	Factor
1	Self-reported grades/Student expectations
9	Teacher clarity
10	Feedback
15	Acceleration
31	Mastery learning
40	Keller's Mastery Learning (PSI)
47	Professional development
48	Goals

Leading Indicators for Level 4

The leading indicators for level 4 are reported in table 4.2 (page 54). Of the leading indicators listed in table 4.2, only a few are practiced in schools today, and even these practices are not widely employed:

- Students keep data notebooks
- Student-led conferences focus on individual student goals
- Parent-teacher conferences focus on individual student goals
- Individual student achievement is examined from the perspective of value-added results

The scant attention currently paid to even the leading indicators for level 4 attests to the fact that this level represents a major shift in how schools operate. To become a high reliability school at level 4, I recommend two critical commitments: (1) develop proficiency scales for the essential content and (2) report status and growth on the report card using proficiency scales. Both represent major shifts in how schools are run.

Table 4.2: Leading Indicators and Examples for Level 4

Leading Indicator 4.1: Clear and measurable goals are established and focused on critical needs regarding improving achievement of individual students within the school.

Examples:

- Goals are established for each student in terms of their performance on state assessments, benchmark assessments, or common assessments.
- Essential elements for each subject area are articulated in terms of clear learning progressions or scales (that is, rubrics).
- Goals accompanied by proficiency scales are established for each student in terms of their knowledge gain regarding the essential elements in each subject area.
- When asked, students are aware of their status on their specific achievement goals.
- Students keep data notebooks regarding their individual goals.
- When asked, parents are aware of their child's achievement goals.
- Student-led conferences focus on the individual student's goals.
- Parent-teacher conferences focus on the individual student's goals.
- Students perceive that their individual goals are academically challenging.

Leading Indicator 4.2: Data are analyzed, interpreted, and used to regularly monitor progress toward achievement goals for individual students.

Examples:

- The status and growth of individual students are analyzed regularly.
- When asked, individual students and their parents can describe their achievement status and growth.
- Individual student achievement is examined from the perspective of value-added results.
- Individual student results from multiple types of assessments are regularly reported and used (for example, benchmark assessments, common assessments).
- When asked, faculty can describe the different types of individual student reports available to them.
- Individual student reports, graphs, and charts are regularly updated to track growth in student achievement.
- Teachers regularly analyze growth data for individual students.
- School leadership teams regularly analyze individual student performance.

Develop Proficiency Scales for the Essential Content

To execute a standards-referenced system of reporting, school leaders and teachers must think differently about how tests are designed and scored. Specifically, a school must design assessments that focus on a single topic or single dimension on which student achievement will be reported. As DuFour and I (2011) note:

> Whether teachers work independently or in groups, they typically design classroom assessments that cover multiple topics. For example, during a unit in an eighth-grade science class, a teacher might design an assessment that addresses two topics: (1) how climate patterns are affected by the water cycle and (2) how all the levels of the earth's atmosphere are affected by temperature and pressure. For the sake of discussion, let's assume that 35 percent of the points on the test address the first topic and 65 percent of the points address the second topic. Now let's consider two students, both of whom receive a score of 70 percent on the test. While their overall scores are the same, these two students might have a very different understanding of the content. (p. 121)

We explain that one student—Student A—might have received a score of 70 by acquiring 35 of 35 points for the first topic and 35 of 65 points for the second topic. A second student—Student B—might have received the same score of 70 by acquiring 5 of 35 points for the first topic and 65 of 65 points for the second topic. DuFour and I (2011) go on to explain: "Clearly, the students have performed very differently on the two topics. Student A seems to know the first topic well, but not the second. Student B has the opposite profile" (p. 122). This practice creates a severe problem if one seeks to provide students with feedback on specific topics in each subject area. Proficiency scales are an effective way of overcoming the problem. (A detailed discussion of the effective use of proficiency scales can be found in the book *Formative Assessment and Standards-Based Grading*, Marzano, 2010a.)

A proficiency scale is a direct descendent of the rubric. Or course, the concept of a rubric has been around for many years. In the assessment world today, the term *rubric* usually applies to a description of knowledge or skills for a specific topic such as the one shown in table 4.3.

Table 4.3: A Rubric for the Social Studies Topic of World War II at Grade 6

4	The student will create and defend a hypothesis about what might have happened if specific events that led to World War II had not happened or had happened differently.
3	The student will compare the primary causes for World War II with the primary causes for World War I.
2	The student will describe the primary causes for World War II.
1	The student will recognize isolated facts about World War II.

While rubrics like that in table 4.3 have been used successfully in individual classrooms, rubrics designed by different teachers are not usually comparable. To illustrate,

consider table 4.4, which is a rubric written by a different teacher on the same topic and at the same grade level as the one in table 4.3.

Table 4.4: A Second Rubric Regarding World War II at Grade 6

4	The student will compare the turning points in World War II to those in other wars.
3	The student will discuss key turning points in World War II that led to the victory of the Allied powers.
2	The student will recall basic information about how the Allied powers achieved a victory in World War II.
1	The student will recognize basic information about the outcome of World War II.

Even though the rubrics in tables 4.3 and 4.4 address the same topic (World War II), they have very different expectations regarding the content for scores 2, 3, and 4. In the first rubric, a score of 3 indicates that students can compare the causes of World War II with those of World War I. A score of 3 in the second rubric indicates that students can describe the turning points in World War II. That content is somewhat easier than the score 3 content in the first rubric.

To solve the problem of inconsistent rubrics from teacher to teacher, it is necessary to develop a systematic approach to rubric design. Such an approach is depicted in table 4.5.

Table 4.5: Generic Form of a Proficiency Scale

Score 4.0	More complex content
Score 3.0	Target learning goal
Score 2.0	Simpler content
Score 1.0	With help, partial success at score 2.0 content and score 3.0 content
Score 0.0	Even with help, no success

To understand the generic form of a proficiency scale shown in table 4.5, it is best to start with score 3.0. To receive a score of 3.0, a student must demonstrate competence regarding the target learning goal. A score of 2.0 indicates competence regarding the simpler content, and a score of 4.0 indicates competence regarding the more complex content. While scores 4.0, 3.0, and 2.0 involve different content, scores 1.0 and 0.0 do not. A score of 1.0 indicates that, independently, a student cannot demonstrate competence in the score 2.0 or 3.0 content, but, with help, he or she demonstrates partial competence. Score 0.0 indicates that even with help, a student does not demonstrate competence or skill in any of the content.

Table 4.6 depicts a proficiency scale for the topic of heritable traits.

Table 4.6: Proficiency Scale for the Topic of Heritable Traits

Score 4.0	Students will be able to discuss how heritable traits and nonheritable traits affect one another.
Score 3.0	Students will be able to differentiate heritable traits from nonheritable traits in real-world scenarios.
Score 2.0	Students will be able to recognize accurate statements about and isolated examples of heritable and nonheritable traits.
Score 1.0	With help, partial success at score 2.0 content and score 3.0 content
Score 0.0	Even with help, no success

The generic form of a proficiency scale depicted in table 4.5 allows for the creation of scales that are comparable across teachers, across topics, across subject areas, and across grade levels. Regardless of who uses a scale, students' scores can be interpreted the same way in terms of their status relative to the learning goals articulated at score 3.0. A student who receives a score of 3.0 has met the learning goal; a student who receives a score of 4.0 has exceeded the learning goal, and so on. The book *Formative Assessment and Standards-Based Grading* (Marzano, 2010a) describes how proficiency scales designed using the generic framework in table 4.5 allow teachers to use three different types of classroom assessments (obtrusive, unobtrusive, and student-generated), compile summative scores for specific topics, and increase the reliability of test design and scoring.

I believe proficiency scales are foundational to reaching level 4 high reliability status and their importance to successful school reform has become evident in the recent research literature. For example, in a study of minimum grading practices, Carey and Carifio (2012) noted:

> The results suggest that policy makers who are looking to institute reforms that lead to fairer, more accurate, and more consistent student assessment will need to look beyond minimum grading and to more substantive reforms, such as instituting standards-based grading and proficiency scales, to address the inherent inequities now empirically established in this study to be a part of traditional grading schemes. (p. 207)

To achieve level 4 high reliability status, proficiency scales should be written for each essential topic in each course at each grade level. There are many resources to aid in such endeavors. For example, over 1,500 scales are available at **itembank.marzanoresearch.com** that address the subject areas of math, English language arts, science, U.S. history, world history, geography, economics, civics, world languages, visual arts, performing arts, physical education, technology, 21st century skills, SEL or life skills, and career and technical skills. Additionally, proficiency scales for the CCSS are available in the book *Using Common Core Standards to Enhance Classroom Instruction and Assessment* (Marzano et al., 2013).

Report Status and Growth on the Report Card Using Proficiency Scales

Ultimately, a school must address the issue of report cards if it is to reach high reliability status for level 4. A report card that would demonstrate such status is depicted in figure 4.1 (pages 60–61). Although the sample report card in figure 4.1 is for fourth grade, the same type of report card can easily be used from kindergarten up to grade 12. The primary difference at the high school level is that courses, as opposed to subject areas, are the focus of the report card.

Summative scores on topics are reported as bar graphs within each subject area. The student whose report card is shown in figure 4.1 (pages 60–61) earned a summative score of 2.5 for the topic of *Word Recognition and Vocabulary* in language arts, a summative score of 3.0 for the topic of *Estimation* in mathematics, and so on. Note that the left side of each bar is darker than the right side of each bar. The darker part represents a student's status at the beginning of the grading period and the lighter part represents the student's knowledge gain during the grading period.

Many schools employ traditional A, B, C, D, and F letter grades. To translate the average score on the proficiency scales addressed during a grading period for a specific subject into a letter grade, a simple guide is needed:

A = 3.00 to 4.00

B = 2.50 to 2.99

C = 2.00 to 2.49

D = 1.00 to 1.99

F = Below 1.00

It is important to remember when considering overall letter grades (commonly referred to as "omnibus grades") that any attempt to summarize a student's status across a variety of topics involves decisions regarding where to end one grade designation and where to begin another. The grade of an A begins with an average of 3.0 for summative scores on learning goals. The grade of B ranges from 2.50 to 2.99, a grade of C from 2.00 to 2.49, and so on. There is a logic to this system that is quite consistent with the design of the proficiency scale. Namely, the grade of A begins at 3.0 because a score of 3.0 indicates that a student has demonstrated understanding of all content in a target learning goal with no major errors or omissions. This makes some intuitive sense—if a student's average score indicates that he or she knows everything that was taught for the target learning goals, he or she should receive an A. The B grade range, 2.50 to 2.99, also has an intuitive logic to it. Having an average score within this range implies that across the learning goals that were addressed in a given grading period, the student typically demonstrated mastery of all of the basic content (score 2.0 content) and partial mastery of the score 3.0 content that was directly taught for the target learning goals.

Some schools like to use more refined categories such as A+, A, A–, and so on. If that is the case, the conversion scale depicted in table 4.7 can be used.

Table 4.7: Conversion Scale to Traditional Grades

Average Scale Score Across Multiple Goals	Traditional Grade
3.75–4.00	A+
3.26–3.74	A
3.00–3.25	A–
2.84–2.99	B+
2.67–2.83	B
2.50–2.66	B–
2.34–2.49	C+
2.17–2.33	C
2.00–2.16	C–
1.76–1.99	D+
1.26–1.75	D
1.00–1.25	D–
Below 1.00	F

A report card like the one in figure 4.1 (pages 60–61) can be accompanied by a traditional transcript that lists courses taken, credits earned (in the case of high school), and an overall grade point average (GPA). As mentioned previously, this report card and variations of it are referred to as "standards-referenced." In a standards-referenced system, students do not have to demonstrate proficiency in each measurement topic to move on to another grade level.

Proficiency scales and standards-referenced report cards both directly address the leading indicators for level 4. In effect, these two critical commitments make it rather easy to establish goals for individual students in the school (leading indicator 4.1) and monitor the progress of students toward those goals (leading indicator 4.2).

Name:	John Mark		**Grade Level:**	4	
Address:	123 Some Street		**Homeroom:**	Ms. Smith	
City:	Anytown, CO 80000				
Language Arts	2.46	C	Participation	3.40	A
Mathematics	2.50	B	Work Completion	2.90	B
Science	2.20	C	Behavior	3.40	A
Social Studies	3.10	A	Working in Groups	2.70	B
Art	3.00	A			

		0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Language Arts									
Reading:									
Word Recognition and Vocabulary	2.5								
Reading for Main Idea	1.5								
Literary Analysis	2.0								
Writing:									
Language Conventions	3.5								
Organization and Focus	2.5								
Research and Technology	1.0								
Evaluation and Revision	2.5								
Writing Applications	3.0								
Listening and Speaking:									
Comprehension	3.0								
Organization and Delivery	3.0								
Analysis and Evaluation of Oral Media	2.5								
Speaking Applications	2.5								
Life Skills:									
Participation	4.0								
Work Completion	3.5								
Behavior	3.5								
Working in Groups	3.0								
Average for Language Arts	2.46								

		0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Mathematics									
Number Systems	3.5								
Estimation	3.0								
Addition/Subtraction	2.5								
Multiplication/Division	2.5								
Ratio/Proportion/Percent	1.0								
Life Skills:									
Participation	4.0								
Work Completion	2.0								
Behavior	3.5								
Working in Groups	2.0								
Average for Mathematics	2.50								

		0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Science									
Matter and Energy	2.0								
Forces of Nature	2.5								
Diversity of Life	1.5								
Human Identity	3.5								
Interdependence of Life	1.5								
Life Skills:									
Participation	3.0								
Work Completion	1.5								
Behavior	2.5								
Working in Groups	1.0								
Average for Science	2.20								
		0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Social Studies									
The Influence of Culture	3.5								
Current Events	3.0								
Personal Responsibility	4.0								
Government Representation	3.5								
Human and Civil Rights	1.5								
Life Skills:									
Participation	3.5								
Work Completion	3.5								
Behavior	3.5								
Working in Groups	4.0								
Average for Social Studies	3.10								
		0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Art									
Purposes of Art	3.5								
Art Skills	3.0								
Art and Culture	2.5								
Life Skills:									
Participation	2.5								
Work Completion	4.0								
Behavior	4.0								
Working in Groups	3.5								
Average for Art	3.00								

Figure 4.1: Standards-referenced report card.

Lagging Indicators for Level 4

The lagging indicators for level 4 are listed in table 4.8.

Table 4.8: Lagging Indicators for Level 4

Lagging Indicator 4.1:	**Written goals are available for each student in terms of their performance on state assessments, benchmark assessments, or common assessments.**
Lagging Indicator 4.2:	**Documents articulating the learning progression for each essential element are available for each subject area.**
Lagging Indicator 4.3:	**Written goals are available for each student in terms of their knowledge gain regarding essential elements.**
Lagging Indicator 4.4:	**Reports, charts, and graphs are available for individual students depicting their status and growth on their learning goals.**
Lagging Indicator 4.5:	**Report cards display student status and growth on essential elements and individual learning goals.**

When proficiency scales and standards-referenced report cards are in place, satisfying the lagging indicators is simply a matter of keeping detailed records and setting criterion scores. For example, to satisfy lagging indicator 4.3, goals must simply be set for each student regarding their growth on the proficiency scale for selected topics.

5

A Competency-Based System That Ensures Students' Mastery of Content

Level 5 directly addresses the extent to which a school has replaced a system that matriculates students based on time for one that matriculates students based on their demonstrated competence. Level 5 has three leading indicators:

Leading Indicator 5.1: Students move on to the next level of the curriculum for any subject area only after they have demonstrated competence at the previous level.

Leading Indicator 5.2: The school schedule is designed to accommodate students moving at a pace appropriate to their background and needs.

Leading Indicator 5.3: Students who have demonstrated competence levels greater than those articulated in the system are afforded immediate opportunities to begin work on advanced content and/or career paths of interest.

A school with level 5 high reliability status operates in the most rarified atmosphere of all—one that is competency-based (also known as standards-based or outcome-based). The driving force behind a competency-based system is that students do not move on to the next level until they have demonstrated competency at the previous level. Additionally, each student progresses at his or her individual pace. This revolutionary concept has been advocated and discussed by many with a number of variations on the theme (for example, Bloom, 1976; Boyer, 1983, 1995; Goodlad, 1984; Guskey, 1980, 1985, 1987; Spady, 1988, 1994, 1995) but is most commonly associated with the work of John Carroll (1963, 1989). The Carroll model can be represented using the following formula:

$$\text{Amount of learning} = \frac{\text{Time actually spent}}{\text{Time needed to learn}}$$

This formula indicates that the amount of content any student learns about a given topic is a function of the time the student actually spends focusing on the content and the time needed to learn the content. If a student has spent five hours on a topic but needs ten hours to learn the content, then she has not learned the content well.

An interesting issue disclosed by Carroll's formula is the fact that students require differing amounts of time to learn content. This is innately problematic. It seems almost self-evident that an optimal educational system would be one in which students could take as much or as little time as needed to learn important content.

As described in the book *Classroom Assessment and Grading That Work* (Marzano, 2006), there are at least two conventions in the current system that work against the realization of Carroll's model—grade levels and credits. By definition, grade levels work against students progressing through content at their own pace. Regardless of their understanding of and skill at the content addressed at a given grade, all students, with some rare exceptions, are moved through the system at exactly the same pace. Time in school is constant, learning is varied.

Using credits as the basic indicator of progress within a subject area at the secondary level also works against the realization of a competency-based system. Students must spend a specific amount of time in a course to receive credit for the course. Credits can be traced back some 100 years to 1906, when Henry S. Smith, the president of the Carnegie Foundation for the Advancement of Teaching, defined a "unit" as a course of five periods weekly throughout an academic year (Tyack & Tobin, 1994). In his book, *High School: A Report on Secondary Education in America*, Ernest Boyer (1983) explains that the credit approach has spawned a virtual "logjam" (p. 237) in terms of allowing students to progress through subject areas at their own pace.

Of the books I have authored, the following contain the most direct reviews of the literature and recommended interventions at level 5:

- *Using Common Core Standards to Enhance Classroom Instruction and Assessment* (Marzano et al., 2013)
- *Formative Assessment and Standards-Based Grading* (Marzano, 2010a)
- *Making Standards Useful in the Classroom* (Marzano & Haystead, 2008)
- *Classroom Assessment and Grading That Work* (Marzano, 2006)
- *Transforming Classroom Grading* (Marzano, 2000)
- *A Comprehensive Guide to Designing Standards-Based Districts, Schools, and Classrooms* (Marzano & Kendall, 1996)

Table 5.1 lists those factors from Hattie's (2012) list that are at or above the .40 hinge-point and directly related to level 5.

Table 5.1: Hattie's Factors Related to Level 5 At or Above the Hinge-Point

Rank	Factor
1	Self-reported grades/Student expectations
9	Teacher clarity
10	Feedback
15	Acceleration
31	Mastery learning
37	Student-centered teaching
40	Keller's Mastery Learning (PSI)
47	Professional development
48	Goals

Leading Indicators for Level 5

The leading indicators for level 5 are listed in table 5.2 (page 66).

Table 5.2: Leading Indicators and Examples for Level 5

Leading Indicator 5.1: Students move on to the next level of the curriculum for any subject area only after they have demonstrated competence at the previous level.

Examples:

- Clear criteria are established for each essential element regarding minimum scores that demonstrate competence.
- A system is in place that tracks each student's status on the essential elements for each subject area at the student's current level.
- Student status and progress for each essential element in each subject area are continually monitored.
- When students reach criterion scores for the essential elements at a particular level within a subject area, they immediately start working on the elements at the next level.

Leading Indicator 5.2: The school schedule is designed to accommodate students moving at a pace appropriate to their background and needs.

Examples:

- Grade levels are replaced by competency levels.
- Multiple venues are available simultaneously (that is, at the same time) for students to learn and demonstrate competency in the essential elements for each level of each subject area.
- Online competency-based instruction and assessment are available in the essential elements for each level of each subject area.
- The time it takes for students to move through the various levels of the curriculum for each subject area at each level is constantly monitored.

Leading Indicator 5.3: Students who have demonstrated competency levels greater than those articulated in the system are afforded immediate opportunities to begin work on advanced content and/or career paths of interest.

Examples:

- Students who have demonstrated the highest level of competence within a given subject area are provided with opportunities for even more advanced study within that subject area.
- Students who have demonstrated competence adequate for high school graduation begin and receive credit for college work.
- Students who have demonstrated competence adequate for high school graduation begin and receive credit for work toward a trade that is of interest to them.

Very few if any of the leading indicators for level 5 are commonly exhibited in schools today. Perhaps the only one that is beginning to receive attention is that online competency-based instruction and assessment are available in some schools.

The critical commitment I believe necessary to attain high reliability status at level 5 is to get rid of time requirements to move through levels of knowledge and adjust the reporting systems accordingly. By definition, this means that overall or omnibus grades cannot be used.

As described in the book *Formative Assessment and Standards-Based Grading* (Marzano, 2010a), a competency-based system does not lock students into a specific grade level based on their age. Rather, students move up and down a continuum of knowledge or skills based on their demonstrated competence for each subject area. Table 5.3 (page 68) depicts an individual student's report card in this version of a competency-based system. This report card indicates the student's status across various subject areas.

In *Formative Assessment and Standards-Based Grading*, Marzano (2010a) describes the type of report card shown in table 5.3 (page 68):

> Most subject areas include levels 1 to 10. Level 10 represents mastery of the content expected for a general high school diploma. Not all subject areas have ten levels, however. Art has six levels, technology has seven levels, and personal/social skills has five levels. This convention is used because in a standards-based system, content is not organized into grade levels that are based on age. It is instead organized into levels based on the nature of the content. Where the content necessary for high school graduation might logically fall into ten levels for some subjects, it might fall into fewer levels for others. (pp. 119–120)

Another feature of the report card in table 5.3 to note is the manner in which a student's current status is reported. In mathematics, for example, the student's score at level 4.0 is reported as a ratio of 21/35. This means that the student has achieved a score of 3.0 or higher on twenty-one of the thirty-five learning goals (that is, proficiency scales) at that level. This student must demonstrate score 3.0 or higher competence on fourteen more proficiency scales to progress to level 5 in mathematics. Finally, each subject area can also include advanced levels. Art has one advanced level, career literacy has two advanced levels, math and language arts have three advanced levels, and so on.

No overall grades are computed in competency-based systems because they are antithetical to the competency-based philosophy. In a competency-based system, the emphasis is on demonstrating proficiency in each and every learning goal before a student progresses to the next level. Overall grades simply summarize a student's average competence across a set of topics across a given level and subject area.

Table 5.3: A Competency-Based Report Card

Level	Art	Career Literacy	Mathematics	Personal/ Social Skills	Language Arts	Science	Social Studies	Technology
Advanced 3	n/a	n/a		n/a			n/a	n/a
Advanced 2	n/a			n/a				
Advanced 1								
10	n/a			n/a				n/a
09	n/a			n/a				n/a
08	n/a			n/a				n/a
07	n/a			n/a				
06				n/a				
05								
04		2 of 16	21 of 35		3 of 36	17 of 25		
03	9 of 10	3.0 (Proficient)	3.0 (Proficient)	4 of 6	4.0 (Advanced)	3.0 (Proficient)	13 of 15	7 of 8
02	3.0 (Proficient)	3.0 (Proficient)	4.0 (Advanced)	3.0 (Proficient)	3.0 (Proficient)	3.0 (Proficient)	3.0 (Proficient)	4.0 (Advanced)
01	3.0 (Proficient)	3.0 (Proficient)	4.0 (Advanced)	3.0 (Proficient)	3.0 (Proficient)	3.0 (Proficient)	3.0 (Proficient)	3.0 (Proficient)

Table 5.4: Competency-Based Reporting for Grades K–8

Level	Art	Career Literacy	Mathematics	Personal/ Social Skills	Language Arts	Science	Social Studies	Technology
8								
7								
6								
5			4 of 32					
4		7 of 11	3.0 (Proficient)		7 of 31	2 of 23		
3		3.0 (Proficient)	4.0 (Advanced)	2 of 6	3.0 (Proficient)	4.0 (Advanced)		
2	9 of 10	3.0 (Proficient)	3.0 (Proficient)	3.0 (Proficient)	4.0 (Advanced)	3.0 (Proficient)	2 of 15	7 of 8
1	3.0 (Proficient)	3.0 (Proficient)	4.0 (Advanced)	3.0 (Proficient)	3.0 (Proficient)	3.0 (Proficient)	3.0 (Proficient)	4.0 (Advanced)
K	3.0 (Proficient)	3.0 (Proficient)	4.0 (Advanced)	3.0 (Proficient)	3.0 (Proficient)	3.0 (Proficient)	3.0 (Proficient)	3.0 (Proficient)

For some schools and districts, getting rid of traditional grade levels represents too radical a shift from the norm. Stated differently, some schools seek to employ a competency-based approach but maintain traditional grade levels. Fortunately, there is a way to do this. The most straightforward approach to implementing a competency-based system while maintaining traditional grade levels is to treat grade levels as performance levels. The record-keeping system up to grade 8 in such a system is depicted in table 5.4 (page 69). Table 5.4 is basically identical to table 5.3 (page 68) except that it uses grade levels. Each grade level represents a level of knowledge or skill defined by specific learning goals for which proficiency scales have been developed. Table 5.5 depicts a competency-based report card at the high school level.

At the high school level, specific courses are listed for each subject area in order of their complexity. For example, in mathematics, Algebra I addresses simpler content than Algebra II and so on. At the high school level, some courses might not exhibit a strict hierarchic structure. For example, it might be the case that in technology, Desktop Publishing does not have to be taken before Digital Graphics and Animation. Therefore, some courses at the high school level will not have prerequisite courses or be prerequisites to other courses. However, progression though any course is still executed in a competency-based fashion. Once a student has demonstrated mastery (score 3.0 content) for all of the proficiency scales within a course, the student receives credit for that course.

Table 5.5: Competency-Based Reporting for High School

Subject Area	Course	Score
Mathematics	Calculus	
	Geometry	
	Algebra II	12 of 24
	Algebra I	3.0 (proficient)
Science	AP Environmental Science	
	Physics	
	Chemistry	6 of 22
	Biology	3.0 (proficient)
Social Studies	Economics	
	World History	11 of 21
	U.S. History	4.0 (advanced)
	Geography	3.0 (proficient)
Language Arts	Shakespeare	
	Ancient Literature	13 of 22
	European Literature	3.0 (proficient)
	U.S. Literature	3.0 (proficient)
Art	Orchestra	
	Performing Arts	9 of 21
	Painting	3.0 (proficient)
Technology	Digital Graphics and Animation	
	Desktop Publishing	17 of 22
	Computer Science	4.0 (advanced)

As is the case with a competency-based system that does not use grade levels, overall omnibus grades are not assigned to students when grade levels are used as performance levels. Rather, the report cards depicted in tables 5.4 (page 69) and 5.5 are kept current at all times and a ratio is recorded at each grade level in which the student is working for each subject area.

Examining the patterns in tables 5.3 (page 68), 5.4 (page 69), and 5.5, it is evident that the lowest acceptable score a student can receive on any proficiency scale for any level, grade level, or course is a 3.0. This is because students must demonstrate a score of 3.0 on all topics to move on to the next level, grade level, or course. However, discriminations can still be made between students as to their performances within each level, grade level, or course. To illustrate, consider table 5.4. Notice that at grade 1, the student achieved an overall score of "advanced" in mathematics and technology and an overall score of "proficient" in all other subjects. Recall that at each grade level, students are scored on a 4-point scale for each learning goal. If a student has achieved a 4.0 on all (or the majority) of the learning goals for a given subject at a given grade level, he or she can be awarded the status of "advanced" as opposed to "proficient."

Lagging Indicators for Level 5

The lagging indicators for level 5 are listed in table 5.6.

Table 5.6: Lagging Indicators for Level 5

Lagging Indicator 5.1:	**A written master plan is available articulating the criterion scores necessary to demonstrate competence for each essential element at each level for each subject area.**
Lagging Indicator 5.2:	**Reports are available that indicate each student's current status for each essential element at each level for each subject area.**
Lagging Indicator 5.3:	**A written master plan is available articulating the alternate pathways a student might take to learn and demonstrate competence in each essential element at each level for each subject area.**
Lagging Indicator 5.4:	**A written master plan is available articulating how students can pursue advanced content, work on college credit, and pursue careers of interest.**
Lagging Indicator 5.5:	**Reports are available depicting how long students are taking to move through the curriculum for each subject area at each level.**

With competency-based reporting systems like the one described here, records can be kept in a manner that provides clear evidence of level 5 high reliability status. For example, each of the report cards depicted in tables 5.3 (page 68), 5.4 (page 69), and 5.5 (page 70) satisfies lagging indicator 5.2: *Reports are available that indicate each student's current status for each essential element at each level for each subject area*. Having this type of data for each student would make it easy to generate reports that would satisfy lagging indicator 5.5: *Reports are available depicting how long students are taking to move through the curriculum for each subject area at each level*. The requirements of other lagging indicators could also be satisfied with the data available from such a reporting system.

Conclusion

Moving Through the Levels

Demonstrating high reliability status for any of the levels described in chapters 1–5 is no small feat and will no doubt require time, resources, and commitment. However, the end product of attaining high reliability status at any level seems well worth the effort. To illustrate, consider level 2 status, which means that a school can guarantee effective instruction in its classrooms. Research indicates that this in itself would dramatically influence students' achievement (Nye, Konstantopoulos, & Hedges, 2004). Indeed, after analyzing the work of economist Eric Hanushek (1971, 1992, 1996, 1997, 2003, 2010), researcher Michael Strong (2011) notes that having effective teachers can even influence a student's earnings over time:

> A teacher who is significantly above average in effectiveness can generate annual marginal gains of over $400,000 in present value of student earnings. Expressed another way, replacing the bottom 5% to 8% of teachers with teachers of average effectiveness could move the United States to near the top of the international math and science rankings. (p. 8)

How then should a school leader proceed who wishes to move up the five levels of high reliability status? While there is no single answer to this question, in working with schools and districts across the country, I have developed a few guidelines that, when followed, facilitate relatively rapid movement through the levels.

Guideline #1: Select leading and lagging indicators that are appropriate for your school.

The leading and lagging indicators described in previous chapters are examples only. Certainly, a school leader should not attempt to address all of them. Such an effort would be counterproductive. Rather, a school leader should select, adapt, or create only those leading and lagging indicators that will most positively influence their students and fit best with the culture and needs of their school. In many cases, leading and lagging indicators will be implicit in the school's mission, vision, and goals.

Guideline #2: Work on levels 1, 2, and 3 simultaneously but seek high reliability status for one level at a time.

Levels 1, 2 and 3 are obviously related because they are a natural part of the day-to-day running of a school. Safety and order are always concerns in a well-run school, and cooperation and collaboration (or lack thereof) always influence day-to-day operations (level 1). Instruction occurs every day, and the more attention paid to enhancing instructional practices in the classroom, the better (level 2). The curriculum is what teachers and students interact about on a daily basis and the more attention paid to ensuring that the curriculum is guaranteed and viable and focused on enhancing student learning, the better (level 3). In short, school leaders are, by definition, engaged in level 1, 2, and 3 activities constantly and anything they can do to improve their school's status regarding these levels is always a step in the right direction. Consequently, a school leader might work on level 1, level 2, or level 3 leading indicators simultaneously. For example, to increase a school's effectiveness, a school leader might decide to install an electronic tool to help collect suggestions and comments from teachers as to the effective running of the school—a level 1 leading indicator. Similarly, the school leader might decide to develop a document that describes a schoolwide model of instruction—a level 2 leading indicator. Finally, the school leader might also decide to determine which elements of the CCSS are considered essential learning goals for each grade level—a level 3 leading indicator. Improvement in various aspects of levels 1, 2, and 3 using the leading indicators as guides is always good practice as long as these efforts do not overload teachers and school leaders.

Establishing criteria and collecting evidence for high reliability status for a particular level, however, should be done methodically and systematically, level by level, starting at level 1. For example, a school leader would start by identifying the lagging indicators the school will use for level 1 and the criterion scores for those indicators. Next, the school leader would collect evidence indicating that the school had met the criterion scores for each selected lagging indicator. Once the criterion scores for all selected lagging indicators were met, the school leader would consider the school validated for level 1 high reliability status and would then move on to level 2.

One final point to make about moving through the levels is that many schools are already operating highly effectively regarding levels 1 through 3. Consequently, attaining high reliability status for these levels might simply be a matter of collecting evidence for selected lagging indicators. In effect, schools that suspect they are already operating at high reliability status for a given level should be able to identify lagging indicators and criterion scores and confirm their perceptions in a quick and efficient manner.

Guideline #3: If necessary, set interim criterion scores for lagging indicators.

Some school leaders might find it useful to set criterion scores for lagging indicators in a staged or incremental fashion to provide a scaffold for reaching their ultimate goal. To illustrate, consider the following lagging indicator for level 1: *Few, if any, incidents occur in which rules and procedures are not followed*. A school leader might ultimately wish to establish as the criterion for high reliability status that the school must average no more than one incident of a significant violation of school rules and procedures per month. However, after examining the school's records, the school leader realizes that the school is currently far from reaching that

status. To provide momentum for progress on this lagging indicator, the school leader might set a goal of moving to an average of no more than five violations per month as an interim step.

Guideline #4: Lead from the perspective of the indicators.

Throughout this paper, I have consistently alluded to the role of school leaders in moving a school through the five levels. Ultimately, whether a school reaches high reliability status for any level is dependent on whether the school leaders keep the five high reliability levels at the forefront of their efforts to guide the school in its improvement efforts. In effect, school leaders should judge their effectiveness by the extent to which they systematically move their school through meeting criterion scores for the lagging indicators. Such a perspective will keep the school and its leaders firmly grounded in tangible results that have direct effects on the wellbeing of students.

In conclusion, the five levels of high reliability status described in this white paper, the leading and lagging indicators, and the critical commitments recommended for each level are a product of the syntheses of research conducted by myself and others over decades. They are also a product of working on long-term projects with schools and districts around the world. This framework is offered as a tool for schools to guide their current and future efforts at reform. Those using this framework should feel free to make adaptations to meet their specific needs and circumstances.

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Read about Dr. Marzano's optimistic view of the future and his recommendations for reaching the highest levels of school effectiveness in *Becoming a High Reliability School: The Next Step in School Reform*. Inside, you'll find:

- A solid research base spanning 40 years of educational research and development.
- Practical strategies for achieving each level of high reliability status.
- Explicit references to previous works by Dr. Marzano and his colleagues that allow you to delve deeper into your school's specific growth areas.
- Leading and lagging indicators with concrete examples to help you determine your school's current status and future action steps.

The Marzano High Reliability Schools framework integrates four decades of Dr. Marzano's work involving teacher and school leader development; *The Art and Science of Teaching*; effective research-based strategies for classrooms, schools, and districts; vocabulary instruction and intervention; and hands-on research and training to give school leaders the tools they need to systematically increase their schools' reliability and effectiveness.